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ABSTRACTS

7th ESSD Congress and World Dysphagia Summit, Barcelona 2017

*Indicates posters of merit (high scored abstracts with poster presentation)

Session 01 Free papers 1: Instrumental assessment and dysphagia diagnosis

METHODIC BACKGROUND OF NARROW BAND IMAGING (NBI) IN DYSPHAGIA DIAGNOSTIC - PROPOSING A HIGH SENSITIVITY FEES

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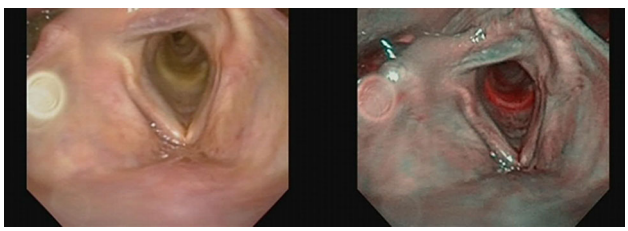
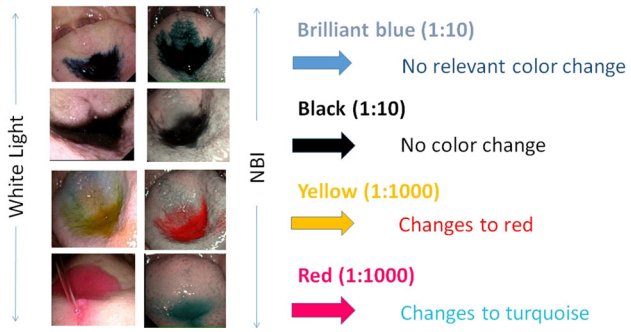
Introduction: The sensitivity and reliability of FEES increases significantly if NBI is used. We want to discuss the questions: How far can colored fluid be diluted under NBI compared to white light (WL) until it is no longer visible? Which colors change under NBI? Which color combination is best used in daily routine? What problems might occur due to enhanced detection?
Method: We prepared a dilution row (1:10 to 1:100 000) with green colored water. The colors were tested in the oral cavity to check at which dilution the color was not visible any more under WL/NBI. Afterwards we tried different food colors (yellow red blue black) commonly used in FEES to find out which colors change under NBI and to what dilution they are visible under WL/NBI. The resulting colors were tested in routine FEES to find the color combination best visible in the combination WL/NBI.



Results: Green yellow and red fluid is visible ten times further diluted under NBI than under WL. The colors changing are yellow and red and their mixtures. The best combination due to poor visibility of pure yellow under WL is red and green though green with a high percentage of blue is not lighting up under NBI. High sensitivity FEES confronts us with seeing minimal aspirations and penetrations previously not visible under WL causing worse PAS-Scores.



Conclusion: Certain colors are ten times better visible under NBI. This is due to filtering out of all colors except NBI's wavelengths of 415 and 540 nm. NBI is programmed to highlight these two spectra to improve the visibility of blood vessels in tumor diagnostics; we use it to increase visibility tempo and certainty of diagnosis in FEES. It has to be discussed though if the better visibility might cause us to artificially worsen patients' PAS-scores. We propose to use NBI in FEES but differentiate the findings—at least preliminary—as "FEES+ " until normal values of PAS-scores under NBI in a healthy population are established.

DEEP LEARNING BASED CLASSIFICATION OF SWALLOWING MEASURES USING A SMARTPHONE CONNECTED WEARABLE DEVICE

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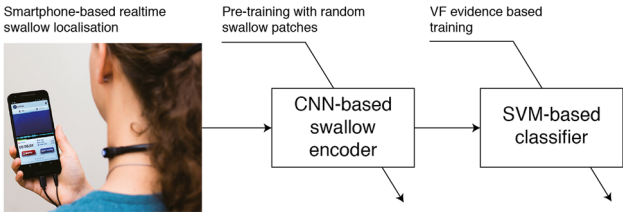
Introduction: Swallowing sound is recognised to contain rich information on the swallowing ability however separating the sound features that define the swallowing ability has been challenging. Deep learning-based artificial Intelligence has shown excellent ability to

learn the features that can define a given input in an unsupervised manner.
Purpose: To develop a convolutional neural network (CNN) based deep learning architecture to identify swallow features and automatically recognise swallowing events using the learnt features.
Subjects: 192 patients who underwent VFSS (128 male; ave. age 62.1 ± 17.2) 17 older residents at a nursing care home (2 male; ave. age 84.3 ± 12.4) and 17 young adults (12 male; ave. age 25.4 ± 2.9).



Methodology: We obtained the spectrograms of swallowing sound collected with a piezoelectric type contact microphone placed on the neck of patients undergoing VFSS and trained a 4-layer deep CNN using 30000 random patches of 30 ms duration. After encoding the swallowing sound using the trained CNN a support vector machine (SVM) binary classifier was trained to separate true positives (1193 swallows) and false positives (1673 swallows) from our previously developed realtime swallow detection algorithm. We developed another SVM classifier to separate swallowing sounds of young adults (405 samples) and the elderly residents at the nursing care home (243 samples).
Results: We achieved a fivefold cross-validated accuracy of 98.1% for the classification of swallows and other sounds with similar temporal characteristics and an accuracy of 93.5% for the classification of swallowing sound of older residents and young adults.
Conclusions: Our results indicate AI can be used successfully to encode swallowing sound into an easily classifiable format potentially capable of estimating the risk of aspiration at bedside or during regular meals.

RESIDUES AND TIME CLEARING: ARE THESE PARAMETERS CORRELATED IN EXPRESSING DYSPHAGIA SEVERITY? THE TIMED POOLING SCORE (TP-SCORE): PRELIMINARY CONSIDERATIONS

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Purpose: Time is a parameter of interest in swallowing. During an endoscopic evaluation this parameter never has been considered in determining the severity of dysphagia. The p-score considering the number of dry swallows needed to clear residues in the pharynx/larynx can be enriched of this parameter to give a more appropriate and functional criterion of severity (the timed p-score tp-score).
Method: Two experienced raters blindly evaluate 35 short videoclips of a 5 cc creamy and liquid and 1/4 craker bolus transits recorded during the endoscopic evaluations of 17 patients with dysphagia of different etiology. The time needed to complete the clearing of the boluses (maximum 5 swallows to apply the pooling score p-score)(-total time: TT) was determined. For each patient the FOIS and DOSS scales were previously detected. A multiple logistic regression considering FOIS and DOSS as dependent variables was performed considering: the TT the p-score total and the consistencies.
Results: The medium time necessary to clear the residues for creamy solid and liquid and the medium total time were respectively: C 225 sc S 307 s L 166 s 53.8 s. The inter-rater agreement between the 2 raters in scoring the p-score was good (ICC > 0.800) for every consistence. The linear regression model documented a statistical significant correlation of the p-score total the TT and the consistences with the FOIS and the DOSS respectively.
Conclusions: The tp-score is a score strongly correlated with severity of dysphagia and functional activities of the patients.

RELATIONSHIPS BETWEEN UPPER ESOPHAGEAL SPHINCTER OPENING AND NADIR PRESSURES IN PATIENTS WITH DYSPHAGIA AND HEALTHY CONTROLS

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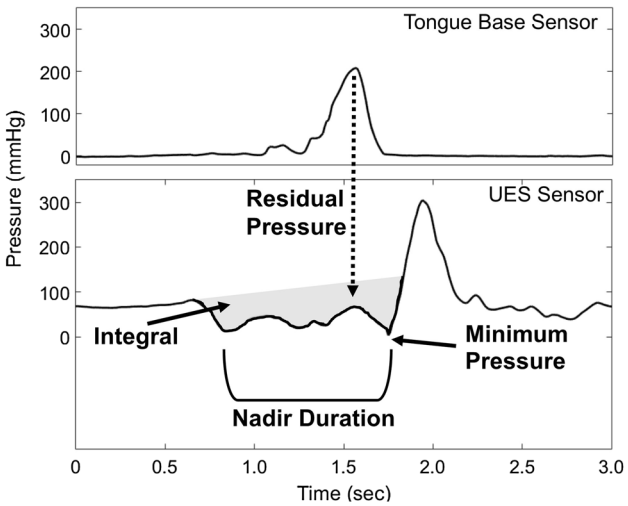
Introduction: Upper esophageal sphincter (UES) opening is multifactorial including cricopharyngeal relaxation hyolaryngeal excursion and intrabolus pressure. UES pressures are measured in many ways but the physiologic correlates of those variables are unclear.



Material and Methods: Pharyngeal high-resolution manometry and videofluoroscopy (VF) were performed on 61 adults (21 age/sex-matched controls 40 patients with dysphagia). Patients included those with cricopharyngeal (CP) prominence on VF and those without. Linear regressions were used to determine relationships between UES opening pressures (minimum pressure residual pressure and integral) UES nadir duration pharyngeal pressures hyolaryngeal movement and UES opening diameter (Fig. 1). Multinomial logistic regression was used to determine differences between groups. We hypothesized UES opening diameter would be related to UES opening pressures but not durations and that patients with CP prominence would have higher opening pressures than controls and patients without CP prominence.
Results: Smaller UES opening diameters are associated with higher UES pressure integrals and higher maximum tongue base pressures ($p < 0.001$). UES minimum pressure is not related to UES opening diameter ($p > 0.05$). Longer UES nadir durations are associated with lower residual UES pressures ($p = 0.008$). Minimum UES pressure is

related to pharyngeal pressure integral (p = 0.01); averaging minimum pressure over 0.25 s more closely relates to maximum velopharyngeal pressure and hyoid movement (p = 0.02). Patients with CP prominence had increased UES residual pressure (p = 0.004) and reduced hyoid movement (p = 0.024) compared to controls and patients without CP prominence.
Conclusions: UES pressures and opening diameter are related to one another and are influenced by pharyngeal pressures. Patients with CP prominence have distinct pressure patterns. Different UES pressure variables may inform on different physiological aspects of swallowing and can improve specificity in the diagnosis of dysphagia.

CORRELATION BETWEEN PHARYNGEAL RESIDUE AND ASPIRATION IN FIBEROPTIC ENDOSCOPIC EVALUATION OF SWALLOWING

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Introduction: Retained pharyngeal residue can predict aspiration/penetration. Fiberoptic Endoscopic Evaluation of Swallowing (FEES) is a sensitive test for the evaluation of pharyngeal residue.
Materials and Methods: 110 FEES examinations of patients visiting a referral dysphagia clinic between 2014 and 2016 were scored for residue severity (Yale Pharyngeal Residue Severity Rating Scale) and swallow efficiency (the number of swallows required to evacuate the bolus from the pharynx bolus evacuation score BES). The first and the worst bolus challenge for each consistency tested (liquid purée and solid) were analyzed. YPR-SRS and BES were correlated with the Penetration-Aspiration Score (PAS) of the same bolus challenge using Pearson's correlation coefficient (PCC).
Results: The study population's mean age was 67 ± 13.4 years; 54% were males (n = 58). A significant correlation was found between the YPR-SRS and the PAS for each bolus consistency tested in every anatomical site (vallecula or pyriform sinus) and both on the first and the worst bolus challenge ($p < 0.001$ for all). The correlation of residue with aspiration was stronger when vallecula and pyriform sinuses scores were summated and strongest when combined with the BES. Purée was the consistency which demonstrated the strongest correlation of YPR-SRS with PAS; PCC of 0.659 and 0.631 for the first and the worst bolus challenge respectively ($p < 0.001$).
Conclusion: Residue severity strongly correlates with penetration/aspiration on FEES. This correlation is strengthened when incorporating the number of swallows required to evacuate the residue. The YPR-SRS can be applied to standardize description of residue in FEES and to aid in predicting aspiration.

INTER-RATER RELIABILITY OF AN ONLINE ANALYSIS PLATFORM FOR PHARYNGEAL HIGH-RESOLUTION IMPEDANCE MANOMETRY (HRIM) RECORDINGS

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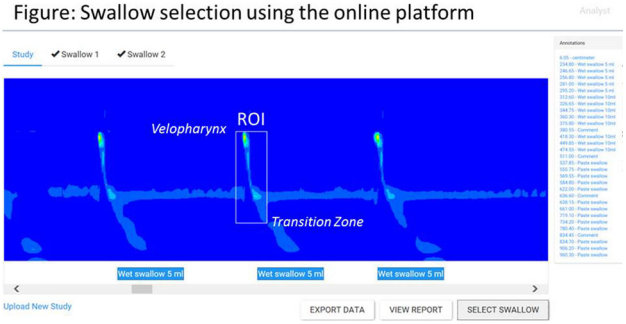
Background: Pharyngeal high-resolution impedance manometry (HRIM) studies can be analyzed by automated impedance manometry (AIM) analysis to objectively derive swallow function variables. [1]An online AIMplot analysis portal was developed to address the need for more widely available simple to use software. The aim of this study was to assess the reliability of online AIMplot.

Figure: Swallow selection using the online platform



Methods: After viewing an introductory video and completing a practice run four observers analyzed 25 pharyngeal HRIM recordings (n = 19 broad pharyngeal dysphagia patients and n = 6 controls; mean age 66 range 58–71 years) using online AIMplot. For each study observers had to select five marked swallows by drawing a box from velopharynx to transition zone (Figure 1) and place six landmarks (1. time of upper esophageal sphincter (UES) opening 2. time of UES closure 3. velopharyngeal proximal margin 4. hypopharyngeal proximal margin 5. UES apogee and 6. UES distal margin). Four swallow function variables are presented; hypopharyngeal intra-bolus pressure (IBP) pharyngeal Peak Pressure (PeakP) UES maximum admittance (indicative of UES opening) and UES 0.25 s integrated relaxation pressure (UES IRP). Inter-rater reliability was determined by intra-class correlation coefficient (ICC; 0.00–0.20 = slight; 0.21–040 = fair; 0.41–0.60 = moderate; 0.61–0.80 = substantial and 0.81–1.00 = excellent agreement).

	All studies (ICC, 95% CI) (n=25 studies)	Controls only (ICC, 95% CI) (n=6 studies)	Patients only (ICC, 95% CI) (n=19 studies)
IBP (mmHg)	0.56 (0.37 - 0.75)	0.46 (0.05 - 0.87)	0.53 (0.30 - 0.76)
Peak Pressure (mmHg)	0.94 (0.89 - 0.97)	0.93 (0.78 - 0.99)	0.88 (0.77 - 0.95)
UES Admittance (Ohms)	0.98 (0.97 - 0.99)	0.92 (0.76 - 0.99)	0.97 (0.95 - 0.99)
UES IRP (mmHg)	0.79 (0.65 - 0.89)	0.73 (0.36 - 0.95)	0.77 (0.61 - 0.90)

Results: Inter-rater agreement was excellent for PeakP and UES maximum admittance and moderate to substantial for IBP and UES IRP (Table 1). Two patient studies were uniformly identified as challenging to analyze by the observers. Excluding these studies from analysis improved agreement for IBP (ICC = 0.91 95% CI 0.83–0.96) and UES IRP (ICC = 0.93 95% CI 0.87–0.97).
Conclusion: Analysis of pharyngeal HRIM studies by online AIMplot derives diagnostic swallow function variables with high inter-rater reliability. UES maximum admittance a parameter highly indicative of swallowing dysfunction[1] was most reliable.

SIMULTANEOUS RADIOLOGIC AND FIBERENDOSCOPIC EVALUATION OF SWALLOWING (SIRFES)

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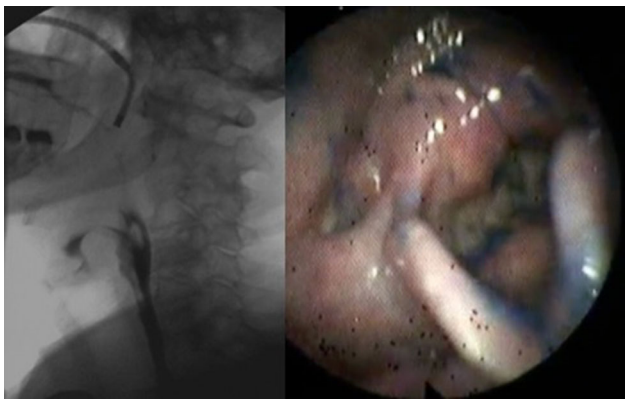
Introduction: The aim of this study was to investigate the swallowing function of patients after surgery of oropharyngeal/laryngeal cancer and radiotherapy by simultaneous fiberendoscopic evaluation of swallowing (FEES) and videofluoroscopic swallowing study (VFSS) and whether the type of investigation influences the results of swallowing assessment such as penetration-aspiration scale (PAS) pharyngeal retentions or time of triggering of involuntary swallowing.



Material and Methods: This study is a prospective double-blinded study from simultaneous VFSS and FEES recordings. It comprises 28 patients with 196 different swallow sequences examined according to a standardized protocol using different bolus quantities and consistencies. The FEES and VFSS swallowing loops were independently scored by two experts (ENT and radiology).
Results: A preliminary evaluation of a patient cohort (n = 43 swallowing sequences) showed significant differences between assessment of penetration-aspiration scale by FEES and VFSS (p = 0.022 tendency of higher scores by VFSS (median = 2) to FEES (median = 1) of residue severity scores with larger residues scored by FEES (valleculae: p = 0.004 and piriform sinus: p = <0.001) and of time of triggering with moderate interrater agreements (Cohens Kappa = 0.477).
Conclusions: PAS scores were significantly higher for VFSS recordings than for FEES whereas pharyngeal residues were consistently larger by FEES. Both FEES and VFSS are valuable procedures and simultaneous evaluation means an advantage in the common assessment of swallowing disorders in dysphagic head and neck cancer patients.

HAS THE OUTPATIENT MANAGEMENT OF GLOBUS PHARYNGEUS IN A UK ADULT POPULATION CHANGED? AN UPDATE OF CURRENT PRACTICE TO REVIEW THE USE OF AVAILABLE INVESTIGATIONS INCLUDING TRANSNASAL OESOPHAGOSCOPY

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[1]Royal Bolton Hospital; [2]Manchester Royal Infirmary

Introduction: Globus pharyngeus is the term used to describe a feeling of something in the throat. Originally described in the 18th century as globus hystericus (Purcell 1707) it still poses difficulties to clinicians regarding diagnosis and appropriate investigations. Patients present to otolaryngology (ENT) outpatient clinics with a wide variety of throat and swallowing symptoms ranging from dysphagia to pain. This presentation sets out to review the current management of globus pharyngeus patients seen in otolaryngology outpatient clinics in the UK. A comparison is made between current practice in 2016 and the management of globus since 2000 (Webb et al. 2000) to establish changes in practice and agreement amongst UK consultants. Clinicians were also asked if they had access to transnasal oesophagoscopy (TNO) and for their opinion on its usefulness in assessing globus patients.
Methods: A 10 question survey monkey questionnaire distributed via ENT UK. Data compared to Webb et al.
Results: One hundred and twenty-two consultants responded. The use of empirical anti-reflux medication has increased from 52% to 75% (p = 0.000). The follow up of globus patients has fallen from 86% to 40% (p = 0.000). In 2000 the most common investigation was a combination of rigid endoscopy in theatre and barium swallow. In 2016 16% of patients undergo an examination in theatre compared to 61% in 2000. The rate of barium swallow examinations fell from 56% in 2000 to 6% in the current cohort. Forty-five percent had access to TNO but opinion regarding its use was varied.
Conclusion: The management has changed since 2000.Fewer investigations are arranged less follow up is booked but there is an increasing trend towards using anti-reflux medications such as proton pump inhibitors.

Session 03 Free papers 2: Physiology 1

VOLUME EFFECTS ON UPPER ESOPHAGEAL SPHINCTER OPENING IN AGEING

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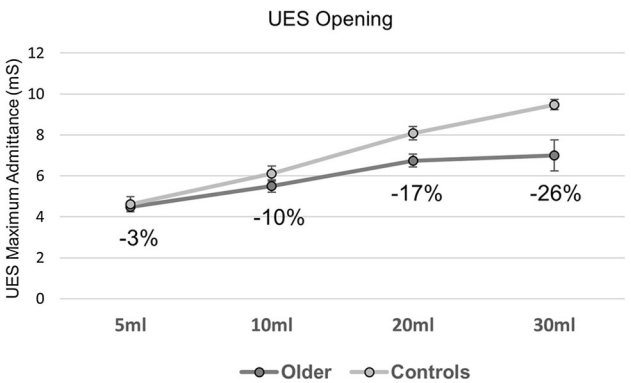
Introduction: Previous studies of swallowing biomechanics using pressure-impedance recordings have measured age- and disease-associated reductions in UES opening. (Omari et al. NMO 2014; Omari et al. FNS 2015; Cock et al. NMO 2015). However the volumes tested were well below that required to approach the "dysphagia limit" (i.e. maximum single swallow volume; Ertekin et al. JNNP 1996). In this study we aimed to evaluate swallowing biomechanics in relation to 5–30 ml boluses comparing young and older healthy subjects.



(% indicated is decrease in UES cross-sectional area in older as compared controls)

Materials and Methods: We studied 17 healthy subjects comprising nine young (5 M; range 21–35 years) and eight older healthy volunteers (4 M; 66–90 years) with high-resolution impedance manometry using a MMS Solar system with 2.7 mm Unisensor catheter. Liquid boluses of 5 10 20 and 30 ml volume were tested (0.9%NaCl). Pressure and impedance data were exported and analysed via AIMplot. Double

swallows were excluded. UES opening was estimated by the maximum UES admittance (1/impedance; Cock et al. NMO 15) during UES relaxation. Two-way repeated measures ANOVA (group/volume) were performed for previously described pharyngeal pressure-flow metrics (Cock and Omari Current Gastroenterology Reports 2017).
Results: UES admittance increased progressively with volume in controls consistent with modulation of UES opening to increased volumes ($F = 25.962$; $P < 0.001$). Age group comparisons revealed a plateau of UES opening extent between 20 and 30 ml in the older subjects. UES relaxation (UES IRP) remained similar but UES opening duration was shorter in older subjects above 10 ml (20 ml O 483 vs. C 622 ms; $P = 0.02$).
Conclusions: The reduced ability of healthy older subjects to accommodate to larger bolus volumes appears to be due to reduced UES opening of shorter duration. Our findings confirm the dysphagia limit in older subjects at 20 ml explaining their clinically observed tendency to piecemeal swallowing above this volume.

EXPLORING EFFECT OF THERMAL TONGUE STIMULATION ON SENSORIMOTOR MODULATION OF HUMAN CORTICAL PHARYNGEAL MOTOR PATHWAYS

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Introduction: Current strategies of swallowing therapy involve facilitation of swallowing initiation by sensory modulation. Although thermal tactile oral stimulation is a common method to treat patients with dysphagia little is known about the possible mechanisms. This study is aimed to investigate whether thermal oral (tongue) stimulation can modulate the cortico-pharyngeal neural motor pathway as a prelude to future oral stimulation based therapies. Our hypothesis was that oral thermal stimulation would increase cortico-pharyngeal excitability.

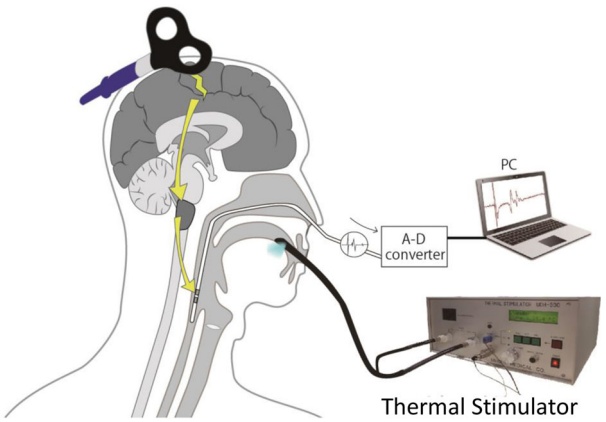

Figure 1: Schema of measuring pharyngeal MEP during thermal oral stimulation.

Materials and Methods: Eighteen healthy volunteers (13 male age range 22–34 years) participated and were intubated with an intraluminal catheter for recording pharyngeal electromyography. Each participant underwent baseline transcranial magnetic stimulation (TMS) cortico-pharyngeal and hand motor evoked potential (MEP) measurements bilaterally. MEPs were then measured during thermal stimulation over the dorsal tongue applied using the Peltier device at 3 different temperatures: 45 37 and 15 degrees Celsius (Figure 1) in a pre-ordered manner. Pharyngeal and hand MEPs were then re-measured without stimulation. Each of three temperatures was given twice and 5-min resting time was provided between each trial. Averaged amplitude changes were analysed using ANOVA and post hoc t-tests with Bonferroni correction.

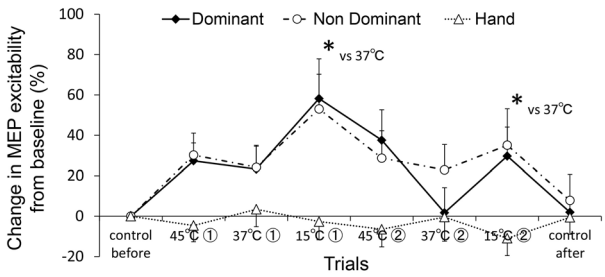

Figure 2: MEP changes to thermal stimulation in pharyngeal and hand motor cortex. (*$p < 0.05$)

Results: Two way repeated measures ANOVA with factors of Temperature and Trial demonstrated no significant interaction but a significant effect of Temperature both in the dominant and non-dominant pharyngeal hemisphere ($p < 0.01$). Subsequent post hoc tests showed the significant increase in pharyngeal MEPs at 15 degrees compared to 37 degrees ($p < 0.05$). There were no significant changes in hand MEPs (Figure 2).
Conclusions: Cold oral stimulation was able to induce significant changes in pharyngeal cortical excitability demonstrating evidence for a sensorimotor interaction between oral and pharyngeal cortical areas.

EVALUATION OF HIGH-RESOLUTION MANOMETRY NON-CLEARANCE PRESSURES WITHIN THE HYPOPHAYRNX DURING SWALLOWING TASKS

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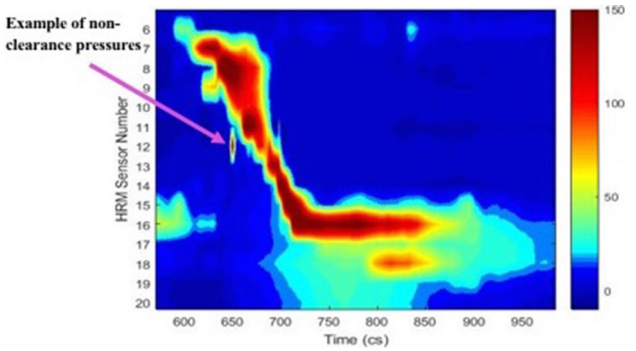
[1]University of Wisconsin

Introduction: Swallowing-related hypopharyngeal pressures are typically characterized by waveform irregularity when captured using high resolution manometry (HRM). This pressure complexity can be due to varying non-clearance pressures generated prior to and/or following the primary clearance wave (Fig. 1). This study aims to improve hypopharyngeal HRM interpretation by characterizing these non-clearance pressures and determining if parameter analyses differ when these pressures are excluded.



Materials and Methods: Simultaneous standard HRM and videofluoroscopy (VF) were performed on 88 healthy adults during 10 ml swallowing tasks. For all subjects regional pressure maximum integral and duration parameters were each calculated with and without inclusion of non-clearance pressures and compared using paired t-tests. Stepwise multiple regression was conducted to evaluate the relationship of age and VF parameters (pharyngeal area normalized anterior hyoid movement and epiglottis movement scores) with non-clearance pressure integral. An additional case example using 3D-HRM illustrates asymmetrical circumferential patterns exhibited during non-clearance pressures.
Results: Pressure maximum integral and duration were significantly less when non-clearance pressures were excluded from parameter calculations ($p < 0.001$). Age explained a low proportion of the variance of non-clearance integral ($R2 = .067$ $p < 0.05$) with pressure increasing with greater age.
Conclusions: Understanding potential sources of pressure signal is essential to interpreting pharyngeal HRM and evaluating dysphagia. Hypopharyngeal non-clearance pressures are a common phenomenon that vary between healthy individuals. These pressures can result from anterior-generated mechanical contact with the catheter and may be influenced by age-related factors such as epiglottic stiffening. Furthermore clinicians should consistently analyze hypopharyngeal pressures to avoid confounding results.

EFECTS OF THE MENDELSOHN MANEUVER AND EFFORTFUL SWALLOW ON ESOPHAGEAL MOTILITY: A STUDY USING HIGH-RESOLUTION MANOMETRY

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Introduction: Mendelsohn maneuver and effortful swallow have been used to improve pharyngeal swallowing function. We occasionally observe food retention in the upper esophagus in videofluorography when Mendelsohn maneuver is used. The purpose of this study was to investigate the effects of the Mendelsohn maneuver and effortful swallow on esophageal motility.

Material and Methods: Eighteen healthy volunteers who were well acquainted with Mendelsohn maneuver and effortful swallow (13 men and 5 women 31.1 ± 5.6 years) swallowed 3 ml thick liquid using regular swallow Mendelsohn maneuver and effortful swallow in upright position. Each swallow method was repeated twice in a random manner. High-resolution manometry was used for evaluation. We measured the following parameters: maximum pressure of the proximal esophagus (PE) and distal esophagus(DE) proximal contractile integral (PCI) vertical distance of the transition zone (TZ) duration from the end of the UES relaxation to the start of the PE peristalsis (UES-PE duration).
Results: The maximum pressures of the PE and the DE in effortful swallow were significantly higher than those in regular swallow and the Mendelsohn maneuver ($p < 0.05$). Vertical distance of the TZ in Mendelsohn maneuver was significantly longer than that in regular or effortful swallow ($p < 0.05$). The UES-PE duration in Mendelsohn maneuver was significantly longer than that in regular swallow.
Conclusions: Esophageal pressure increased in effortful swallow. In addition the area of deficient contraction increased and start time of the esophageal peristalsis delayed in Mendelsohn maneuver. These results may suggest that the esophageal motility is inhibited in Mendelsohn maneuver and facilitated in effortful swallow. Although further study is needed in dysphagia patients it may be necessary to consider the effect on esophageal mobility when we use these maneuvers.

SWALLOWING FUNCTION IS A NON-DOPAMINERGIC CONDITION IN PARKINSON'S DISEASE

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Introduction: Dopaminergic medication may affect swallowing function in patients with Parkinson's disease (PD) although studies have not determined how. Our aim was explore whether the OFF/ON state affects swallowing in PD patients and to describe the main physiological variables for swallowing in this population.

	OFF	ON	p-value
VFS			
Impaired safety (%)	37.50% (15)	47.50% (19)	0.497
Impaired efficacy (%)	95.00% (38)	100.00% (40)	0.493
OSR (5mL Nectar)			
LVC (ms)	265.56±77.18	274.59±83.35	0.504
UESO (ms)	192.22±52.21	190.27±51.99	0.653
Mean bolus vel. (m/s)	0.34±0.11	0.35±0.14	0.395

Materials and Methods: We studied 40 patients (21 women) with PD. Swallow was assessed clinically with the Volume-Viscosity Swallow Test (V-VST) and instrumentally with videofluoroscopy (VFS). We evaluated swallows of 5 ml 10 ml and 20 ml of three viscosities (thin liquid 20.40 ± 0.23 mPas nectar 274.42 ± 13.14 mPas and spoon-thick 3931.23 ± 166.15 mPas). Both tests were performed in OFF (after a period of 12 h without any medication for

PD) and ON (1 h after usual medication—mean doses 567.10 ± 302.35 mg) state.
Results: The Hoehn-Yahr clinical stages ranged from 1 to 3 (2.14 ± 0.74). Mean age was 69.05 ± 10.46 years old mean time of disease 5.03 ± 3.25 years and mean time of treatment 5.10 ± 3.52 years. There was no significant difference in swallow between OFF and ON states for efficacy safety or oropharyngeal swallow response. In both situations and with both V-VST and VFS patients presented similar high prevalence of efficacy impairment (Table 1). The V-VST showed high prevalence of piecemeal swallow (OFF: 82.50%; ON: 77.50%) and pharyngeal residue (OFF: 70.00%; ON: 60.00%). VFS showed high prevalence of oral residue (OFF: 92.50%; ON: 90.00%) piecemeal swallow (OFF: 75.00%; ON: 80.00%) and hypopharyngeal residue (OFF: 85.00%; ON: 85.00%). Patients had prolonged oropharyngeal swallow response with delayed laryngeal vestibule closure time unaffected by treatment.
Conclusion: Swallowing function appears to be significantly impaired and not to be affected by dopamine treatment in PD patients in initial/medium clinical stages (Hoehn-Yahr). New active treatment strategies should be developed and assessed for this group of patients.

Session 06 Free papers 3: Geriatric neurodegenerative and complications in dysphagia

SWALLOWING DYSFUNCTION IN COPD: IS IT MORE RELATED TO BURDEN OF DISEASE THAN LUNG FUNCTION? RESULTS FROM THE TIE-STUDY

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Aim: The Swedish TIE-study* is a prospective multi-center study in primary and secondary care. The objective of this sub-study was to investigate the prevalence of subjective swallowing dysfunction in COPD and to determine the relation to severity of airflow limitation gender exacerbations burden of disease and physical capacity.
Method: In total 571 patients (58% female) with a physician- and spirometry-verified COPD were included. Data pertaining patients' subjective swallowing ability was gathered through a questionnaire: 1. Does food get stuck in the throat? 2. Do you cough when eating? 3. Do you choke when eating? Physical capacity was assessed by means of the 30-metre walk test. Exacerbation is defined as acute visit and/or prescription of perioral corticosteroids and/or antibiotics during the previous year.
Results: Thirty-three percent (n = 189) of the subjects reported a swallowing dysfunction. No significant difference was found between men and women (32% vs 34% p = 0.57). Subjects reporting a swallowing dysfunction were slightly older (69 ± 7.4 years vs 68 ± 7.8 years p = 0.03). Subjects classified as GOLD2017 group B and group D had higher prevalence of swallowing dysfunction than subjects classified as group A or C: 41% and 42% compared with 22% and 10% p < 0.001. Subjects with swallowing symptoms needed a longer time to walk 30 metres than subjects without p = 0.02. Similar percentage of subjects experienced a swallowing dysfunction in the different stages of airflow limitation (GOLD 1–4): 40% in grade 1 31% in grade 2 37% in grade 3 and 27% in grade 4 p = 0.28. No relation was found between swallowing symptoms and COPD exacerbations the previous year compared with no COPD exacerbations last year p = 0.69.
Conclusion: In this study one third of the subjects reported a swallowing dysfunction. It appears to be a problem in all grades of lung function and relate to burden of disease and physical capacity. *Tools Identifying Exacerbations

OROPHARYNGEAL DYSPHAGIA IN A COHORT OF OLDER PATIENTS WITH DEMENTIA IN A PSYCHOGERIATRIC UNIT

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Introduction: Dementia is one of the leading causes of dysfunctionality and disability among older people and has a high physical psychological social and economic impact. Oropharyngeal dysphagia (OD) is a frequent problem in patients with dementia causing serious complications such as malnutrition dehydration and respiratory complications and is a risk factor for mortality. Our aim was to describe the prevalence complications and follow up of OD in patients with dementia from a psychogeriatric unit (PU) of a general hospital.

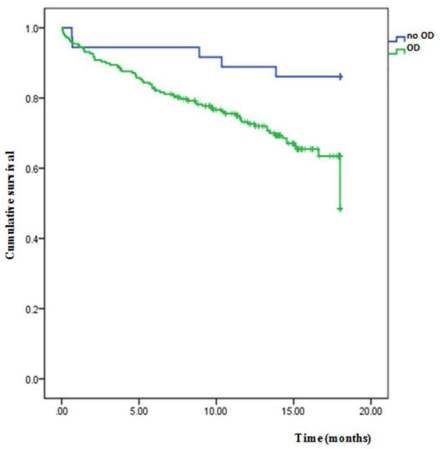

Figure 1. 18-month survival curves for dysphagic and non dysphagic patients (p= 0.002). OD: oropharyngeal dysphagia patients; noOD: patients without OD.

Patients and Methods: We designed a prospective observational study with 255 patients from the PU of one hospital in our city. OD was clinically assessed with the Volume-Viscosity Swallowing Test (V-VST). In addition a complete geriatric evaluation was performed including functional status (Barthel) comorbidities (Charlson) dementia type and severity (GDS FAST) nutritional status (MNA-sf) and oral hygiene (OHI-S). Patients were given recommendations on fluid and diet adaptation and were followed up 18 months after discharge.

Table 1. Sociodemographic and clinical characteristics of the study population

	OD (n=219)	noOD (n=36)	p-value
Age (years)	84.06±7.8	80.16±8.5	**0.007**
Sex (♀)	61.2% (134)	63.9% (23)	0.757
Charlson	2.05±1.41	1.78±1.07	0.432
Barthel			
Admission	28.65±24.36	44.03±23.07	**<0.0001**
Discharge	37.46±26.63	52.64±21.66	**0.002**
MNA-sf (%, n)	n=211	n=35	0.305
Well-nourished(12–14)	3.3 (7)	5.7 (2)	
At risk (8 – 11)	43.1 (91)	54.3 (19)	
Malnourished (0 – 7)	53.6 (113)	40 (14)	
Dementia severity	n=201	n=32	
GDS (%, n)			**>0.001**
2-3	0.5 (1)	9.40 (3)	
4	9.5 (19)	12.5 (4)	
5	21.9 (44)	28.1 (9)	
6	46.3 (93)	50 (16)	
7	21.9 (44)	0 (0)	
FAST	n= 200	n=28	**0.007**
2-3	0 (0)	3.6 (1)	
4	8 (16)	10.7 (3)	
5	15.5 (31)	10.7 (3)	
6	48 (96)	67.9 (19)	
7	28.5 (57)	7.1 (2)	

OD: oropharyngeal dysphagia patients; noOD: patients without OD; GDS: Global Deterioration Scale; FAST: Functional Assessment Staging Test.

Results: Mean age of the participants was 83.6 ± 7.9y. Alzheimer disease was the main cause of dementia among the whole population (54.9%). Prevalence of OD was 85.9% (219/255) with 81.7% of patients with impaired safety. Patients with OD were older ($p < 0.01$) had worse functional status on admission ($p < 0.0001$) and discharge ($p < 0.01$) and higher severity of dementia ($p < 0.001$) than those without OD (Table 1). During the follow up 18-month mortality was statistically associated with OD ($p < 0.01$) impaired functionality ($p < 0.0001$) malnutrition ($p < 0.05$) and severity of dementia ($p < 0.0001$) (Figure 1).

Conclusions: OD is very prevalent among patients with dementia and is statistically associated with older age impaired functionality severity of dementia and increased mortality. OD should be systematically screened and treated in any clinical facility dealing with older patients with dementia.

EFFORTFUL SWALLOWING MANEUVER RESTRICTS UES OPENING IN HEALTHY OLDER VOLUNTEERS

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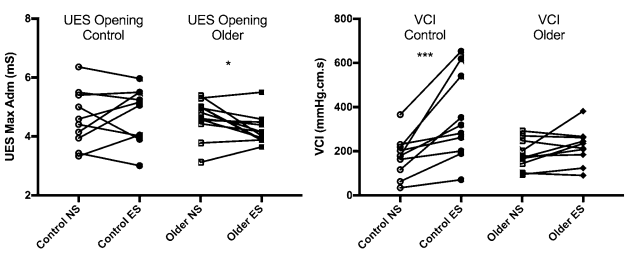
Introduction: Compensatory strategies and swallow maneuver exercises are designed to improve oropharyngeal contractility and upper esophageal sphincter (UES) opening during swallowing. We compared altered swallowing biomechanics during effortful swallowing in a cohort of young and older (> 65 years of age) healthy volunteers.



Materials and Methods: Ten young (5 M range 21–35 years) and older but otherwise healthy (5 M 66–94 years) volunteers were included. Pressure and impedance recordings of swallows were performed using MMS Solar manometry with a 2.7 mm Unisensor catheter. Ten 5 ml liquid boluses (0.9% saline) were tested with subjects swallowing the first five normally (NS) and the remainder effortfully (ES). Data were exported and compared via AIMplot. UES was estimated through maximum admittance (Cock et al. NMO 15) and integrals calculated as previously described (Nativ-Zelzer et al. NMO 16). Two-way repeated measures ANOVA (swallowing condition/group) were performed.

Results: There was a significant main effect of ES on UES opening in the older group ($F = 6.272$; $P = 0.03$). Post-hoc analysis revealed decreased UES opening during ES in older subjects (NS 4.6 ± 0.2 vs. ES 4.1 ± 0.2mS $P = 0.03$). There was a significant main effect for ES ($F = 17.094$; $P < 0.001$) on velopharynx/tongue base contractile integral which was increased in the younger group ($P < 0.001$) and pharyngeal contractile integral ($F = 5.038$; $P = 0.03$) similarly increased in the younger group ($P = 0.006$). Integrals were unchanged in older volunteers.

Conclusion: As previously reported the main of effortful swallowing is to increase pharyngeal occlusive pressures. However ES produced a markedly different response in older individuals in whom it was less effective at augmenting occlusive pressures with reduced UES opening and potentially increased pharyngeal emptying resistance. In patients with dysphagia such changes are potentially counterproductive and may increase aspiration risk.

CHANGES IN SWALLOWING BIOMECHANICS AND FUNCTION IN THE CONTEXT OF EFFORTFUL SWALLOWS IN HEALTHY ELDERLY INDIVIDUALS

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Introduction: A significant proportion of healthy seniors report difficulty swallowing thought to result from age-related decline in muscle bulk/function. Effortful Swallowing (ES) is used both as a compensatory maneuver to improve pharyngeal propulsion/clearance and has been proposed as an exercise to improve pharyngeal strength. This study sought to quantify kinematic temporal and functional changes during ES to quantify its exercise potential in age-related dysphagia.

Material and Methods: Videofluoroscopies were collected from 44 healthy seniors (22 male) > 65 years old (mean = 76.9 SD = 7.1). Each participant swallowed six 5 ml boluses of Varibar nectar-thick liquids: 3 regular effort (RE) and 3 ES. Individual swallows (264) were measured on pharyngeal constriction and shortening (PC PS) laryngeal closure duration stage transition duration pharyngeal transit time pharyngeal response duration hyoid movement duration Normalized Residue Ratio Scale (NRRS) and Penetration Aspiration Scale (PAS). Nine non-parametric Wilcoxon Rank Sum for repeated measures tested the effect of ES on each outcome. Exact p-values were calculated based on permutation methods. To adjust for multiple testing problem individual p-values < 0.008 was deemed to be significant.

Results: ES significantly prolonged all temporal variables. Significantly less PS was observed in ES (74.4% C2–4 SE = 16.9) than RE

swallowing (77.1%C2–4 SE = 14.3) [p = 0.0033]. Significantly greater NRRSp scores were observed in ES (0.049 SE = 0.30) compared to the RE swallows (0.042 SE = 0.27) [p = 0.002]. No differences between ES and RE were noted for PC NRRSv or PAS.
Conclusions: ES prolonged temporal measures of swallowing as expected. Interestingly in this sample of healthy seniors ES lead to worse kinematics (less PS) and function (increase in NRRSp). We speculate this negative manifestation may be the result of forced volitional manipulation of swallowing in the ES condition in an otherwise normal elderly swallow.

CUT-OFF VALUES OF THE COUGH STRENGTH INDUCED BY THE CITRIC ACID INDUCED REFLEX COUGH TEST IN THOSE AT RISK OF ASPIRATION PNEUMONIA

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Introduction: Patients with dysphagia with risk of aspiration are known to have impaired cough sensitivity and weakened cough strength as measured by the peak cough flow (PCF) during citric acid induced reflexive cough test. However the exact cut-off values of these weakened cough strength that may help predict aspiration pneumonia have not been reported yet. The objective of this study was to determine the predictive value of PCF during reflex cough tests associated with aspiration pneumonia in patients with dysphagia.
Materials and Methods: PCF during voluntary coughing (VC) and reflexive coughing (RC) were obtained. Citric acid nebulization was performed with a Citric acid concentration of 0.28 mol/L (5% citric acid) diluted in 0.9% sodium chloride was administered to all subjects for 20 s via a mouth mask. An ultrasonic nebulizer was connected via an oral-nasal interface that was attached to a peak flow meter to record the cough strength. Receiver operating curve (ROC) analysis was performed to determine the predictive value of PCF during RC for aspiration pneumonia.
Results: Of the 163 patients studied 53% of patients had aspiration pneumonia related to dysphagia. With RC related PCF cut-off values of 56 L/min (confidence interval 0.537–0.687) the cough strength showed significant association with aspiration pneumonia (Area under the curve 0.614 P values = 0.0146). With VC related PCF cut-off values of 82 L/min (confidence interval 0.569–0.717) the VC cough strength showed significant association with aspiration pneumonia (Area under the curve 0.644 P values = 0.015).
Conclusions: Our results provide cut-off values for PCF during VC and RC that may help screen those at risk of aspiration pneumonia.

Session 08 Free papers 4: Dysphagia in stroke patients

THE EFFECTS OF 1HZ LOW FREQUENCY TRANSCRANIAL MAGNETIC STIMULATION ON SWALLOWING FUNCTION IN POST-STROKE DYSPHAGIA

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Introduction: The study aimed to investigate the effect of repetitive transcranial magnetic stimulation (rTMS) on swallowing function of monohemispheric post-stroke patients with dysphagia.
Material and Method(s): This study was designed as a single blind randomized controlled trial. Twenty eight patients were randomized and split between study and control group. Each group received exercise program 3 days a week for 4 weeks study group also received 1 Hz rTMS to healthy hemisphere in the final week. The patients were evaluated before and after treatment and 1 month and 3 months after the treatment.Clinical swallowing function and videofluoroscopic swallowing studies (VFSS) were assessed using Swallowing Ability and Function Evaluation (SAFE) Eating Assessment Tool (EAT-10) and Penetration Aspiration Scale(PAS) tools. In addition tongue retraction hyolaryngeal elevation delayed swallowing reflex and residue (vallecullae pharynx wall piriform sinususoral area) were analyzed by using VFSS images and were scored between 0 and 3.
Result(s): The demographic and clinical features were similar at the beginning ($p > 0.05$). As well in all evaluations of swallowing function it has been determined that there has been significantly improvement in each groups ($p < 0.05$). However the most significant considerable effects of 1 Hz rTMS application on swallowing function delayed swallowing reflex ($p = 0.028$) and residue scores ($p = 0.011$) improved immediately after treatment. But there was no difference in swallowing assessments between groups at each evaluation ($p > 0.05$).
Conclusions: These results suggested that 1 Hz low frequency rTMS may be included in treatment protocols.Comprehensive studies should be done about this stimulation protocol.
Keywords: monohemispheric stroke dysphagia repetitive transcranial magnetic stimulation

DOES THE IMPLEMENTATION OF DYSPHAGIA GUIDELINES IMPROVE THE OUTCOME IN PATIENTS WITH ACUTE STROKE? - IMPLICATIONS FROM A LARGE STROKE REGISTRY

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Introduction: Early dysphagia screening and appropriate management is recommended by current guidelines to reduce complication rate and case fatality in acute stroke. The objective of our study was to assess the extent of implementation of dysphagia guidelines and determine the impact of modifications in dysphagia screening and treatment practices on pneumonia rate and stroke patient outcome over time.
Patients and Methods: In this prospective register-based study ("Stroke Register of Northwestern Germany") all adult stroke patients admitted to the 157 participating hospitals between 01/2008 and 12/2015 were included (N = 674.423). Dysphagia incidence upon admission the proportion of patients receiving a standardized swallowing screening and the percentage of dysphagic patients being referred to a SLT for treatment were obtained per year. Pneumonia rate modified Rankin Scale (mRS) at discharge and inhospital mortality were compared between groups of dysphagic vs. non-dysphagic patients over time.

Results: Despite continuously increasing screening rates from 47.2% in 2008 to 86.6% in 2015 the proportion diagnosed with dysphagia remained stable around 19%. The number of dysphagic patients receiving SLP treatment grew from 81.6% up to 87.0%. Pneumonia incidence was higher in dysphagic stroke cases (adjusted OR 5.4 [5.2–5.5] $p < 0.001$) accompanied by a worse mRS at discharge (adjusted OR for mRS $\geq$ 3: 3.1 [3.0–3.1] $p < 0.001$) and higher mortality (adjusted OR 3.1 [3.0–3.2] $p < 0.001$). The order of magnitude of these end points did not change over time.
Conclusions: Although advances have been made in dysphagia care prevalent screening and treatment practices fail to reduce pneumonia rate improve functional outcome and lower case fatality in dysphagic stroke patients. More research is urgently needed to develop effective swallowing therapies.

INCREASE OF SUBSTANCE P LEVEL IN SALIVA INDICATES TREATMENT SUCCESS OF PHARYNGEAL ELECTRICAL STIMULATION IN SEVERELY DYSPHAGIC STROKE PATIENTS

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Introduction: SP (Substance P) is a neuropeptide that enhances the swallow and cough reflex and likely acts as a neurotransmitter in the pharyngeal mucosa. Dysphagia after stroke may be related to reduced levels of SP. In healthy adults PES (Pharyngeal Electrical Stimulation) induces a temporary increase of SP level in saliva. The research items of the present study were to find out whether PES treatment in severely dysphagic stroke patients is associated with changes in SP level and whether a change of SP level might be linked with treatment success.
Material and Methods: 23 tracheotomized stroke patients from our neurological ICU who could not be decannulated due to severe and persisting dysphagia (evaluated by FEES) were included in this prospective single-center study. Unlike to prior studies comorbidities likely to cause dysphagia were not an exclusion criterion. PES was performed for 10 min on three consecutive days. 3 patients received multiple stimulation cycles. Saliva samples were collected prior to and directly after each treatment session.
Results: 60% of all patients (n = 14) respectively 73% of patients without comorbidities likely to cause dysphagia (n = 7) were decannulated. An increase of SP directly after stimulation was closely related to treatment success i.e. decannulation. 79% of successfully treated patients showed a post-stimulation increase of SP whereas in 89% (n = 9) without clinical improvement of dysphagia SP levels remained stable or even decreased. Logistic regression analysis showed there was a trend for increased SP level to be independently predictive of improved swallowing function after PES. All 3 multiply treated patients showed an increase of mean SP levels when progressing from the 1st to the 2nd cycle. In one patient this trend was continued when a 3rd PES cycle was applied. 2 of these 3 patients could be decannulated after repetitive PES.
Conclusion: Salivary SP levels might work as biomarker indicating treatment success.

LARYNGEAL ELEVATION AND PHARYNGEAL SHORTENING IN LEFT VERSUS RIGHT HEMISPHERIC STROKE: VARIATIONS IN DISPLACEMENT POSING NEW TREATMENT TARGETS

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Introduction: During normal swallowing elevation of the larynx and shortening of the pharynx are important events that may seem overlapping but are engaged by different muscular slings. Post stroke laryngeal and pharyngeal elevation may be dysfunctional leading to aspiration. The investigation sought to analyze these functions in a larger cohort.

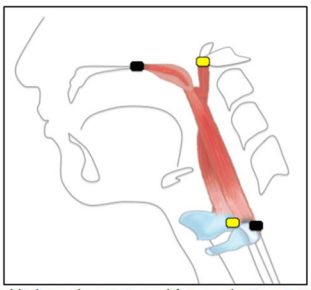

Figure 1. An illustration highlighting the points used for coordinate mapping to infer laryngeal elevation (yellow coordinates) and pharyngeal shortening (black coordinates).

Method: Baseline Modified Barium Swallow (MBS) videos from 58 left-sided and 31 right-sided stroke patients were used. The bolus trials for 5 mL nectar pudding and thin liquid boluses were analyzed. Coordinates were collected from MBS imaging using ImageJ. Laryngeal elevation was marked by the minimum to maximum displacement between two coordinates at rest and at the height of the swallow (atlas to the posterior vocal folds to represent the stylopharyngeus). Pharyngeal shortening was marked by displacement between two different coordinates (hard palate to hypopharynx to represent the palatopharyngeus Figure 1). The laryngeal elevation distance (centimeters) for each bolus swallow was plotted in relationship to the pharyngeal shortening (centimeters). Associations were evaluated using Pearson's correlation.

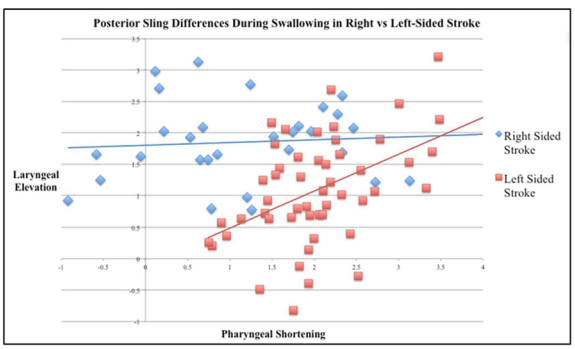

Figure 2. The correlations between left- and right-sided stroke laryngeal and pharyngeal displacement as measured by the posterior muscular sling at the height of the swallow.

Results: There was a low and non-significant correlation in the right-sided stroke between laryngeal shortening and pharyngeal elevation ($r = 0.072$ $p = 0.7$ $r^2 = 0.01$). There was a high and significant correlation in the left-sided stroke between laryngeal shortening and pharyngeal elevation ($r = 0.46$ $p = 0.0006$ $r^2 = 0.2$).
Conclusions: The finding that swallowing structures are reduced in stroke patients is not novel. What is novel is the laterality in hemispheric deficits and the ability from coordinate mapping to infer which musculature was more dysfunctional during the swallow. Right-sided stroke demonstrated reduced pharyngeal shortening and an apparent compensation by laryngeal elevation. This finding could implicate novel targets for therapy post-stroke depending on which hemisphere was affected.

INVOLVEMENT OF GLUTAMATE RECEPTORS IN THE ROSTRAL-COMMISSURAL MEDIAL AND VENTROLATERAL NTS SUBNUCLEI IN THE INITIATION OF SWALLOWS IN ANESTHETIZED GUINEA PIGS

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Purpose: It has been reported that the nucleus of the solitary tract (nTS) contains the generator neurons involved in swallowing. However it remains unclear which areas within the nTS play an essential role in the initiation of swallows. Using focal microinjection technique we explored which areas within the nTS are responsible for initiation of swallows.
Materials and Methods: Urethane-anesthetized male Hartley guinea-pigs were used. Swallows were evoked by microinjection of NMDA or kainic acid (KA) into nTS and distending the upper airways (UA) with a continuous flow (20 ml/s) of air delivered through the tracheal cannula. A swallow was identified by suprahyoid electromyographic bursts accompanied by transient decreases in UA-flow or increases in esophageal pressure. The number of swallows was counted for 5 min after microinjection of NMDA (0.1 nmol) or KA (0.1 nmol) into six different nTS subnuclei (rostral-intermediate caudal-intermediate rostral-commissural caudal-commissural medial and ventrolateral n = 10–22 in each group). The effect of AP5 (NMDA receptor antagonist 0.2 nmol) and CNQX (non-NMDA receptor antagonist 0.2 nmol) microinjection into the nTS subnuclei on UA-distension evoked swallows was also evaluated (n = 5–9 in each group).
Results: Many swallows were evoked following NMDA or KA microinjection into the rostral-commissural medial and ventrolateral subnuclei (NMDA: median 6 [IQR 5–8] 13 [4–24] and 7[3.5–14.5] KA: median 6 [IQR 1–13] 13 [12–22] and 5[0.5–14] for rostral-commissural medial and ventrolateral respectively). The number of UA distension evoked swallows was significantly decreased by AP5 and CNQX microinjection into these areas (rostral-commissural: 9 ± 2 vs. 5 ± 2 medial: 10 ± 1 vs. 5 ± 1 ventrolateral: 8 ± 1 vs. 5 ± 1 for control vs. antagonist respectively).
Conclusion: We speculate that glutamate receptors in the rostral-commissural medial and ventrolateral nTS subnuclei are involved in the initiation of swallo

Session 10 Free papers 5: Paediatric dysphagia palsy and treatment

COMPARISON OF THICKENED LIQUID FLOW AND CONSISTENCY: BOSTWICK VERSUS IDDSI GRAVITY FLOW TESTING

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Introduction: Measuring viscosity is time-consuming and requires expertise and instrumentation that is not accessible to clinicians. A lack of simple but valid approaches for testing makes it difficult for clinicians to be confident about the thickness of liquids that are prepared for patients. One simple test is the Bostwick which measures flow distance (in cm); there is no established consensus for mapping Bostwick results to texture categories. More recently a novel flow test developed by the International Dysphagia Diet Standardisation Initiative (IDDSI) uses gravity-flow through a syringe and maps results to terminology for different levels of thickness. We compared the IDDSI and Bostwick flow testing methods for an array of thickened liquids.
Materials and Methods: We used the IDDSI syringe flow test and Bostwick consistometer to measure flow for slightly- mildly- moderately- and extremely-thick liquids (lemon-flavored water). Both starch and xanthan gum thickeners were used. Repeated flow tests were performed at 60 120 and 180 min intervals after mixing Results were compared using non-parametric statistics and correlations.
Results: The IDDSI flow test clearly identified all 4 levels of liquid thickness and revealed time-dependent changes in the starch-thickened liquids across the 3 timepoints of measurement. Both testing methods were significantly correlated ($r = 0.86$) but the Bostwick method showed both floor and ceiling effects. Although 4 different liquid consistencies were tested the results clustered in 3 Bostwick ranges. The Bostwick test was unable to discriminate moderately-thick versus extremely-thick liquids and was not sensitive to time-dependent variation.
Conclusion: The IDDSI flow test is more sensitive than the Bostwick consistometer for liquid flow measurement. The IDDSI flow test can be used across the full range of thickened liquids and can reveal subtle differences in flow that are not detected by the Bostwick method.

SPECIFICATION OF DYSPHAGIA WITH ORAL MUSCLE UTRASOUND IN PEDIATRIC MYOTONIC DYSTROPHY TYPE 1

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Introduction: Dysphagia is often noticed in neuromuscular disorders from neonatal age up to adolescence. There is not much known about dysfunctional swallowing in congenital and childhood onset Myotonic Dystrophy type I (MD1) 1. Obvious signs are hypotonia respiratory and feeding difficulties. The aim of this study was to get more insight in the underlying mechanisms of dysphagia in pediatric MD1.

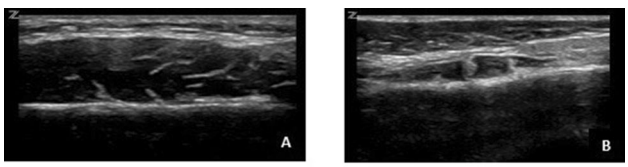

Figure 1. Ultrasound images m. masseter. A. healthy boy (12,0 years), EG z-score 0.2, thickness z-score 0.5; B. boy with MD1 (12,75 years), EG z- score 3.9, thickness z- score -2.3

Methods: In 10 children with MD1 (age range 07–180 years) a feeding and swallowing assessment was performed including quantitative muscle ultrasound (QMUS) of oral and masticatory muscles. Data were collected on oral intake with the Functional Oral Intake Scale (FOIS) ranging from 1—nothing by mouth to 7—total oral diet with no restrictions1. Complaints on chewing and dental characteristics were assessed following a standardized procedure2. QMUS was used to describe muscle thickness and structure expressed in echogenicity (EG).
Results: Based on the FOIS (median 6 range 3–6) all children needed adaptation to their diet. Nine children showed mastication problems had a small upper dental arch with open mouth posture and tented upper lip. The digastric and geniohyoid muscles showed an abnormal EG (z-score > 2) in 40% of the children. In 80% the masseter muscle showed an abnormal EG (z-score > 2) and in 60% a reduced thickness (z-score < -2) (Fig. 1). The EG of the tongue was abnormal in 37% and reduced thickness was found in 40%.
Conclusion: In this cohort of pediatric MD1 patients mastication problems with an affected masseter muscle were highly prevalent. More factors play a role in the dysphagia like up till now not known involvement of submental muscles. In addition found tongue abnormalities open mouth posture and dental deviances highlight the multifactorial of dysphagia in pediatric MD1.

PIECEMEAL DEGLUTITION AND THE IMPLICATIONS FOR PRESSURE IMPEDANCE SWALLOW ASSESSMENT

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Intro: High resolution impedance manometry (HRIM) allows objective swallow assessment and to date has focused primarily on analysis of single swallows per volume given. Piecemeal deglutition (PD) defined as swallowing of a single bolus in two or more portions may show intact oral control with larger boluses but is also a feature of pediatric oropharyngeal dysphagia (OPD). The extent to which PD alters contractility distension and flow timing swallow measures is unknown.

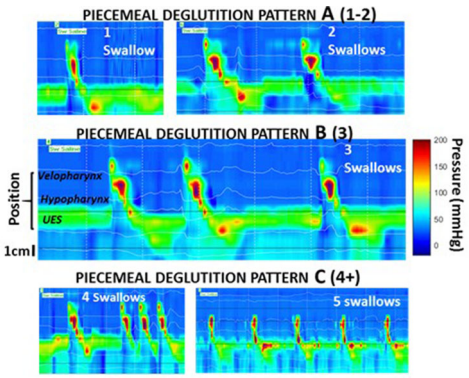

Figure 1. Illustration of piecemeal deglutition swallow patterns, as indicated on high resolution impedance manometry recordings.

Material and Methods: Pharyngo-esophageal motility and bolus flow were recorded using an 8 French pressure-impedance catheter (32×1 cm pressure and 16×2 cm impedance segments) in 27 children (19 M mean age 15 months) with repair of type C esophageal atresia and no evidence of OPD. At least 3×3 ml saline boluses were recorded per child and the PD sequences were analysed. PD patterns were defined according to the number of bolus swallows (based on impedance) in the sequence as follows: A = 1–2 swallows; B = 3 swallows; and; C = ^{3}4 swallows (Figure 1). Pressure Flow Analysis with AIMplot software defined intrabolus pressure upper esophageal sphincter (UES) opening pharyngeal contractility and flow timing of the swallows within each PD group. Data were averaged for each PD pattern.

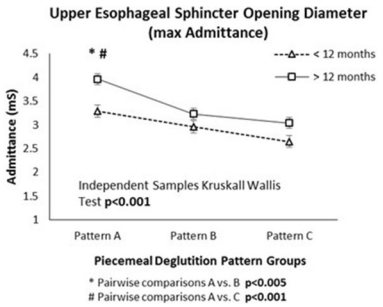

Figure 2. The effect of piecemeal deglutition on upper esophageal sphincter opening diameter.

Results: PD pattern B was most commonly observed (43.7% of sequences). Swallows of different PD patterns were biomechanically different. The most significant effect of PD pattern was on UES opening diameter whereby an increased number of piecemeal swallows in the sequence was associated with a reduced UES diameter (Figure 2). UES distension pressure ($p < 0.01$) and flow timing ($p < 0.001$) were also altered consistent with reduced bolus volume per swallow.
Conclusions: HRIM assessment allows identification of PD swallowing. PD changes the bolus volume per swallow which in turn alters physiological swallow measures. PD is a necessary consideration for accurate HRIM analysis of swallow function in pediatric populations.

PREVALENCE OF SWALLOWING AND FEEDING PROBLEMS IN CEREBRAL PALSY ACROSS THE LIFESPAN

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Introduction: Cerebral palsy (CP) is one of the most common causes of childhood disability with an overall prevalence of two per 1000 births. CP is a lifelong disability of central origin influencing motor control and can lead to swallowing and feeding problems that result in dehydration or malnutrition and have a major impact on quality of life of persons with CP and their caregivers. The current review reports on the prevalence of swallowing and feeding problems in persons with CP across the lifespan.
Methods: A systematic literature search was performed in line with the PRISMA statement using five databases: AMED Cinahl Embase Medline and Pubmed. All dates up to April 2017 were included. Only original articles describing prevalence of swallowing and/or feeding problems in persons with CP were included.
Results: A total of 28 studies met all inclusion criteria and showed sufficient methodological quality as assessed by the STROBE statement checklist. Prevalence varied greatly with higher prevalence

relating to more severely impaired gross motor function (GMFCS) and intellectual disabilities. When summarising data for oropharyngeal dysphagia specifically prevalence varied between 2 and 70% for children at GMFCS level I and up to 95–100% in children at level V. Limited data were available for adults. The spread of prevalence data as objectified by meta analyses resulted from differences in patient characteristics and terminology as well as a variety of utilised assessments and outcome variables.
Conclusions: Even though the generalization of study results was limited due to methodological heterogeneity it became obvious that swallowing and feeding problems in CP are very common. This review supports the need for early identification and treatment. Future research should also focus on adult populations and determine prevalence across the lifespan. A study protocol was proposed describing study quality criteria to improve generalizability of future study results.

FUNCTIONAL AND STRUCTURAL CONNECTIVITY IN CHILDREN WITH UNILATERAL CEREBRAL PALSY AND CLINICAL DYSPHAGIA: A MULTIMODAL NEUROIMAGING STUDY

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Introduction: We recently showed preliminary evidence that children with unilateral brain lesions affecting the somatosensory cortex use primarily contralesional compensations to develop functional swallowing. However the mechanism of this reorganization is not known. Hence we aimed to examine the relationship between functional and structural brain connectivity and clinical swallowing performance in children with unilateral brain lesions manifesting as unilateral cerebral palsy (UCP).
Materials and Methods: 15 children (8 males; 5 years 11 months–17 years 6 months) participated. Clinical dysphagia was evaluated with the Dysphagia Disorders Survey (DDS). Functional and structural connectivity were assessed using resting-state fMRI (rs-fMRI) and DTI scans. Independent Component Analysis (ICA) was used to identify the rs-fMRI sensorimotor network (SN). DTI postprocessing included measures of Mean Diffusivity (MD) Fractional Anisotropy (FA) and Radial Diffusivity (RD) for the internal capsule (anterior and posterior limb knee) and cerebral peduncle (CeP). Laterality indices (LIs) were calculated for the somatosensory network and the DTI measures. Negative LIs show higher connectivity contralesionally; values ~ 0 show balanced connectivity; positive values depict higher connectivity ipsilesionally. Correlations were calculated between LIs and DDS scores.
Results: Both functional and structural connectivity remained predominantly balanced in most children. No significant correlations were seen between SN LI and DDS scores. However higher DDS scores were significantly correlated with balanced LI (close to 0) of RD ($r = -0.534$ $p = 0.04$) and MD ($r = -0.655$ $p = 0.008$) in the cerebral peduncle.
Conclusion: This bilateral structural connectivity in the CeP may be a maladaptive compensatory pattern as it correlates with worse clinical dysphagia. This work further validates our prior preliminary work indicating the importance of contralesional adaptations for functional swallowing in these children.

Session 11 Free papers 6: Assessment

UVULOPALATOPHARYNGOPLASTY AND COBLATION CHANNELLING OF THE TONGUE FOR OBSTRUCTIVE SLEEP APNOEA SYNDROME: POTENTIAL IMPACTS ON SWALLOWING FUNCTION

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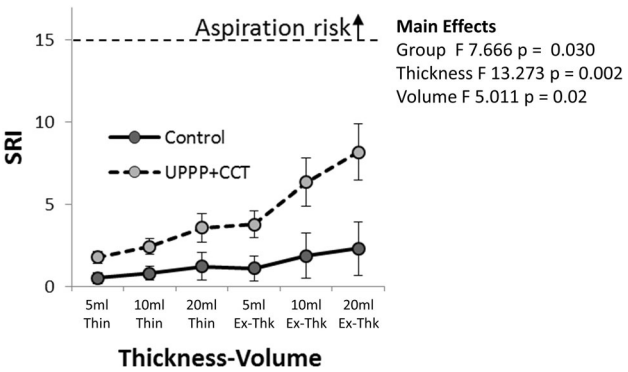
[1]Flinders University; [2]Flinders Medical Centre

Introduction: Uvulopalatopharyngoplasty with Coblation Channelling of the Tongue (UPPP + CCT) surgery is used to treat Obstructive Sleep Apnoea (OSA). The extent to which UPPP + CCT alters swallow modulation due to potential removal of afferent innervation is unknown. We conducted a pilot study to quantify the swallowing-related biomechanics following UPPP + CCT.



Materials and Methods: Ten OSA patients (mean age 48 years; range 28–63) who previously underwent the UPPP + CCT surgery (1–6 years; mean 3) were compared to 10 control subjects (mean age 28 years range 24–33). Swallowing function was assessed by Sydney Swallow Questionnaire (SSQ) and pharyngeal high resolution manometry with impedance (HRIM) was performed (MMS Solar GI System; 8Fr HRIM catheter). Testing consisted of 3–5 repeats of 5–20 ml Thin (IDDSI 0) and Extremely Thick (IDDSI 3) boluses. HRIM data were analysed by online AIMplot software which calculated a global Swallow Risk Index (SRI) pharyngeal intrabolus pressures (IBP) and UES maximum admittance (defining UES opening).
Results: Three of the UPPP + CCT patients returned and abnormal SSQ score (> 234). Patients compared to controls had a higher SRI per volume (see Figure) elevated IBP (RM-ANOVA F 9.103 $p = 0.008$) and reduced UES opening (F 11.828 $p = 0.003$). The swallow modulation response to increasing volumes was markedly dampened in the patients.
Conclusion: Our findings suggest that UPPP + CCT surgery may induce a specific sensory deficit which alters the modulation of the swallowing mechanism to changes in bolus volume. Further studies

are required to determine if the documented reduction in swallowing reserve is a feature of OSA or occurs as a consequence of surgery.

FLOW AND PRESSURE OF THICKENED BOLUSES IN A MECHANICAL ORAL SIMULATOR WITH SHEAR RHEOMETRY

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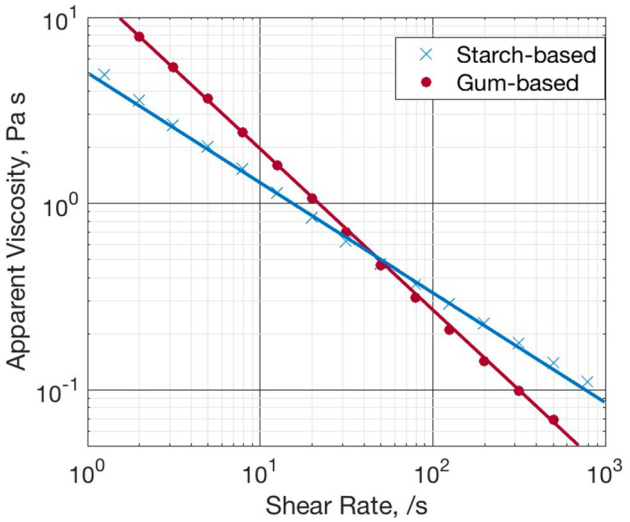
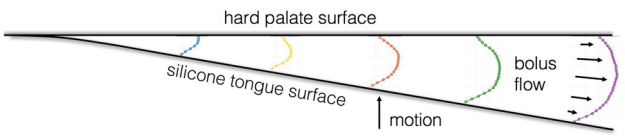
Introduction: Texture modification of food and drink is common in dysphagia management but needs more evidence of the effect of thickener type and concentration. This study investigated differences in the flow of boluses combining rheometry with a novel in vitro mechanical oral simulator.



Methods: Semi-solid materials were created from water with starch (S) and gum (G) thickeners. Concentrations were calculated to have equal apparent viscosity at 50/s (0.47 Pa.s). The mechanical simulator compresses a 12-ml bolus between a soft tongue and hard palate replicating physiological motion from ultrasound measures (oral phase: 0.67 ms). Palate surface pressure was recorded at 5 points and particle image velocimetry (PIV) quantified flow within the boluses.



Flow lines show P.I.V. measurements of velocity throughout bolus displayed on a representation of the tongue-palate simulator rig. Shear rate varies from 0 along centre-line to 40 /s near surfaces

Results: Rheology over a wide range of shear rates 0.1–1000/s revealed differences between G and S: at slow shear (< 50/s) G had a higher apparent viscosity but at faster shear rates (> 50/s) S had the higher apparent viscosity [FIG 1]. In the oral simulator G was found to exert a slightly higher pressure in the slow initial motion (0.8 vs 0.4 kPa) but then S required much higher pressure to clear the bolus (2.0 vs 4.7 kPa). PIV analysis found shear rates up to 40/s during initial bolus transport then as the tongue and palate drew closer higher shear rates were required within the bolus (Fig. 2). Successfully clearing the bolus required shear rates faster than 50/s: in this range S has higher apparent viscosity than G accounting for the increased palate pressure observed for S versus G.

Conclusions: Pressures recorded during these simulated swallows are low compared to physiological limits nevertheless the extra pressure required to clear S indicates a possible reason behind reports of increased residue with thick starch. The differences were attributable to specific features of the two fluids' rheology which may be used in future to improve the design and prescription of dysphagia management products.

MAXIMAL ISOMETRIC PRESSURES (MIP) OF THE TONGUE IN HEALTHY BELGIAN TEENAGERS: INFLUENCE OF AGE, SEX, LOCATION, VISUAL FEEDBACK AND ORDER

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[1]Thomas More University College; [2]De Mick Brasschaat; [3]Antwerp University Hospital

Introduction: Knowledge of normative MIP data and possible influencing factors is essential when evaluating and treating oropharyngeal swallowing disorders. An extensive database of these data in teenagers is however missing. We aimed to establish such a dataset and study several influencing conditions already known to be important in children and/or adults.

Method(s): 80 healthy teenagers were studied with ages ranging from 12 to 19 years old who were Dutch speaking and had passed the Yale swallow protocol. Exclusion criteria were any history of dysphagia or dysarthria oral motor impairment use of 'special needs' (including SLP-therapy) oral cavity surgery (beyond routine dental surgery) or active orthodontics. The IOPI device with standard tongue bulbs was used to collect the measurements with the MIP defined as the highest of 3 trials. Several conditions were studied: age sex location (anterior or posterior position; MIPa and MIPp respectively) visual feedback (VFB) from the LCD and order of testing (anterior versus posterior start).

Result(s): Feasibility was excellent with no missed trials. MIPa and MIPp revealed no difference in the age groups according to ANOVA and post hoc Tukey tests with all small effect sizes (ES). Sex differences were not significant using independent t -tests at both locations and during both feedback conditions again with all ES small. Paired t -tests showed MIPa greater than MIPp both with and without visual feedback and with medium ES. VFB analysis was only significant at the posterior location with an medium ES. There was no significant order effect in any condition.

Conclusions (including clinical relevance): This largest dataset available shows no significant differences in MIP by age within the adolescent lifespan unlike similar data in children and adults. The position sex and VFB effects were in contrast with national and sparse international data.

PHARYNGEAL HIGH-RESOLUTION MANOMETRY WITH/WITHOUT IMPEDANCE: A SYSTEMATIC REVIEW OF CURRENT METHODOLOGY AND ANALYSIS TECHNIQUES

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Introduction: Pharyngeal high-resolution manometry (HRM) with and without impedance (HRIM) is increasingly used in the evaluation of pharyngeal swallowing. This systematic review evaluated patterns and variability in published methodologies and analysis techniques of pharyngeal HRM and HRIM.
Material and Methods: Four electronic databases (CINAHL Embase Medline The Cochrane Library) were searched up to and including February 2017. Reference lists and citations of the included manuscripts were cross-checked to minimise publication bias. Peer-reviewed studies in English German and Spanish were included if they implemented HRM and/or HRIM in adult populations to evaluate pharyngeal swallowing parameters such as pressure magnitude timing and/or measurements of flow. Following the Cochrane guidelines publications were reviewed by two independent raters; discussion was then undertaken to reach 100% consensus agreement on eligibility criteria and data extraction.
Results: From 2133 initial search results 55 publications met the inclusion criteria. Methodological aspects such as use of topical anaesthetic differed among studies. Regarding analysis considerable variability was observed in definitions of anatomical regions of interest measurement parameters and use of analysis software. In the majority of articles insufficient information was reported for the study to be replicated; thus a meta-analysis could not be performed. Findings will be reported according to PRISMA guidelines.
Conclusion: This review emphasises the need for detailed reporting of methodology and analysis techniques of HRM/HRIM. Due to the high variability in execution and subsequent analysis of pharyngeal HRM/HRIM further understanding the reliability and validity of existing measures is paramount. This will allow for generation of standardised procedures to increase the comparability of data between studies and further develop best practice in pharyngeal HRM/HRIM.

PREDICTORS OF INTUBATION, PROLONGED NEED FOR A TRACHEAL CANNULA AND PEG-PLACEMENT IN PATIENTS WITH GUILLAIN–BARRE-SYNDROME

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Introduction: The Guillain-Barré-Syndrome (GBS) is an autoimmune-mediated neuropathy leading to paralysis of the limbs and the cranial nerves. Frequently patients require endotracheal intubation and tracheostomy but risk factors for a prolonged need for a tracheal cannula and PEG-placement have not yet been identified.
Material and Methods: Retrospective analysis of the medical records of 88 patients treated in the Neurological Department of the University Hospital Münster Germany was performed. Findings of neurological examination were extracted from the patient records. Swallowing function was assessed with FEES after patients had been weaned from the respirator.
Results: 88 patients were included in the study. 36 patients (409%) received orotracheal intubation followed by tracheostomy in 35 patients. 30 of the intubated patients (6667%) had already developed bulbar symptoms prior to intubation as opposed to 15% in the group of patients not requiring later intubation ($p < 0001$). In 23 patients (6571%) the tracheal cannula could be removed immediately after weaning was completed. Due to severe dysphagia decannulation could not be performed at this moment in 12 patients (3428%). Logistic regression analysis revealed that impaired clearing of pharyngeal secretions was highly correlated to prolonged need for a tracheal cannula ($p < 001$) and PEG-placement ($p < 005$) which had to be performed in 9 patients.
Conclusions: The presence of bulbar symptoms is an essential risk factor for poor short-term prognosis in GBS-patients and significantly increases the likelihood of orotracheal intubation and tracheostomy. Interestingly the majority of intubated GBS patients did not present with severe dysphagia when being weaned from the respirator thus enabling decannulation at this moment in nearly two third of them. FEES and in particular the secretion severity rating score are useful to identify patients with a prolonged need for a tracheal cannula and PEG-Placement.

Session 12 Free papers 7: Physiology 2

DEVELOPMENT OF AN ESOPHAGEAL MECHANICAL STIMULATION METHOD FOR ELICITING THE SWALLOWING REFLEX IN HEALTHY YOUNG SUBJECTS

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Introduction: Recent animal studies have shown that the swallowing reflex can be evoked by esophageal mechanical stimulation. Through experiments with human participants we aimed to verify whether the swallowing reflex can be evoked by peripheral esophageal stimulation and whether the response differs depending on the stimulated area of the esophagus and the volume or speed of stimulation.
Material and Methods: Ten healthy individuals participated in this study. A catheter was inserted through the nose and the tip of the catheter was placed at the upper upper middle lower middle or lower esophageal region for injection. A manometric catheter was also passed transnasally. Intraesophageal injection of 3 ml or 10 ml thickened water was administered. The rate of the injection was controlled at 3 mL/s or 10 mL/s. Each trial was repeated twice. The latencies from the start of the injection to the onset of upper esophageal sphincter relaxation were compared across injection locations amounts and rates.
Results: Swallowing reflex occurred with probabilities of 100% 98% 95% and 55% within 30 s at upper upper middle lower middle or lower esophageal regions respectively. Comparison of injection amounts revealed that the latency after 10 mL injection was shorter than for 3 mL injection in all regions at an injection rate of 10 mL/sec ($p < 0.01$). However there was a significant difference between injection amounts only in the upper region at an injection rate of 3 mL/sec. Although there was no difference between injection rates with 3 mL injection ($p > 0.05$) a significant difference was observed between injection rates with 10 mL injection regardless of injection region ($p < 0.01$).
Conclusions: Our results indicate that: (1) Esophageal stimulation by fluid injection with clinically available amounts and rates can induce a swallowing reflex in healthy adults; (2) Reflex latencies can be changed by the stimulation location fluid injection amount and rate; and (3) The most effective condition for inducing the swallowing

reflex involves a larger fluid amount with a faster injection rate in the upper esophagus.

ADJUSTMENT OF TRUE VOCAL CORD FOR AIRWAY PROTECTION DURING SWALLOW-KINEMATIC ANALYSIS USING 320-ROW AREA DETECTOR CT

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Purpose: Laryngeal closure during swallow is critical for airway protection. By videofluorography study we now understand the part of its mechanism by observing laryngeal vestibule (LV) and epiglottis but not true vocal cord (TVC) closure as visualization is limited. 320-Row Area Detector CT (320-ADCT) providing precise and detailed observation of swallow dynamics enables the evaluation of all swallow-related structures including TVC closure. This study analyzed and discussed the adjustment of TVC closure during swallow from research series of 320-ADCT since 2008.
Methods: Forty two healthy volunteers (22–56 years) underwent 320-ADCT scan during swallowing under any of four different conditions; (1) 10 ml thin 10 ml thick liquid (2) 3 10 20 ml thin liquid (3) 10 ml thin with 45 and 60 reclining position (4) regular and Supersupra glottis swallow (SSGS). All were command swallows and bolus consistency/volume was blind to subjects. Timing of critical events was measured.
Results: With thin with larger bolus and with 45 reclining bolus reached pharynx and esophagus faster from oral cavity. Responding to these changes of bolus propulsion only TVC closure began significantly earlier ($p < 0.05$). LV closure tended to start earlier with larger bolus and 45 reclining but was not significant. In SSGS compared with regular swallow both TVC and LV preceded onset of hyoid anterosuperior movement.
Conclusion: The timing study indicates that (1) early TVC closure is adapted to bolus consistency and volume and to posture and (2) timing of TVC closure can be adjusted by voluntary control of the swallow. Oropharyngeal swallow can be modified by afferents in the oral cavity which triggers the anticipatory control as airway protection. TVC is independent modality and can be a target of exercise for controlling laryngeal closure in rehabilitation.

EFFECTS OF THETA BURST STIMULATION ON SUPRAHYOID MOTOR CORTEX EXCITABILITY IN HEALTHY SUBJECTS

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Introduction: Continuous theta burst stimulation (cTBS) and intermittent TBS (iTBS) are powerful patterns of repetitive transcranial magnetic stimulation (rTMS) with substantial potential for motor function rehabilitation post-stroke. However TBS of suprahyoid motor cortex excitability has not been investigated. This study investigated TBS effects on suprahyoid motor cortex excitability and its potential mechanisms in healthy subjects.
Material and Methods: Thirty-five healthy subjects (23 females; mean age = 21.66 ± 1.66 years) completed three TBS protocols on separate days separated by at least one week. A stereotaxic neuronavigation system facilitated accurate TMS positioning. Left and right suprahyoid motor evoked potentials (SMEP) were recorded using single-pulse TMS from the contralateral suprahyoid motor cortex before stimulation (baseline) and 0 15 and 30 min after stimulation. The SMEP latency and amplitude were analyzed via repeated measures analysis of variance.
Results: cTBS suppressed ipsilateral suprahyoid motor cortex excitability and activated the contralateral suprahyoid motor cortex. iTBS facilitated ipsilateral suprahyoid motor cortex excitability; however it did not affect the contralateral excitability. iTBS eliminated the inhibitory effect caused by cTBS applied to the contralateral suprahyoid motor cortex. TBS had no significant effect on the latencies of bilateral SMEP. TBS effects on suprahyoid motor cortex excitability lasted a minimum of 30 min.
Conclusions: TBS effectively regulates suprahyoid motor cortex excitability. Suppression of excitability in one hemisphere leads to further activation of the corresponding contralateral motor cortex. iTBS reverses the inhibitory effect induced by cTBS of the contralateral suprahyoid motor cortex.

A COMPARATIVE STUDY ON THE THERAPEUTIC EFFECT OF TRPV1, TRPA1 AND TRPM8 AGONISTS ON SWALLOWING DYSFUNCTION ASSOCIATED WITH AGING AND NEUROLOGICAL DISEASES

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Introduction: Oropharyngeal sensory impairment is a potential target to treat swallowing dysfunction in patients with oropharyngeal dysphagia (OD). The aim of this study is to assess the therapeutic effect of stimulating oropharyngeal sensory afferents with TRPV1 TRPA1 or TRPM8 agonists versus increasing bolus viscosity in older and neurologic patients with OD by comparing 4 studies of similar experimental design.
Materials and Methods: Swallow function of 142 older patients with impaired safety of swallow at nectar ([50–350] mPa s) viscosity was evaluated with videofluoroscopy (VFS) while treated with TRPV1 (150 μM) TRPV1/A1 (150 μM and 1 mM) or TRPM8 (1 mM or 10 mM) agonists or modified starch (MS) at spoon thick viscosity (> 1750 mPa s).
Results: TRPV1 stimulation with capsaicinoids reduced penetrations by 50% pharyngeal residue by 80% and LVC time by 24.38% and increased bolus velocity by 36.51%. TRPV1/A1 stimulation with piperine reduced penetrations by 56.32% LVC time by 25.55% and increased bolus velocity by 23.63%. TRPM8 stimulation with menthol 1 mM reduced penetrations by 37.5% while 10 mM reduced LVC time by 18.44%. Thickeners reduced penetrations by 77.11% but increased pharyngeal residue by 19.89% delayed LVC by 41.73% and reduced bolus velocity by 13.44%.

Conclusion: Natural capsaicinoids have a stronger therapeutic effect on VFS signs and swallow response by stimulating TRPV1 than TRPV1/A1 or TRPM8 agonists. While TRP stimulants increased bolus velocity and reduced swallow response times thickeners reduced bolus velocity and further delayed the swallow response. This study sets the bases to develop new pharmacologic strategies for older patients with OD moving away from compensation towards the recovery of swallow function.

EXPLORING THE EFFECTS OF CARBONATION ON SWALLOW SAFETY IN ADULTS WITH NEUROGENIC DYSPHAGIA: A FEES STUDY

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Introduction: Sensory properties such taste viscosity and carbonation have been shown to alter swallowing parameters (Palmer 2005). Studies examining the effects of carbonation on swallowing using videofluoroscopy have yielded varying results (Turkington et al. 2016). FEES may offer superior visualisation of the pharynx and avoids use of barium (Pisegna and Langmore 2016).

Diagnosis	N
Parkinson's	2
Myasthenia Gravis	1
PSP	1
Stroke	5
Dystonia	1
Ataxia	2

Table 1

Methods: Adults with neurogenic dysphagia were recruited using convenience sampling. After completing an EAT-10/FOIS scale participants underwent a standardised FEES exam. Participants were given 5 ml 10 ml and sips of non-carbonated thin fluids (NCTL) and carbonated thin fluids (CTL). Taste (deionised water) temperature (20–23 °C) carbonation (Soda Stream 9-bar pressure) presentation (random) were controlled for in study protocol. The endoscopist rating aspiration (Penetration Aspiration Scale) and residue (Yale residue scale) was blinded to carbonation status bolus volume and presentation order

Results: Twelve participants (mean = 68 years; 4 female and 8 male) were recruited (Table 1). Data of eleven was analysed. As a group 52% saw a reduction in PENASP scores with CTL over 6 bolus trials analysed. The effect of CTL on PENASP scores was found to be statistically significant for 5 ml n = 6) 10 ml (n = 4) and sip (n = 3). The effect of CTL on PENASP scores was not found to be statistically significant for 5 ml ($p = 0.092$) 10 ml ($p = 0.0093$) and sip ($p = 0.360$). Pharyngeal residue reduced with CTL although not significantly. Ten participants indicated a preference for CTL.

Conclusion: Although not clinically significant results suggest that carbonation can positively impact swallow safety in patients with neurogenic dysphagia with a reduction in PENASP scores. This research will add to existing evidence inform clinical practice and direct future research.

Session 14 Free papers 8: Dysphagia after HNC treatment

EVOLUTION OF ACUTE POSTSURGICAL DYSPHAGIA AFTER TORS FOR OROPHARYNGEAL CANCER: A PROSPECTIVE REGISTRY ANALYSIS

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[1]MD Anderson Cancer Center

Intro: Transoral robotic surgery (TORS) is gaining popularity for oropharyngeal cancer (OPC). A major goal is to improve swallowing by personalized treatment based on pathologic rather than clinical staging. Yet the impact of TORS itself on swallow is poorly described. The aims were: 1) estimate rates of acute post-TORS dysphagia; and 2) compare severity of acute swallowing symptoms after TORS to non-surgical treatment.

Method: 81 patients with T1-2 NX-2b and T3 N0 OPC were sampled from the prospective MD Anderson OPC Registry. Among the group of 41 who had primary TORS pre and post-TORS MBS were compared using nonparametric Wilcoxon of DIGEST. Multi-symptom MDASI-HN questionnaires were collected weekly in all who underwent RT regardless of surgery. MDASI-HN swallow items (scale: 0–10) at onset (week 1) and end of RT were compared using multiple linear regression between groups: treatment naïve post-induction and post-TORS.

Results: MBS DIGEST grade significantly worsened post-TORS ($p < 0.001$): 15% had moderate (grade 2) 17% severe (grade 3) and 2% profound (grade 4) acute dysphagia. T-stage significantly impacted post-TORS DIGEST ($p = 0.004$). At RT start MDASI-HN swallow symptoms were significantly worse among the post-TORS group (2.1 ± 1.6) relative to post-induction (0.1 ± 0.4 $p = 0.007$) and treatment naïve (0.3 ± 0.7 $p < 0.001$). This trend inverted at end of RT when swallowing symptoms were better in the post-TORS group relative to non-surgical groups but this was not statistically significant after controlling for concurrent chemotherapy.

Conclusion: While most have a functional swallow after primary TORS one-third develop moderate-severe pharyngeal dysphagia in the acute postsurgical period. The evolution of post-TORS dysphagia requires further assessment. Symptom trajectories suggest that the trade-off for favorable late swallowing outcomes after TORS reported by others may be slightly higher swallowing symptom burden during early weeks of postoperative RT.

SUBMENTAL MUSCLE DOSE/VOLUME PREDICTS VIDEOFLUOROSCOPY DETECTED DYSPHAGIA PER DIGEST IN OROPHARYNGEAL CANCER SURVIVORS

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Introduction: The radiotherapy (RT) beam path travels through non-target normal structures and results in different toxicity profiles often including dysphagia. Toxicity can be manipulated by de-escalation or dose constraint among groups with RT-sensitive tumors such as HPV + oropharyngeal cancer (OPC). Our primary aim was to prospectively validate retrospective work identifying RT dose to submental muscles as a driver of chronic dysphagia. As an exploratory aim we sought to compare various binary splits of videofluoroscopy grades.

Materials and Methods: Forty-one patients with stage III-IV OPC underwent pre- and 3–6 month post-RT videofluoroscopy on an IRB-approved protocol. Dose volume histogram (DVH) for superior/middle pharyngeal constrictor (S/MPC) intrinsic tongue muscle (ITM) geniohyoid (GH) genioglossus (GG) mylohyoid (MH) masseters anterior/posterior digastrics (ADM PDM) and buccinators were calculated. Dysphagia severity was graded per published Dynamic Imaging Grade for Swallowing Toxicity (DIGEST) criteria at 6 months post-RT and dichotomized at ≥ 2 (moderate/severe). Bivariate plots of cumulative dose volume histograms (DVH) by DIGEST were compared with Wilcoxon rank sum test and p-values plotted via heat map analysis.
Results: 39% developed moderate/severe dysphagia 3–6 months after CRT (i.e. $\geq$ grade 2 DIGEST) with higher dose to swallowing muscles illustrated on DVH. After bonferroni correction significant DVH differences were observed for MHM ADM and GGM.
Conclusion: The findings from this prospective longitudinal study validate prior observations that dose to submental musculature predicts increased the burden of dysphagia after the RT in HPV +ve OPC survivors. Findings also support binary split of DIGEST grade ≥ 2 for predictive dose-toxicity analysis of videofluoroscopy results.

DOES ORGAN PRESERVATION MEAN A HIGHER QUALITY OF LIFE? QUALITY OF LIFE AND SWALLOWING FUNCTION IN PATIENTS AFTER TREATMENT OF ADVANCED HEAD AND NECK CANCERS

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Introduction: The treatment of advanced laryngeal or hypopharyngeal cancer consists either of total laryngectomy with adjuvant radiation (LE) or of primary chemoradiation (CR). Overall survival rates are similar for both treatments. The purpose of the study was to identify and compare the impacts of both treatments regarding the swallowing functions and quality of life.
Material and Methods: Patients presenting to our hospital with cT3 laryngeal or hypopharyngeal carcinoma between 2009 and 2015 were included in this study (n = 130). A retrospective analyses of survival probability depending on the treatments LE vs. CR (n = 91) was conducted. Prospective swallowing function and quality of life by the treatment groups LE (n = 12) and CR (n = 4) were established with a cross-sectional study using questionnaires (MDADI EORTC QLQ-C30 EORTC H&N35) and fiberoptic endoscopic evaluation of swallowing (FEES).
Results: No statistically significant difference in the overall survival was seen between the treatments LE and CR although the 2-year-survival rate showed a trend in favour for LE (70.4% vs. CR 56.3%). Both treatments resulted in swallowing disorders. Although these were more threatening in patients after CR because of a higher aspiration probability LE patients felt more handicapped in everyday life due to their dysphagia. They also showed a lower general quality of life a poorer state of health and declared more impairments in regards to functionality as well as severe symptoms of anxiety and depression.
Conclusions: Late effects of CR can result in massive loss of function but in our collective we detected a trend towards a higher overall quality of life in this group. Organ preservation does not equate physiologic function. And physiologic function does not necessarily correlate with the quality of life.

DOES PRE-TREATMENT EDUCATION MODEL IMPACT ON SWALLOW AND NUTRITION OUTCOMES IN HEAD AND NECK CANCER PATIENTS RECEIVING (CHEMO)RADIOTHERAPY?

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Introduction: Speech-language pathology and dietetics/nutrition (SP/DN) input is a vital component to holistic head and neck cancer (HNC) care preventing long-term impacts on function and quality of life. Novel service-delivery solutions to provide sustainable care to this continually growing population are required. This study investigates the viability of providing pre-treatment education in a group model in comparison to traditional individual education to patients with HNC prior to (chemo)radiotherapy treatment.
Material and Methods: This retrospective non-inferiority study examined 191 patients with HNC who attended pre-treatment SP/DN individual (year range 2011–2012) or group education (year range 2013–2014) sessions. Swallowing and nutrition outcome measures in the first week (baseline) and in the final week (final) of (chemo)radiotherapy treatment were retrieved and compared across individual and group education cohorts. Outcome measures included diet and fluid consistency Functional Oral Intake Score (FOIS) weight and percentage weight loss and need for alternative non-oral feeding.
Results: At baseline no statistically significant differences were found between both individual and group education cohorts. At final SP/DN review both individual and group education cohorts yielded similar outcomes for 6/7 swallowing and nutrition measures. A greater proportion of the individual education cohort were unable to tolerate any oral intake at final SP/DN review.
Conclusions: This study found that pre-treatment SP/DN group education was not inferior to individual education in terms of functional outcomes suggesting that group education is a viable clinical alternative. In the current fiscal environment such service-delivery models may assist in addressing the demands of increasing patient numbers and limited clinical resources and delivering best-practice pre-treatment education for patients with HNC.

CAN NEW ASSESSMENT TOOLS PROVIDE GREATER INSIGHT INTO THE NATURE OF DYSGEUSIA DURING AND POST HEAD AND NECK CANCER MANAGEMENT?

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Introduction: Dysgeusia is a common deficit following head and neck cancer (HNC) treatment and can have significant negative impact on oral intake. Although its prevalence is well recognized it is often not formally assessed rather is typically identified from patient report. This prospective case series highlights a comprehensive taste battery used to assess taste perception recognition and intensity during and after radiotherapy. This study also examined the use of taste strips as a quick and easy alternative to a liquid taste test.
Materials and Methods: A case-series of four HNC patients were assessed at baseline during treatment (week 24) and 1 3 and 6 months post-Tx. Participants completed two physiological taste tests: (1) solution-based (liquid) tastants to assess recognition and intensity of salt/sweet/sour/bitter (2) taste strips to assess recognition and intensity of tastants for whole mouth. Patients also completed a taste-related questionnaire (the Chemotherapy-induced Taste Alteration Scale (CiTAS).
Results: Patients had taste changes as early as week 2 with improvements seen by 6 months post-tx but without return to baseline. Taste recognition was stable for liquid tastants. Taste intensity declined on all tastants with some improvement by 3 months. Although the strip test recognition results were comparable to liquid test there was variance between the tools for intensity perception.
Conclusions: Chemoradiotherapy treatment negatively impacts taste resulting in a level of persistent deficit long term. Based on these for cases it appears that recognition of tastants remains however the intensity of perception is most impacted. The mouth strip data was similar but not identical to the liquid testing. Future cohort studies are warranted to assess comparison of these tools. The addition of this comprehensive taste assessment protocol provides important and relevant clinical information that can be collected in a reasonable time frame.

Session 05 Poster session 1.1: Screening and clinical assessment I

*VARIABILITY OF CITRIC ACID COUGH REFLEX TEST: A TIDAL BREATH DOSE–RESPONSE METHOD

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Introduction: A reproducible method is crucial in establishing cough sensitivity. Although reproducibility of the tidal breath dose–response (TB-DR) method using capsaicin has been validated the same method using citric acid is uninvestigated. This study determined the variability across multiple TB-DR cough reflex tests (CRT) on suppressed cough threshold in healthy individuals.
Materials and Methods: Sixteen healthy volunteers underwent five CRT (inter-test interval of at least 30 min) within a single day. The TB-DR method was used to administer 0.1 M increments of citric acid ranging from 0.1 M-1.2 M. Up to three 15 s trials of each concentration (45 s inter-trial interval) were administered via facemask. Placebo trials of saline were randomly interspersed. The suppressed cough threshold was defined as the concentration producing two consecutive coughs on 2/3 trials. Data was analysed using a generalised linear mixed effects model assuming a Gamma distribution and effects are estimated on a logarithmic scale.
Results: The average suppressed cough threshold at the baseline test was − 1.76logM (95% CI [− 3.70 − 0.67]) with an estimated variability across participants of 0.60logM (95% CI [0.001 3.17]). The estimated variability within participants was 0.31logM. No significant effect of repeated tests was observed (p = 0.261). The test effect varied across participants with a standard deviation of 0.16logM (95% CI [0.005 1.02]).
Conclusions: This study defined the variability of the TB-DR method using citric acid. There was no systematic trend in responses observed over the course of five CRT. However large within and between participant variabilities may reduce accuracy in interpretation of CRT results.

*IDENTIFYING AND PROFILING PRE-CLINICAL DYSPHAGIA IN COMMUNITY DWELLING OLDER ADULTS

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Introduction: Increasing evidence suggests that community dwelling elderly (CDE) are at risk for dysphagia. Furthermore swallowing difficulties are often unidentified until swallowing-related negative morbidities like under nutrition or pneumonia occur. These cases of unidentified dysphagia prior to any clinical intervention may be termed 'pre-clinical dysphagia'. Identifying pre-clinical dysphagia is challenged by the lack of validated tools appropriate for CDE. This study developed and validated a novel patient reported outcome (PRO) screening tool for pre-clinical dysphagia in the CDE.
Materials and Methods: Literature review and expert opinion were used to generate a comprehensive tool that measured multiple domains that were theoretically thought to relate to the development of pre-clinical dysphagia in the CDE. Following pilot application in two cohorts (N = 53 and N = 335) the tool was revised and evaluated in a third large cohort of 317 CDE.
Results: Item analysis and psychometric validation procedures resulted in a tool with 17 questions. This tool demonstrated strong psychometric properties including reliability (Cronbach's alpha = 0.908); construct validity (via exploratory factor analysis and partial confirmatory factor analysis) and concurrent validity against a validated tool the EAT-10 (rho = 0.719). Additionally the pre-clinical dysphagia screener demonstrated high sensitivity (80.3) specificity (82.6) and negative predictive value (96); indicative of good potential to screen for pre-clinical dysphagia.
Conclusions: This study developed a psychometrically sound novel PRO tool that considers multiple domains contributing to pre-clinical dysphagia in CDE. By considering domains not included in other dysphagia screeners this novel PRO tool is more comprehensive than current screeners is easy to complete and disseminate and has high potential to help in early identification of pre-clinical dysphagia in CDE.

SUBMENTAL SEMG AS A SURROGATE FOR LINGUAL-PALATAL PRESSURE MEASURES IN HEALTHY ADULTS

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Introduction: The submental sEMG signal comes from muscles located in the floor of the mouth which also contribute to lingual functions. Therefore submental sEMG amplitude may be sensitive to

lingual motor activities such as lingual-palatal pressure. The aim of this study was to determine if submental sEMG can function as a surrogate for lingual-palatal pressure in a lingual press task.

Lingual Press Level	sEMG Measures	r	p
40 % of Max.	Average	0.368	0.025*
	Peak	0.354	0.032*
60 % of Max.	Average	0.296	0.075
	Peak	0.256	0.127
80 % of Max.	Average	0.433	0.007*
	Peak	0.416	0.011*
Max.	Average	0.428	0.008*
	Peak	0.416	0.010*
sEMG, surface electromyography; r, Pearson's r, Max, Maximum lingual-palatal pressure.			* $p < 0.05$

Methods: 37 healthy adults participated in this study. The age range was 20–69 (42.68 SD = 17.53). The Synchrony sEMG system was used to collect submental sEMG data and Iowa Oral Performance Instrument (IOPI) was used to measure lingual-palatal pressure. sEMG and lingual pressures were collected simultaneously. Submental sEMG amplitude was evaluated at four different levels of a lingual press task: (1) maximum lingual-palatal pressure (2) 40% of maximum (3) 60% of maximum and (4) 80% of maximum. Each lingual press lasted for a second. Submental sEMG peak (μv) and average (μv) amplitudes were measured for each lingual task and subsequently correlated with lingual-palatal pressure (kPa) for the corresponding lingual press tasks. To investigate relationships bivariate correlation coefficients (Pearson's r) were completed between submental sEMG peak and average values and lingual-palatal pressure at each of the 4 lingual press levels.
Results: Relationships between submental sEMG amplitude and lingual-palatal pressure are shown in Table 1. Significant correlations were obtained for 40% of maximum lingual-palatal pressure 80% of maximum lingual-palatal pressure and maximum lingual-palatal pressure tasks for both peak and average sEMG values. These results suggest moderate but significant relationships between submental sEMG amplitude and lingual-palatal pressure.
Conclusions: In healthy adults submental sEMG amplitude may function as a surrogate for direct lingual-palatal pressure measurement. Stronger correlations were noted at higher lingual pressure levels.

CLINICAL ASSESSMENT OF DYSPHAGIA IN NEURODEGENERATION (CADN): DEVELOPMENT, VALIDITY AND RELIABILITY

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Background: Screening assessments for dysphagia are essential in disease management of neurodegenerative disease. There are few purpose-built tools to quantify swallowing deficits at bedside. A quantifiable brief easy to administer assessment that measures the impact of dysphagia and predicts the presence or absence of aspiration is needed.
Methods: The Clinical Assessment of Dysphagia in Neurodegeneration (CADN) was designed by a multidisciplinary team (neurology neuropsychology speech pathology) and validated against strict methodological criteria in two neurodegenerative diseases Parkinson's disease (PD) and degenerative ataxia (DA). CADN comprises two parts an anamnesis (part one) and consumption (part two). Two thirds of patients were assessed using reference tests the SWAL-QOL symptoms subscale (part one) and videofluoroscopic assessment of swallowing (part two). CADN has 11 items and can be administered and scored in an average of 7 min. Test–retest reliability was established using correlation and Bland–Altman plots.
Results: 125 patients with a neurodegenerative disease were recruited; 60 PD and 65 DA. Validity was established using ROC graphs and correlations. CADN has sensitivity of 79% and 84% and specificity 71% and 69% for parts one and two respectively. Significant correlations with disease severity were also observed ($p < 0.001$) for PD with small to large associations between disease severity and CADN scores for DA. Cut off scores were identified that signal the presence of clinically meaningful dysphagia symptomatology and risk of aspiration.
Conclusions: The CADN is a reliable valid brief quantifiable and easily deployed assessment of swallowing in neurodegenerative disease. It is thus ideally suited for both clinical bedside assessment and future multicentre clinical trials in neurodegenerative disease.

VALIDATION OF THE DYMUS, A QUESTIONNAIRE FOR THE ASSSESSMENT OF DYSPHAGIA, IN AUSTRALIAN ADULTS WITH MULTIPLE SCLEROSIS

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Objective: The DYMUS questionnaire is a self-administered tool used to identify swallowing problems in adults with MS. The purpose of this study is to assess the validity and reliability of the DYMUS questionnaire against another questionnaire; EAT-10.
Method: English-speaking adults with MS in a region of Australia completed two questionnaires across two phases. Statistical analyses were performed to investigate the psychometric properties of the DYMUS questionnaire.
Results: Factor analysis reduced ten items in the DYMUS to five only. This revised version of DYMUS showed good internal consistency (alpha = 0.904) which has improved with the elimination of five questions resulting in a five item questionnaire. The revised questionnaire showed satisfactory reproducibility and strong correlation with the EAT-10 questionnaire (r = 0.748).
Conclusion: Evaluation of this questionnaire resulted in a revised questionnaire with five general questions related to dysphagia. This questionnaire is considered short and useful in identifying patients with dysphagia at an early stage of MS.

APPLICATION OF THE TEST OF MASTICATING AND SWALLOWING SOLIDS (TOMASS) IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

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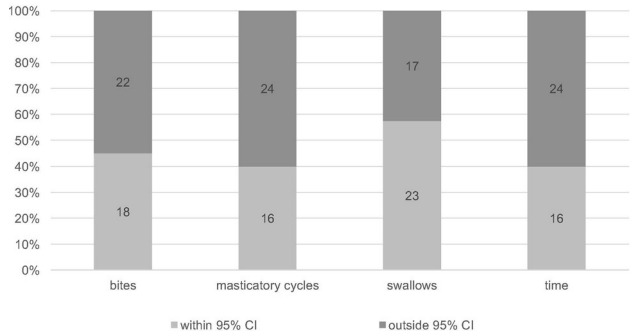
Introduction: The Test of Masticating and Swallowing Solids (TOMASS) is a standardized validated tool for quantitative assessment of solid bolus ingestion. In patients with Chronic Obstructive Pulmonary Disease (COPD) swallowing be impaired by breathing-

swallowing dyscoordination and reduced oropharyngeal muscle function (Gross et al. 2009 Coelho 1987). We investigated the validity of the TOMASS in patients with COPD and effects of COPD severity (GOLD stage) age and gender on the TOMASS parameters.

Fig 1: Performance of COPD patients (n=40) during the Test of Masticating and Swallowing (TOMASS) – comparison with normative data (95% CI)



Methods: The TOMASS was conducted with one DeBeukelaer Tuc ClassicTM cracker per patient. During eating the TOMASS parameters (1) discrete bites (2) masticatory cycles (3) swallows (4) total time to finish the cracker were counted. Ratings of these parameters were compared with independent second ratings (interrater reliability) and with age- and gender-matched normative data (construct validity). Differences between the groups (GOLD stage age gender) were analyzed with the non-parametric Kruskall-Wallis and Mann–Whitney tests.

Results: 40 COPD patients (m = 25 f = 15 age M = 72.1) participated. Interrater agreement was excellent for 'bites' and 'swallows' ($\kappa = 1.000$ $p = 0.000$) and moderate for 'masticatory cycles' ($\kappa = 0.536$ $p = 0.000$) and 'total time' ($\kappa = 0.543$ $p = 0.000$). More than 50% of the patients deviated from normative ranges in 'bites' 'masticatory cycles' and 'total time' to finish the cracker and more than 40% with respect to 'swallows' (Fig 1). No differences were found between the GOLD-stage groups ($p > 0.05$). Females needed more bites ($p > 0.009$) and time ($p > 0.040$) and older participants needed more bites ($p > 0.029$) masticatory cycles ($p > 0.009$) and time ($p > 0.001$).

Conclusions: The TOMASS is a reliable tool that is sensitive to detect changes in the efficiency of solid bolus ingestion in patients with COPD. While we found no effect of the GOLD stage our results confirm previous findings of age and gender effects on the TOMASS parameters (Huckabee et al. under review).

SCREENING OF OROPHARYNGEAL DYSPHAGIA WITH THE P-EAT -10 AND MECV-V IN A PUBLIC HOSPITAL: AN INTERDISCIPLINARY PROJECT

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Introduction: Oropharyngeal dysphagia (OD) refers to swallowing dysfunction and can affect efficacy of swallowing causing malnutrition or dehydration and can also affect safety of deglutition with potential complications such as aspiration pneumonia and high costs for the Health System. Patients with OD should be identified as soon as possible to minimize these consequences. In many hospitals there is a big discrepancy between the high prevalence morbidity mortality and costs caused by nutritional and respiratory complications of OD and the restricted availability of human and material resources dedicated to dysphagic patients.

Aim: (1) to know the prevalence of OD in a public hospital; (2) reduce the consequences associated with OD; (3) awareness of the importance of including the diagnosis of OD in medical reports.

Methods: Development of an interdisciplinary project (SLP and nurses) for the early detection of OD using selected screening instruments: P-EAT-10 and MECV-V. Between june and november 2016: (1) 11 training sessions lasting 4 h for nurses; (2) parametrization of screening instruments in the informatic system; (3) January 2017 OD screening to all adult and elderly patients;(4) the first survey of the prevalence of OD in the context of the World Deglutition Day promoted by the ESSD was carried out.

Results: 360 nurses were trained from June to November 2016. A total of 407 patients studied showed a OD prevalence of 21.3%. These had one or several risk factors mainly with Stroke (67.8%) or $\geq$ 65 years (61.9%).

Conclusions: We observe changes in daily practice individual behaviors with the definition of objectives and strategies based on screening results for OD in accordance with preventive health care and rehabilitation. We observed an empowerment of the interdisciplinary team in the provision of health care in the various departments of the Hospital. Proposal: perform a new survey of the prevalence of OD in June 2017 with comparison of the results.

Session 05 Poster session 1.2: Instrumental assessment and dysphagia diagnosis I

*STAMPS - DEVELOPMENT AND VERIFICATION OF SWALLOWING KINEMATIC ANALYSIS SOFTWARE

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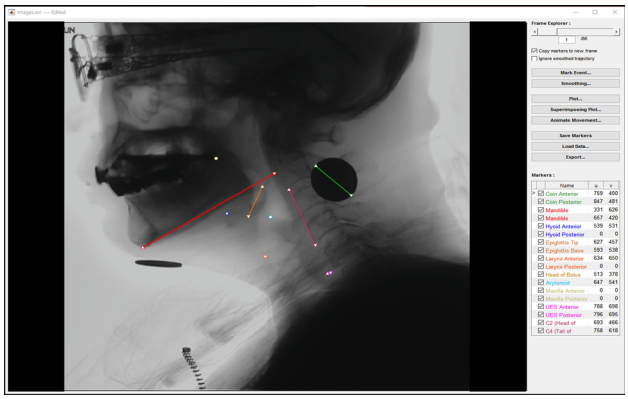
Introduction: The swallowing kinematic analysis is essential for the quantitative evaluation of swallowing and the investigation of the oropharyngeal structure motions. This study aims to develop a novel swallowing kinematic analysis software called spatio-temporal analyzer for motion and physiologic study (STAMPS) and verify its validity and reliability.

Material and Methods: STAMPS is developed in MATLAB which is one of the most popular platforms in biomedical analysis researches used to process and analyze the spatio-temporal data of swallowing (Fig 1). This software is constructed to easily and efficiently acquire process and analyze the swallowing motion data. The target swallowing structures of the digitization include bony structures (hyoid bone mandible maxilla and cervical vertebral bodies) cartilages (epiglottis and arytenoid) soft tissues (larynx and upper esophageal sphincter) and food bolus. Numerous functions using spatio-temporal parameters are available for the following swallowing structures: displacement angular change linear velocity in horizontal/vertical/two-dimensional direction and/or angular velocity.



Results: The intra- and inter-rater reliability tests show excellent agreement for displacements and moderate to excellent agreement for velocities in 10 dysphagic patients with diverse etiologies. The Pearson correlation coefficients between the measured and instrumental reference values are nearly 1.00 ($P < 0.001$) for linear/angular displacements and velocities. The Bland–Altman plots showed good agreement between the measurements and the reference values.
Conclusions: STAMPS provides precise and reliable kinematic measurements and multiple practical functionalities for temporal and spatial analyses. The software is expected to be valuable for researchers interested in the swallowing motion analysis.

*GOOD APPEARANCE OF DIET INCREASES REWARD-RELATED BRAIN ACTIVITY: A FUNCTIONAL MRI STUDY

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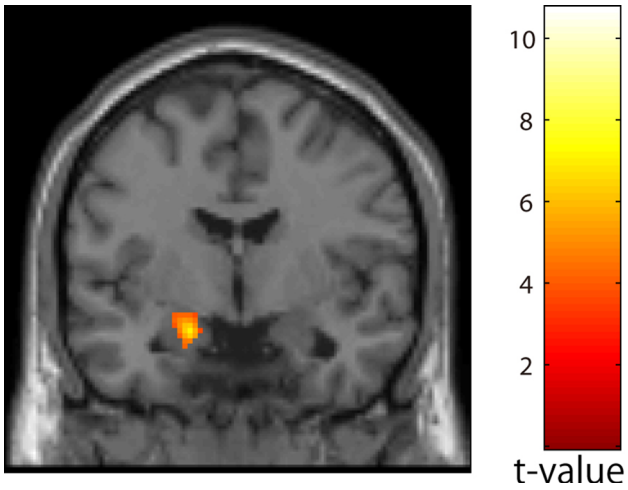
Introduction: Modified diets such as blender diets are wildly served for dysphagia patients. However these diets often make patients lose their appetite because the appearance of these diets is different from normal diets. iEat® a new form of food has natural appearance and softness and thus has a potential to be served for dysphagia patients. A previous psychological study using a subjective rating has reported that iEat® could stimulate appetite. In the present neuroimaging study we investigated brain activity of healthy volunteers during visual presentation of iEat® using functional magnetic resonance imaging (MRI).
Material and Method: Brain activities of 20 healthy adults were measured when pictures of iEat® blender diets and non-food objects were presented. GE 1.5 T MRI scanner (Optima MR360 Advance) was used for data acquisition. The data were analyzed using SPM12 software. This work was approved by the local ethics committee and supported by KAKENHI (16H03201).



Results: Compared to the visual presentation of blender diets and non-food objects the visual presentation of iEat® mainly activated the left amygdala which is known as a part of reward-related brain structures. The activity in the left amygdala was positively correlated with the subjective rating of appetite toward iEat®.
Conclusion: Visual presentation of iEat® a new form of food with good appearance and softness mainly increases the activity in the left amygdala. Together with the previous study the present physiological study supports the notion that iEat® can sharpen appetite.

A SYSTEMATIC REVIEW ON THE RELATION OF PENETRATION ASPIRATION AND RESIDUE IN DYSPHAGIC PATIENTS WITH QUANTITATIVE TEMPORAL MEASURES ON VIDEOFLUOROSCOPY

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Introduction: Quantitative temporal measures of swallowing physiology have been studied during videofluoroscopic evaluation to understand how they may impact swallow safety and efficiency. This knowledge is critical to understand and plan therapeutic interventions. The purpose of this systematic review was to assess the available evidence relating temporal measures during videofluoroscopy and the events of penetration aspiration and residue in adult patients with dysphagia regardless of etiology.
Materials and Methods: Operational definitions of relevant terms were defined a priori including: oropharyngeal dysphagia videofluoroscopic assessment of deglutition quantitative temporal measures penetration aspiration and residue. A structured search was conducted to 24/11/2016 without restriction to language using multiple databases. Two independent raters reviewed the abstracts and later the full

articles according to a priori criteria. All accepted articles advanced to data extraction and the critical appraisal both conducted according to the Cochrane protocol.
Results: Of the 16 articles accepted the temporal measures used by more than one author were classified in five broad categories: (1) transit time; (2) closure time; (3) response time; (4) opening time; and (5) movement time. Across all articles critical appraisal revealed that 35% of the articles did not assess reliability of their temporal measures 94% did not describe important characteristics of the study population and 88% failed to declare if the raters of outcomes were blinded to one another. The pharyngeal transit time swallow response time and duration of upper esophageal sphincter opening were measures most related to aspiration. In contrast temporal measures of vestibular laryngeal closure and hyoid displacement were not strongly associated with aspiration.
Conclusion: Across existing studies videofluoroscopic temporal measures have mixed associations to the pathophysiologic findings of deglutition.

THE INFLUENCE OF AGE, GENDER, LOCATION, VISUAL FEEDBACK AND CONSISTENCY ON LINGUAL MAXIMUM (MIP) AND SWALLOWING PRESSURES (PS) IN HEALTHY BELGIAN ADOLESCENTS

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Introduction: Maximum isometric tongue pressures (MIP) lingual swallowing Pressure (Ps) and influencing factors are well studied in healthy Belgian adults. However these parameters have not been studied before in teenagers.
Materials and Methods: 80 healthy teenagers with ages ranging from 12 to 19 years old were studied. Exclusion criteria were a history of dysphagia/dysarthria oral motor impairment use of 'special needs' (incl SLP-therapy) and oral cavity surgery (beyond routine dental surgery) or active orthodontics. The IOPI with standard tongue bulbs was used to collect the measurements with Ps defined as the highest value of 3 trials per condition. Boluses used were saliva non-sparkling water (5 ml) and unsweetened natural yoghurt (5 ml). Several conditions were studied: age sex anterior or posterior position and visual feedback (VFB). Analysis used Mixed Models ANOVA and pairwise comparisons with appropriate post hoc testing.
Results: All measurements were successful indicating excellent feasibility. No differences in MIP or Ps were found for gender or location and any of the swallowing tasks. Age revealed differences in anterior saliva Ps between 16 and 18yo during saliva swallows and 15 vs 18–19 yo for semisolids at the posterior position. Use of VFB resulted in significant higher Ps for all consistencies.
Conclusions: This first study on Ps in teenagers show no gender and only minimal age differences during teenage years. Use of VFB results in higher Ps across all tests. These data can form the starting point for guided rehabilitation of dysphagia in teenagers.

RADIAL ASYMMETRY IN PHARYNGEAL PRESSURE: COMPARISON OF UNIDIRECTIONAL AND CIRCUMFERENTIAL MANOMETRIC MEASURES

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Introduction: Manometry was designed for the radially-uniform oesophagus but is used without adaptation to evaluate the asymmetric pharynx which is different in both form and function. This study investigated differences in unidirectional (i.e. conventional) and circumferential manometry by evaluating radial asymmetry during swallowing which provides insight into how asymmetry is represented in high-resolution manometry (HRM). This may provide insight into variability in existing normative data across conventional and HRM.
Material and Methods: Ten healthy subjects (mean age 29 years) were evaluated with both a 2.1 mm unidirectional and a 2.75 mm circumferential catheter with order of catheter placement randomised. Unidirectional measurements were made in four directions (posterior anterior and right/left lateral). Variability within a direction measured by the coefficient of variation (CV) and the area under the curve (i.e. integral) were analysed comparing posterior to anterior/lateral and circumferential recordings.
Results: There were differences between posterior versus lateral pharyngeal integrals with reduced area under the curve in lateral right (upper $p = 0.02$; distal pharynx $p = 0.02$) and lateral left directions (upper pharynx $p = 0.04$; distal pharynx $p = 0.01$). No significant differences were found between anterior and posterior directions. There were no significant differences in CV between posterior and unidirectional recordings. However circumferential measures (e.g. HRM) had increased CV of 64% (95% CI 15–136%) in the upper pharynx ($p = 0.01$) compared to posterior measures.
Conclusions: Radial asymmetries lead to increased variance in circumferential recordings providing some explanation for differences in normative data between unidirectional and circumferential manometry. Further research is needed with simultaneous adjunctive instrumentation such as videofluoroscopy to characterise these differences in manometric pressures.

THE RELATIONSHIP BETWEEN LARYNGOPHARYNGEAL SESATION AND PHARYNGEAL MOTOR FUNCTION IN THE EVALUATION OF PATIENTS FOR SUSPECTED ASPIRATION OF PUREED FOOD

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Introduction: The study goal was to evaluate the association among laryngopharyngeal sensory deficits pharyngeal motor function and the

risk of aspiration of pureed food by the use of flexible endoscopic evaluation of swallowing with sensory testing.
Material/Method: Hundred dysphagic patients underwent flexible endoscopic evaluation of swallowing with sensory testing and were prospectively divided into 2 groups with normal and severe sensory deficits. Each group was divided into those with normal and those with impaired pharyngeal squeeze. The patients were given pureed food boluses and the prevalence of aspiration in each group was compared.
Results: There was a significant difference in the incidence of aspiration of pureed foods for normal and sensory loss when comparing normal and impaired pharyngeal squeeze
Discussion: Patients with diminished laryngopharyngeal sensation and pharyngeal motor function are at significantly greater risk for aspiration of pureed foods. These results emphasize the relationship between laryngopharyngeal sensation and pharyngeal motor function in the evaluation of patients for suspected aspirationThe aspiration of pureed foods depends more on pharyngeal motor function than on sensation. Dysphagic patients who are given pureed foods to prevent aspiration may still be at risk for aspiration. This may be predicted by the use of flexible endoscopic evaluation of swallowing with sensory testing.

EFFECTS OF HEAD ROTATION ON PHARYNGEAL AND UPPER ESOPHAGEAL SPHINCTER PRESSURES–A STUDY USING HIGH RESOLUTION MANOMETRY–MANOMETRYY

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Introduction: Head rotation has been used as a compensation technique for dysphagia patients. However few studies have investigated the physiological effects of the head rotation in detail. In this study we observed changes in pharyngeal and upper esophageal sphincter (UES) pressures during swallowing in healthy individuals using high-resolution manometry (HRM).
Methods: Fifteen healthy subjects (33 ± 8 years old) were recruited. A participant was seated in upright position and a HRM catheter was inserted transnasally. The subject swallowed 3 ml thick liquid in the neutral head position and in the head position rotated toward the catheter and away from the catheter by 30° and 60°. Swallow at each head position was repeated twice in a random manner. Videoendoscopy was performed to confirm the location of the HRM catheter at the UES level. The maximum pressures in upper pharynx and tongue base UES pressures and UES activity time (time lapse between maximum peak pressures preceding and succeeding UES opening) were measured. Nine subjects in which the location of the HRM catheter was not changed regardless of the head position were analyzed in this study.
Results: UES pressures at rest on ipsilateral head rotation at 60°and 30° neutral head position contralateral head rotation at 30°and 60°were 103 ± 29 136 ± 59 100 ± 39 56 ± 27 and 58 ± 28 mmHg respectively. UES pressure at rest was significantly higher on ipsilateral head rotation at 60°and lower on contralateral head rotation at 30°and 60° as compared to neutral head position. UES activity time and nadir pressure was not significantly changed. The maximum pressure in upper pharynx was significantly lower on contralateral head rotation at 60°.
Conclusions: Head rotation may smooth food transfer by decreasing the pressure in the contralateral side of UES. Although further study is needed in dysphagia patients with UES dysfunction head rotation up to 30°may be sufficient to decrease the UES pressure.

SYNCHRONIZED VIDEORADIOGRAPHY S-EMG AND MANOMETRY: A STUDY OF ORO-PHARYNGEAL SWALLOWING IN HEALTHY VOLUNTEERS

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Introduction: Oropharyngeal dysphagia are common and often require multimodal evaluation. The introduction of computer assisted examination combining and synchronising different imaging modalities has vastly improved the ability to evaluate the physiology of oropharyngeal swallowing including the relationships between luminal pressures neuromuscular signals and structural as well as bolus movements. The aim of the present study in healthy volunteers was therefore to characterize and establish reference values for some variables of potential interest in the evaluation of oropharyngeal swallowing by means of simultaneous and synchronized video-radiography surface electromyography(s-EMG) and manometry.

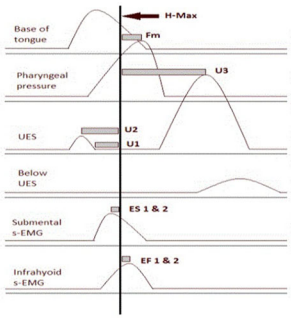
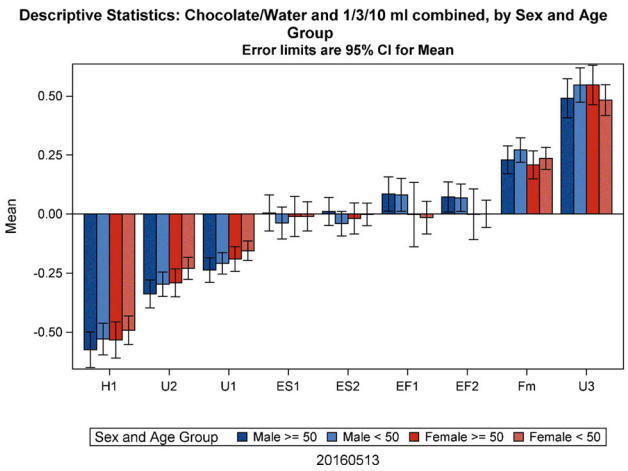


Fig 2: Swallowing time intervals from H-max to video-radiographic and manometric events
From H-max to:
1) First elevation of larynx seen on video-radiography, ***HI,***
2) first tag of UES, ***U2,***
3) first entrance to residual pressure, ***U1,***
4) maximum amplitude of the submental s-EMG, ***ES1 &2,***
5) maximum amplitude of infrahyoid s-EMG, ***EF1& 2,***
6) calculated maximum pressure of pharyngeal pressure, ***Fm,***
7) calculated second tag of UES, ***U3***
The first and fourth graphs from top represent the pressure at the base of the tongue and oesophageal pressure immediately below UES (not included in study)

Material and Methods: 24 healthy volunteers 11 men and 13 women(mean age 47.8) enrolled and subjected to a complete ENT and neurol. evaluation including FEES. Combined video-radiography infrahyoid and submental s-EMG and a manometric examination registered and synchronized. Boluses of 1310 ml swallowed. Time intervals calculated in relation to the H-max e.g. the most antero-cranial position of the Hyoid bone (Fig. 1).



Results: Maximum cranial-ventral excursion of the hyoid (H-max) was simultaneous or closely simultaneous to the maximum elevation of larynx. H-max was in turn strongly correlated with the opening phase of UES e.g. the lowest pressure period between the two peaks of UES (U2 and U3). H-max and the peak of s-EMG signals coincided with the time interval between the 2 tags of the M-shaped UES the interval with low residual pressure during which the bolus passes through UES on video radiography. Figure 2 illustrates a whole single swallowing process and demonstrates a linear correlation between the time intervals.
Conclusion: Evaluation as above offer improved understanding of the physiology of swallowing and differantiate between laryngeal elevation disturbancies and peristaltic disturbancies. s-EMG is a useful noninvasive investigation tool.

Session 05 Poster session 1.3: Dysphagia in neurodegenerative diseases I

*PATHOPHYSIOLOGY OF BOLUS INEFFICIENCY IN OCULOPHARYNGEAL MUSCULAR DYSTROPHY

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Purpose: Although dysphagia is common in individuals with oculopharyngeal muscular dystrophy (OPMD) [1] few studies have studied swallowing efficiency profiles and contributing pathophysiology in this population. We therefore aimed to: (1) delineate swallowing profiles and (2) determine pathophysiology of swallowing inefficiency in individuals with OPMD.
Methods: 22 OPMD patients were recruited from a university neurology clinic and underwent a standardized videofluoroscopic swallow study (thin nectar honey-thick liquids pudding cracker). Blinded frame-by-frame analyses were completed and included: Dynamic Imaging Grade of Swallowing Toxicity (DIGEST) Normalized Residue Ratio scale (NRRS) and mechanisms of laryngeal vestibule closure (LVC). Descriptive statistics were performed to characterize swallowing profiles (Aim 1). Between-group ANOVAs were utilized to compare physiologic swallowing parameters across efficiency groups (Aim 2).
Results: Of the 163 individual bolus clips analyzed 87.9% were characterized as inefficient (NRRSv $\geq$ 0.07; NRRSp $\geq$ 0.20). Further DIGEST analyses indicated efficiency was impacted in 96.2% of the cohort. Inefficient OPMD swallowers demonstrated incomplete LVC attributable to incomplete epiglottic inversion and arytenoid to base of epiglottis contact resulting in significant vallecular [NRRSv: $F(1108) = 12.979$ $p < 0.00$] and piriform sinus residue [NRRSp: $F(1113) = 40.437$ $p < 0.001$].
Conclusions: Swallowing inefficiency was noted in nearly every analyzed swallow and attributable to poor epiglottic inversion and incomplete laryngeal vestibule closure. Elucidating specific pathophysiology contributing to dysphagia provides rationale for dysphagia treatment including implementation of rehabilitative and compensatory strategies. Strategies targeting epiglottic inversion (e.g.via laryngeal elevation and pharyngeal contraction) such as the Mendelsohn maneuver and effortful swallow may be efficacious rehabilitation approaches.

*SPINAL MUSCULAR ATROPHY: BULBAR PROBLEMS ACROSS DIFFERENT TYPES OF SMA

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[1]University Medical Centre Utrecht, Rudolf Magnus Institute of Neuroscience, Department of Neurology, Netherlands; [2]Radboud university medical centre, Donders Centre for Neuroscience, Department of Rehabilitation, Netherlands

Introduction: Spinal Muscular Atrophy (SMA) is a progressive autosomal recessive neuromuscular disease leading to weakness that is most pronounced in axial proximal arm and leg and respiratory muscles. Four types of SMA (type I II III and IV) are identified based on age of onset and acquisition of two specific motor milestones i.e. sitting and walking independently. Feeding and swallowing problems are reported (1). The aim of this study was to investigate the prevalence of bulbar problems (speech swallowing) with a questionnaire for patients.

	SMA type I (n=13)	SMA type II (n=53)	SMA type IIIa (n=28)	SMA type III b and IV (n=25)	*p*-Value*
Median Age at inclusion (range)	7.26 (1-38)	18.63 (1-72)	34.52(6-64)	50.38(16-75)	< 0.001
Reported problems, n (%):					
Difficulty swallowing solid food	6 (46)	15 (28)	9 (32)	3 (12)	< 0.001
Choking	10 (77)	29 (55)	17 (61)	11 (44)	0.255
Coughing with solid food	8 (62)	12 (23)	8 (29)	7 (28)	0.053
Food sticking in throat	4 (31)	23 (43)	8 (29)	5 (20)	0.169
Fatigue during chewing	10 (77)	26 (49)	8 (29)	8 (32)	0.015
Jaw problems: (limited mouth opening, problems biting off hard foods)	4 (31)	20 (38)	9 (32)	7 (28)	0.809
Short of breath when talking	6 (46)	12 (23)	4 (14)	5 (20)	0.15
Exhausted after talking	5 (39)	8 (15)	4 (14)	5 (20)	0.134
People ask to repeat	6 (46)	13 (25)	5 (18)	4 (16)	0.171
People ask to repeat in noisy environment	9 (69)	2 (42)	12 (43)	5 (20)	0.030
Sore throat	2 (15)	11 (21)	7 (25)	6 (24)	0.906
Insufficient loudness of voice	4 (31)	18 (34)	6 (21)	3 (12)	0.174

Table 1. Data of the questionnaire * *P-Value* for differences between the SMA subgroups

Materials and Methods: An adapted (Dutch) questionnaire consisting of 35 questions related to complaints on feeding mastication and swallowing and 6 questions related to speech was sent by email to patients with a genetically confirmed diagnosis of SMA. Differences between subgroups were tested using Kruskall and Chi^2 test or Fisher Exact Test when appropriate.
Results: The questionnaire was returned by 119 patients. Results are summarized in Table 1. Dysphagia and fatigue were the most common complaints irrespective of SMA severity. Although complaints are less frequent in the milder types of SMA (type IIIb and IV) swallowing mastication and jaw problems were still reported by nearly 30%. Swallowing problems were reported almost exclusively in solid foods. Speech problems were also common in SMA type I and II. Insufficient voice loudness in combination with shortness of breath and decreased speech intelligibility were reported.
Conclusion: Our study shows a higher prevalence of bulbar problems both dysphagia and dysarthria than previous studies (2). This might be explained by baseline differences for example nearly one third of the responding patients from our study is older than 40 years. With this study we show that significant bulbar problems are reported in all types of SMA patients. Further research is needed in order to develop treatment strategies for speech mastication and swallowing problems.

THE DISCREPANCY BETWEEN PATIENT PERSPECTIVE ON SWALLOWING AND CLINICAL FINDINGS IN PARKINSON'S DISEASE

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Introduction: Aim of this study was to evaluate the relationship between dysphagia-related quality of life (MD Anderson Dysphagia Inventory (MDADI) and Dysphagia Severity Scale (DSS)) and the severity of dysphagia (fiberoptic endoscopic evaluation of swallowing (FEES) and videofluoroscopy (VFS)) in Parkinson disease (PD).
Material and Methods: Ninety dysphagic PD patients completed the MDADI (Dutch neurogenic version) DSS and a standardized FEES and VFS examination with 10 cc thin 10 cc thick liquid boluses and a bite-sized cracker. Two blinded clinicians performed visuoperceptual ordinal ratings of FEES and VFS variables. Patients were divided in 3 clinical patient labels: oral pooling or aspiration. It was possible for one patient to have multiple labels. The oral group scored abnormal on mastication and/or oral residue and/or posterior spill and/or piecemeal deglutition. The pooling group consisted of patients who scored abnormal on vallecular and/or pyriform sinus pooling. The aspiration group scored abnormal on the penetration/aspiration scale. Exclusion criteria: presenting with a concurrent neurological disease; scoring below 23 on a Mini Mental State Examination; being older than 85 years; having undergone head and neck surgery; and being illiterate or blind. Neural network analysis in SPSS was used to detect any relationship between the clinical patient label groups and the MDADI and DSS outcome.
Results: Observer agreement was sufficient (Kappa $\geq$ 0.6). Neural network analysis could not reveal any relationship between the 3 clinical patient label groups and the MDADI and the DSS.
Conclusions: Although all PD patients reported dysphagia-related quality of life issues in the present study the MDADI and DSS cannot be used as an indicator for the severity of dysphagia neither can VFS or FEES predict the dysphagia-related quality of life scores. Both dysphagia-related quality of life and swallowing findings (FEES and/or VFS) should be measured in PD patients.

*IS TONGUE STRENGTH IN PARKINSON'S DISEASE RELATED TO SWALLOWING CAPACITY?

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Introduction: Motor disorders in Parkinson's disease (PD) are characterized by hypokinesie and rigidity but generally not by muscle weakness. However there is an ongoing debate about tongue strength in PD and whether it relates to dysphagia.
Materials and Methods: We used the Iowa Oral Performance Instrument (IOPI) to assess tongue strength in 33 community-dwelling patients with PD (27 men). The anterior and posterior tongue strength (maximum isometric pressure in kiloPascal) and endurance (in seconds) were measured following the protocol that was used to collect normal values in Belgium [1]. In addition disease duration Hoehn & Yahr stage age and length were collected as well as the maximum swallowing speed (MSS in ml/s) and the severity of patients' complaints about speech swallowing and drooling with the Radboud Oral Motor inventory for Parkinson's disease (ROMP).
Results: Mean age was 71 years (SD 7.3) and mean disease duration 7 years (SD 7.8). The mean outcomes versus normal values were for anterior strength 41.8 kPa vs. 38.6 kPa ($p = 0.23$) posterior strength 35.5 kPa vs. 36.6 kPa ($p = 0.69$) anterior endurance 14.6 s vs. 25.1 s ($p = 0.00$) and posterior endurance 10.0 s vs. 16.5 s ($p = 0.00$). When comparing by age group strength was equal in all groups but higher in group 71–80 ($p = 0.02$) and endurance was lower in group 61–70 years ($p = 0.03$). Tongue strength and endurance remained stable with H&Y stage and did not correlate with MSS or ROMP-swallowing but strength ($r = 0.52$ with $p < 0.01$; $r = 0.43$ with $p < 0.05$) and anterior endurance ($r = 0.39$ with $p < 0.05$) correlated with the ROMP-drooling. However MSS was significantly dependent from age and H&Y stage ($p = 0.04$) and the total ROMP score from H&Y stage ($p = 0.00$).
Conclusion: Tongue strength does not seem to be diminished in patients with PD when compared with Belgian normal values while swallowing capacity decreases with age and disease severity as expected. A larger study is underway to collect data for more robust conclusions.

OBJECTIVE MEASUREMENTS OF SWALLOWING AND STRENGTH IN OCULOPHARYNGEAL MUSCULAR DYSTROPHY (OPMD)

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Introduction: Oculopharyngeal muscular dystrophy (OPMD) is a very rare late onset progressive neuromuscular disorder. The most common features are ptosis and dysphagia. Currently there is a profound lack of knowledge about oropharyngeal disorders in OPMD. As part of an international research program we designed an intensive protocol (OPMD-Forte) to describe the natural history [1]. Here we present the first data of oropharyngeal functioning of a large group of OPMD-patients.
Material and Methods: Fifty participants (27 women; mean age 61 years; SD 8.5) including asymptomatic patients were recruited and measured with the following objective measurements: maximum swallowing speed (MSS) maximum swallowing volume (MSV) maximum anterior tongue strength (Iowa Oral Performance Instrument) and maximum bite force (VU University Bite Force Gauge).
Results: The mean MSS was 10.3 ml/s (SD 7.0) compared to the reported normal mean value of 17.8 ml/s (SD 4.8). The mean MSV was 28 ml (SD 19.0) compared to mean normal value of 60 ml (SD 16). Mean maximum anterior tongue strength for women was 32.4 kPa (SD 12.8) and for men 31.2 kPa (SD 16.1) compared to normal values for women 58 kPa and men 56.8 kPa [2]. Mean maximum bite force for women was 12.8 kg (SD 7.5) and for men 17.3 kg (SD 6.7). The strongest correlations were between MSS and tongue strength 0.552 ($p = 0.000$) and between MSV and maximum bite force 0.537 ($p = 0.000$).

Conclusions: In OPMD swallowing capacity is substantially reduced and maximum anterior tongue strength is almost 50% decreased; this has been found in previous research with a small sample size (2; n = 11) but now confirmed in a larger OPMD population (n = 50). Moreover in OPMD reduced swallowing capacity correlates with lower maximum forces of tongue press and biting.

TYPICAL SWALLOWING COMPLAINTS IN OPMD

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Introduction: Oculopharyngeal muscular dystrophy (OPMD) is a very rare late onset slowly progressing neuromuscular disorder with dysphagia and ptosis as the most common features. As part of an international research program we designed an intensive protocol (OPMD-Forte) to study muscle functioning of a relatively large group of OPMD-patients including chewing and swallowing ultrasound imaging and magnetic resonance imaging [1]. Here we present the results of a subjective swallowing evaluation.
Material and Methods: We used the preliminary Rasch-built Overall Disability Scale (pre R-ODS) a patient-based interval scale to quantify the daily life activities and social participation in neuromuscular disorders. It contains 146 items with four response options: (0) 'impossible to perform' (1) 'performed with difficulty' (2) 'easily performed' (3) 'not applicable'. For this study 34 items about swallowing chewing and participation were newly added.
Results: Forty-seven participants (26 women) with a mean age of 61 y (SD 8.6) agreed to participate. The three most difficult items—in percentage of 'easily performed'—were eating chewy food like meat (29%) eating solid food without feeling it getting stuck in the throat (33%) and swallowing large pills (33%). The three most easy to perform activities were eating thick liquids like yoghurt (88%) to maintain weight (81%) and to perform hobbies despite the swallowing disorders (83%).
Conclusions: People with OPMD typically have more difficulty with swallowing solid food than liquids which is to be expected based on their pharyngeal muscular dystrophy. However this is the first study to demonstrate this in a relatively large and representative cohort. Future validation of this questionnaire will investigate its accuracy to identify and quantify the typical swallowing complaints in OPMD.

A PARADIGM SHIFT FOR THE ONSET PROGRESSION AND PATHOLOGY OF PRECLINICAL DYSPHAGIA AND GASTROINTESTINAL DYSMOTILITY IN PARKINSON DISEASE

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Introduction: The complex neuropathology underlying ingestive deficits in Parkinson disease (PD) is poorly understood. It is possible that pathology begins in the gut and spreads centrally. Here we address these gaps in knowledge using a rat model of PD.
Methods: We assayed oropharyngeal swallowing and gastric motility with videofluoroscopy in a well-established Pink1-/- rat model of PD. We also studied pathology in peripheral nerves muscles gut and brain tissue that may be linked to these deficits.

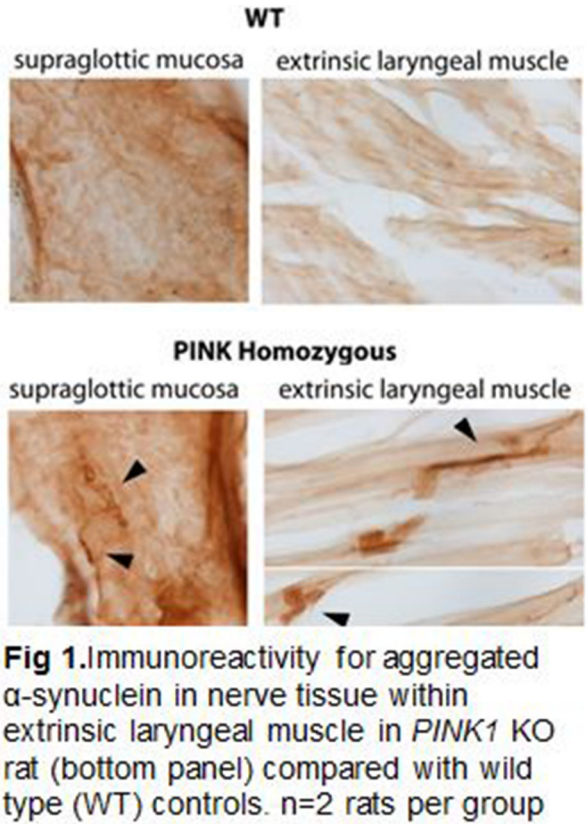

Fig 1. Immunoreactivity for aggregated α-synuclein in nerve tissue within extrinsic laryngeal muscle in *PINK1* KO rat (bottom panel) compared with wild type (WT) controls. n=2 rats per group

Results/Conclusions: Analyses are ongoing but preliminary findings suggest that compared to WT controls Pink1-/- rats have oropharyngeal swallowing deficits delayed gastric emptying and decreased colorectal motility. Preliminary data that support the presence of hallmark PD pathology (aggregated alpha-synuclein) in the dorsal motor nucleus of the vagus vagal nerves and muscles of the larynx pharynx and esophagus at 6 months of age. Currently we are also examining neuroinflammation over time into correlate pathology to the progression of ingestive deficits. The overarching goal of this work is to track the spread of pathology from the peripheral to central nervous system. This represents a paradigm shift regarding the pathogenesis of PD and can change the way we diagnose treat and perhaps prevent ingestive deficits.

Session 05 Poster session 1.4: Dysphagia in neurodegenerative diseases II

DROOLING IS NOT PREDICTIVE FOR DYSPHAGIA IN PARKINSON'S DISEASE

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Introduction: With the increasing incidence of Parkinson's disease (PD) also the demand of rational dysphagia diagnostics increases. In search of suitable dysphagia predictors to select severely affected patients the frequent symptom drooling is of particular interest.

Several studies provide evidence that the oral overflow of saliva in PD is caused by disabled swallowing. The aim of this study was to investigate the relationship between drooling and dysphagia in PD patients and to clarify the thesis that drooling is an early sign for dysphagia.
Material and Methods: In a cross-sectional study 119 non-preselected PD outpatients of all stages and 32 controls were examined clinically and by flexible-endoscopic evaluation of swallowing (FEES). Drooling and dysphagia including retained pharyngeal secretions were assessed by established evaluation scales (Penetration-Aspiration Scale of Rosenbek Drooling Severity and Frequency Scale Secretion Severity Rating Scale of Murray).
Results: The high inclusion rate of 84% of non-preselected Parkinson's patients allows a transferability to the actual medical care situation. Drooling occurred significantly more frequently in the PD group than in controls. And also without dysphagia 11% of patients had a strong drooling. However 39% of the PD patients with critical aspiration (PAS $\geq$ 7) had no drooling at all. In contrast to the disturbed oral saliva management there was no excessive pharyngeal salivary retention in the drooling patients.
Conclusions: Drooling is no early sign of dysphagia and therefore unsuitable for its prediction. Although frequently drooling and dysphagia are not associated symptoms in PD. Drooling appears to be due to an impaired oral phase and thus to a functional disorder of the voluntary proportion of swallowing while the involuntary pharyngeal phase was not disturbed.

*ESOPHAGEAL MOTOR IMPAIRMENT: A NOVEL BIOMARKER OF EARLY PARKINSON'S DISEASE?

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Introduction: Esophageal motor dysfunction is present even in early stages of Parkinson's disease (PD) and reflects alypha-synucleinopathy of the enteric nervous system with highest concentration in the distal esophagus.1 In atypical Parkinsonism (AP) there also seem to be a relation between alpha synucleinopathies and the occurrence of esophageal dysphagia whereas tauopathies do not seem to be affected in the same way.2 However the occurrence of esophageal motor disorders in the premotor stages of PD remains unknown so far. Rapid-eye-movement sleep behavior disorder (RBD) is a premotor manifestation of PD with affected patients having an 80–90% risk to convert to PD within 10 years.
Methods: In a pilot study we performed a detailed analysis of high resolution manometry (HRM) examination of two patients with an idiopathic RBD (79 and 57 years)0.3 Neurological examinations were performed in regular intervals to screen for PD motor symptoms. Furthermore a review on the available data of affected HRM parameters in alpha synucleinopathies was conducted.
Results: Both patients showed an increased intrabolus pressure (25 mmHg and 227 mmHg; Ref.-value $<$ 17 mmHg) which is congruent to the pathological HRM findings in PD patients or other synucleinopathies.1–3 Besides a slight impairment of upper esophageal sphincter distal contractile integral and esophageal contraction time could be found. Both patients developed first motor symptoms of PD within two years after HRM examination.
Conclusion: Esophageal motor impairment may occur not only in early PD stages but also in premotor stages. Following the analyzation of the available data so far not only one specific finding but a composite score of different esophageal HRM motor parameters (including intrabolus pressure and peristalsis) might serve as a biomarker of PD. Further prospective studies with idiopathic RBD patients and an age-matched control group are necessary to verify these promising findings.

SWALLOWING FEATURES IN HUNTINGTON'S DISEASE: A COMPARISON BETWEEN SAFE VERSUS UNSAFE SWALLOWERS

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Introduction: Dysphagia has been reported in around 72–100% of patients with Huntington's Disease (HD) and aspiration pneumonia is the main cause of death in this population. Despite its high prevalence few studies have investigated dysphagia in HD and no data on which features differentiate deglutition in safe versus unsafe swallowers are currently available.
Matherial and Methods: Twenty-two patients with diagnosis of HD 10 males and 12 females with a mean age of 58.9 $\pm$ 10.8 were enrolled. All patients underwent a fiberoptic endoscopic evaluation of swallowing (FEES) using liquid semisolid and solid. The Penetration-Aspiration scale (PAS) the Yale Pharyngeal Residue Severity Rating Scale and the Dysphagia Outcome and Severity Scale (DOSS) were used to score FEES. Patients with a PAS score $\geq$ 2 with at least one consistency were considered unsafe swallowers. The Test of Mastication and Swallowing Solids (TOMASS) was performed. Typical oral intake was recorded using the Functional Oral Intake Scale (FOIS). Clinical assessment was conducted using the Mann Assessment of Swallowing Ability (MASA). Meal consumption was observed and scored through the Mealtime Assessment Scale (MAS). Patients completed the Huntington's Disease Dysphagia Scale (HDDS). Mann–Whitney test was used to compare deglutition variables between safe and unsafe swallowers.
Results: Eleven patients showed a PAS score $\geq$ 2 with at least one consistency. Mean PAS score in the unsafe swallowers was 4.63 $\pm$ 2 for liquids 2.09 $\pm$ 1.64 for semisolids and 1.2 $\pm$ 0.63 for solids. No statistically significant differences were found between the two groups.
Conclusions: HD patients unsafe swallowers present comparable pharyngeal residue efficacy of oral phase performance in meal consumption oral intake and perception of swallowing impairment to HD safe swallowers. Lack of statistically significant differences may be due to the small sample size and the low severity of airway invasion in our unsafe swallowers group.

MAXIMUM SWALLOWING SPEED: A USEFUL TEST TO DETECT BULBAR INVOLVEMENT IN PATIENTS WITH AMYOTROPHIC LATERAL SCLEROSIS

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Introduction: Early detection of involvement of the bulbar region is important for the diagnosis prognosis and treatment in Amyotrophic

Lateral Sclerosis (ALS). The aim of this study was to identify which bulbar maximum performance test has the best positive and negative predictive value to detect involvement of the bulbar region.
Methods: Twenty-eight outpatients with ALS were assessed at three visits with intervals of 12 weeks. The bulbar subscales of the revised Amyotrophic Lateral Sclerosis Functional Rating Scale (ALSFRS-R-bulbar) and a neurological examination of the bulbar region served as composite reference test to divide patients with (BI) and without bulbar involvement (NBI). Blinded for this outcome a speech-language therapist assessed bulbar function with four tests: maximum phonation time maximum swallowing speed maximum swallowing volume and maximum tongue strength. For each test we estimated the optimal diagnostic accuracy with an ROC-curve analyzed positive and negative predictive values and compared the test scores between the first and last visit to assess longitudinal sensitivity.
Results: All test performance scores were significantly lower in the BI-group (n = 19) ($p < 0.05$). Maximum swallowing speed (MSS) showed the highest positive (94%) and negative predictive value (80%) with a cut-off score of 25 ml/s. MSS also showed the greatest decline in bulbar function over time (absolute change = − 5.9 (95% CI − 8.3 − 1.0). The two patients with a false negative score had bulbar involvement only based on fasciculation in the tongue.
Conclusion: Maximum swallowing speed of less than 25 ml/s is an easy to perform test with acceptable diagnostic accuracy to support the clinical diagnosis of involvement of the bulbar region in patients with ALS however fasciculation in the tongue does not seem to reduce swallowing capacity. Prospective validation is the next step.

SELF-PERCEPTION AND PREDICTORS OF CRITICAL DYSPHAGIA IN PARKINSON PATIENTS

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Introduction: Dysphagia is very common in Parkinson patients. It is still unclear which factors influence dysphagia and its severity. Reliable and simple methods for the detection of susceptible patients are needed in order to be able to provide them with targeted endoscopic diagnostics. Aim of the present study was to evaluate the significance of patient's self-perception of deglutition and identifying predictors for a critical dysphagia.
Methods: 122 out of 146 consecutive outpatients with an idiopathic Parkinson syndrome were recruited and 119 included. All disease stages were presented. The patients rated their swallowing on three different scales and underwent a comprehensive clinical examination and FEES.

Results: The patient's self-perception of swallowing reflected the endoscopically evaluated findings in less than 50%. Although severe dysphagia with silent aspiration was significantly more common in older and severely affected patients (determined with H&Y and also UPDRS (total and part III)) 25% resp. 29% of patients with H&Y stadium 2 resp. 3 suffered from aspiration. A logistic regression revealed three significant predictors for critical dysphagia: age (OR 1.1 in years 95% CI 1.03–1.18 $p < 0.01$) sex (OR 0.3 for females 95% CI 0.08–0.97 $p = 0.04$) and aspiration signs (explicitly inquired for) (OR 8.6 95% CI 3.05–26.52 $p < 0.001$). Using these predictors as a calculation base we reached a sensitivity of 86% and a specificity of 79% thus far superior to the patients' answers to current questionnaires.
Conclusion: Self-perception of swallowing is not suitable in Parkinson patients to detect those with critical dysphagia. The three predictors can be raised quickly and easily. Provided that they prove valid in a future study these predictors allow efficient allocation to instrumental dysphagia diagnostics.

LINGUAL DYSTONIA IMPACT ON SWALLOWING: A CASE STUDY

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Introduction: An 82-year woman was sent to speech and language therapist due to unspecified lingual dystonia. Because of the tongue muscles weakness there were severe swallowing difficulties. Speech and language therapy goals were directed to improve range of motion and strength of the tongue to facilitate the swallowing. Her tongue was too weak to push the bolus into the pharynx and after swallowing there was a residue in the mouth which was unable to clean due to reduced range of tongue motion.
Material and Methods: At the first session tongue strength and endurance with Iowa Oral Performance Instrument (IOPI) was measured. Strength of tongue tip and the back was significantly lowered (tongue tip only 6 kPa with average of 29 kPa for her age and tongue back 3 kPa with an average of 28 kPa for her age; endurance of half of maximum strength only 1 s on both sides—average 10 s tongue tip and 8 s back of the tongue). Therapy included classic oral motor exercises for tongue strength and larger motor range.
Results: After four months of speech and language therapy the patient's swallowing significantly improved. She noticed fewer difficulties with bolus transport from oral to pharyngeal phase and also larger range of tongue motion. IOPI also showed strength and endurance improvement (tongue tip is now on 20 kPa with endurance of 5 s; back of the tongue is now on 22 kPa with endurance of 2 s). She also was once again examined by otorhinolaringologist who confirmed easier bolus transport from the oral to pharyngeal phase. The therapy is not finished yet and it is focused on tongue endurance extension.

IMPORTANCE OF AN EARLY APPROACH TO SWALLOWING DISORDERS IN PATIENTS WITH NEURODEGENERATIVE DISEASES

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Introduction: Swallowing disorders in neurodegenerative diseases could be developed as a primary symptom or could appear in advanced stages of the disease.
Aim: Prove the importance of swallowing treatment in early stages of a neurodegenerative disease even though the presence or absent of dysphagia symptoms with the aim of slowing down the progression of disease in swallowing process.
Methods: 20 patients with different diagnosis of neurodegenerative diseases like Amyotrophic Lateral Sclerosis Parkinson's disease Multiple Sclerosis Alzheimer 's disease Huntington's Disease and Dementia. The evolution of dysphagia was compare in patients who has received early treatment and patients who only received treatment when swallowing disorders had been developed.
Results: Comparing patients with the same neurological disease those who had received early and preventive treatment developed swallowing disorders in more advanced stages of the disease in relationship with patients who only received treatment when dysphagia became apparent. At the same time progression of dysphagia and its severity have been reduced and slowed down in the group of patients that received an early therapy for swallowing disorders.

Conclusion: An early intervention in swallowing process is essential since the diagnosis is done to prevent an increase rate of evolution of dysphagia in patients with neurodegenerative disease. This early intervention results in a better quality of life during the course and evolution of the disease and depending of the case postpone diet changes or alternative methods of providing nutrition
Key words: Swallowing neurodegenerative disease dysphagia.

Session 05 Poster session 1.5: Dysphagia in geriatric patients I

DYSPHAGIA AND PALLIATIVE CARE PORTRAYED IN MOVIES ABOUT ELDERLY PEOPLE WITH DEGENERATIVE DISORDERS

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Introduction: Due to population aging and consequently the increasing of neurodegenerative diseases it urges to discuss the finitude of life including the swallowing aspects. The movies can portray the social imaginary and be important tools to popular and formal education in health. It were found in the revised literature researches that analyzed how the cinema deal with issues like death and dementia but none had similar aim of this study: to discuss movies that portray elderly people with neurodegenerative disease under the perspective of palliative care with emphasis in dysphagia.
Material and Methods: It was carried out a qualitative research of documental type in movies (drama romance or documentary) released between 1994 and 2013 with elderly characters with neurodegenerative disease available in Brazil by legal ways. The identification of them was by sites about movies or the knowledge of the researchers. By the content analysis it was discussed the swallowing communication death and palliative care in the dialogues scenes and the plot of the movies.
Results: Five movies were analyzed (see Figure 1) four about dementia and one about Parkinson disease. In four movies the disease was in advanced stage. The difficulties in the feeding but not in the swallowing were present in two movies. It was portrayed the palliative care in some scenes but it was not named like that. All the movies presented the suffering of the elderly with disease and their caregiver and the death in different ways.
Conclusions: This research points to necessity of presenting dysphagia in movies about degenerative diseases in elderly people. It is possible that the absence of the dysphagia in scenes are due the commercial aims of the movies because that can be unpleasant to see. But this fact may contribute to the ignorance about the theme and its properly management in palliative care mainly in countries whose general population knows a little or nothing about it.

DYSPHAGIA MANAGEMENT IN ADULTS AND ELDERLY PERSONS WHO ARE RECEIVING PALLIATIVE CARE: A SCOPING REVIEW

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Introduction: The management of dysphagia is important to the quality of life and quality of death in the adult and elderly persons under palliative care not only because the role of swallowing in physical but also in psychological and social aspects involved in feeding. In order to explore and summarize our understanding about the dysphagia management in palliative care in adults and elderly people a scoping review of the literature was conducted.
Material and Methods: A scoping review of the literature was realized searching scientific articles in Portuguese English and/or Spanish in the databases Scielo PUBMED LILACS and Medline from 1995 to 2016 using the keywords "Palliative care" "Deglutition" "Deglutition disorders" and "Aged". It also were included—when considered relevant to the topic—articles cited in the found papers.
Results: The number of articles included in the first phase of the search 685 but they refer to the results of searching about communication and deglutition in palliative care because this abstract is part of the original work that investigated both—communication and deglutition. After the exclusion criteria fifteen studies were found discussing swallowing what demonstrate that the literature is scarce. The evidence levels were low and the degree of recommendation were D (95% of articles) and C (5%). The dysphagia was mentioned as being frequent; however in few studies it was investigated. The speech and language therapist was mentioned in the majority but not in all the studies. At the end of life there are particularities of the care which involves difficult choices regarding the way of feeding (by mouth or tube) and the capacity (or not) of the patient express their wishes but these aspects are mentioned in a generic way and in few papers.
Conclusions: Further research would be beneficial to better guide the dysphagia management in palliative care mainly about the end of life issues.

IMPROVING MEALTIME EXPERIENCE FOR FRAIL AND LIMITED NURSING HOME RESIDENTS THROUGH DUCHESSE®; AN ALTERNATIVE TO A REGULAR PUREED DIET ; A PILOT STUDY

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Introduction: Texture-modified diets often have a negative impact on mealtime experiences. People on a dysphagia pureed diet complain about the visual presentation lack of flavor and grainy meat substances. Caregivers also report motivational difficulties. Therefore in 2016 Duchesse® was developed and can be a substitute for the regular pureed diet that is used in nursing homes. Duchesse® currently exists of 9 different smooth and homogenous meals including pasta rice and fish. The purpose of this study was to pilot test Duchesse® in a frail and challenged nursing home population since the pureed diet is frequently advised for people in later stages of dementia or who suffered from severe stroke with many cognitive and communicative restrictions.
Materials and Methods: Via an explorative design 2 studies were conducted. (1) A pilot study in which 10 nursing home residents with limited abilities tried Duchesse® for 7 days. Experiences of the residents and staff were observed through qualitative reports ®questionnaires and tasting sessions. (2) In a 2nd 6-week test study 24 more dysphagic residents were followed. There were 5 measurements of the regular pureed diet and 15 measurements of Duchesse. Since the majority of the residents was not able to give (adequate) feedback

the duration food-intake and amount of waste was measured in combination with 2 proxy measurements by caregivers as well as retrieval from medical and nutritional records.
Results: There were no major changes in duration and intake but there was significantly less waste (7% vs 20%; $p < 0.05$). The 5 verbally fluent residents and 20 proxies all expressed a strong preference for Duchesse ® since it was tastier and easier to process.
Conclusion: Preliminary data suggests that Duchesse ® is a tasty alternative to regular pureed diets and therefore an implementation protocol for nursing homes was designed. Future studies will investigate the long-term impact on nutritional status and well being in different populations

ALIMENTATION AND QUALITY OF LIFE IN THE ELDERLY

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Introduction: With aging the elderly present physiological changes that affect their health. The study aimed to verify the indices of quality of life in the elderly related to feed condition.
Methods: 70 elderly were interviewed without reports of pre existing diseases neurological head and/or neck disorders aged over 60 years divided into three groups according to the age group being group 1 formed by elderly people aged between 60 and 70 years group 2 by individuals aged between 71 and 80 years and group 3 formed by elderly over 81 years old. For data collection used the Objective Quality of Life Questionnaire adapted from the Oral Health Impact Profile Test for Edentulous (OHIP-EDENT) composed by questions that address specific issues related to physical/functional and psychological/social power.
Results: It was noted that the amendments that obtained the most were those related to chewing and a smaller number of complaints related to swallowing according to the number of positive answers for the questions of number 1 "Did you have difficulty chewing some food?" 3 "Did you find it difficult to swallow any food?" 4 "Did you feel pain to swallow?" 5 "Did you feel discomfort to swallow?" 6 "Did you feel pain to chew?" 7 "Did you feel discomfort to chew?" 10 "Did you have to avoid eating something because of the difficulty to chew" 11 "Did you have to avoid eating something because of the difficulty to swallow?". The chewing complaints index was 33% in Group 1 27% in Group 2 and 23.75% in Group 3. On the other side complaints related to swallowing were in Group 1 of 27% Group 2 of 17% and Group 3 of 16.25%. These data are contradictory since it is believed that chewing changes have a negative influence on swallowing.
Conclusion: The elderly report more complaints related to chewing than swallowing evidencing a greater perception for the alterations of the chewing function and possible restrictions of the alimentary consistency.

*ATROPHY OF SWALLOWING MUSCLES - A RISK FACTOR FOR POST-STROKE DYSPHAGIA?

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Introduction: Sarcopenia is an independent risk factor for dysphagia. Dysphagia itself is one of the most important and prognostically relevant complications of acute stroke. The role of muscle atrophy as a contributing factor for the occurrence of post-stroke dysphagia is yet unclear. To assess whether there is a correlation between age and muscle volume and whether muscle volume is related to dysphagia in acute stroke patients.
Material and Methods: This retrospective single-center study included 73 patients with acute ischemic or hemorrhagic stroke who underwent Computed Tomography Angiography on admission and an objective dysphagia assessment by Fiberoptic Endoscopic Evaluation of Swallowing (FEES) within 72 h from admission. With the help of semi-automated muscle segmentation and three-dimensional reconstruction volumetry of the digastric temporal and geniohyoid muscles was performed. For further analysis participants were first divided into four groups according to their age (< 61 years n = 12; 61–75 years n = 16; 76–85 years n = 28; ≥ 86 years. n = 17) secondly into three different groups according to their dysphagia severity using the Fiberoptic Endoscopic Dysphagia Severity Scale (FEDSS) (FEDSS 1&2 n = 25; FEDSS 3&4 n = 32; FEDSS 5&6 n = 16).
Results: Muscle volumes of single muscles (except for geniohyoid and the right digastric muscles) as well as the sum muscle volume were significantly and inversely related to dysphagia severity. We found a significant decline of muscle volume with advancing age for most muscle groups and in particular for the total muscle volume.
Conclusions: Apart from features being determined by the acute stroke itself (e.g. site and size of stroke) also premorbid conditions in particular age-related muscle atrophy have an impact on the complex pathophysiology of swallowing disorders post stroke.

A STUDY ON OLFACTORY FUNCTION AND APPETITE IN ELDERLY RESIDENTS OF NURSING HOMES

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Purpose: Olfactory function is said to affect the palatability of meals and diet behavior as well. Some reports have been made that reduced olfactory function may make it difficult to sense odor resulting in the associated reduction in appetite. However no investigative report has been made on reduction in olfactory function and appetite of elderly residents of nursing homes. Therefore we have conducted a survey of olfactory function among them and considered factors related to the deterioration in olfactory function.
Method: The subjects were 73 elderly residents of nursing homes. The odor stick identification test for Japanese (OSIT-J) was used for a survey of their olfactory function. Their results were compared with those of 23 healthy adults. In addition using the OSIT-J as the objective variable in 67 subjects who were able to complete the Hasegawa's Dementia Scale (HDS-R) and with five explanatory variables including age HDS-R dietary intake body mass index (BMI) and appetite (Council on Nutrition Appetite Questionnaire CNAQ) multiple regression analysis was performed.
Results: The OSIT-J was 3.1 ± 2.5 points for elderly residents of nursing homes and 11.0 ± 1.1 points for healthy adults and the elderly residents had a significantly lower olfactory function than healthy adults ($p < 0.01$). As a result of the multiple regression analyses a significant correlation was observed even though it was low between OSIT-J and age (R = 0.48) and HDS-R (R = 0.39) with a determination coefficient of 0.26.

Discussion: The current survey indicates that olfactory function deteriorated in elderly residents of nursing homes compared with that of healthy adults. The results also suggest that deterioration of olfactory function is associated with age and cognitive function but not with appetite. We have planned to conduct further research and review since relationship of reduced olfactory function with appetite and BMI has been recognized in some reports.

*THE EFFECT OF THE ORAL FUNCTION TRAINING ON TONGUE AND NECK IN THE COMMUNITY DWELLING OLDER ADULTS

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Introduction: The tongue pressure and the neck muscles have an important role for swallowing function in elders. Oral exercise programs are considered to improve swallowing ability and neck relaxation. This study evaluated the effect of an oral function training program on tongue pressure and cervical active range of motion.
Material and Methods: Sixty-five elders (age: $\geq$ 65) participated in this study and were randomly divided into two groups (oral intervention and control groups). All the subjects performed the physical function improvement program. The oral intervention group (n = 30) performed oral function training which consisted of orofacial myofunctional exercises. Dental hygienists instructed the subjects to perform the orofacial training such as exercise of the facial muscles tongue and salivary glands swallowing and speaking. This program was performed for half an hour twice a month during 3 months. A follow-up survey was performed after 3 months. The following items were assessed at baseline: age gender remaining teeth tongue pressure and cervical active range of motion (flexion extension lateral flexion and rotation). In addition the improvement during 3 months in tongue pressure and cervical active range of motion were compared between baseline and follow-up examinations in both groups. Statistical significance was accepted at $p < 0.05$.
Results: There were significant differences in all cervical active range of motion between baseline and follow-up examinations in the oral intervention group. The differences in cervical active range of motion between baseline and follow-up examinations were 8.2°-18.6° ($p < 0.05$). On the other hand in the control group extension and lateral flexion did not improve significantly. The tongue pressure did not improve significantly in both groups.
Conclusions: A 3 months oral function training programs for community dwelling older adults might have a significant effect on cervical active range of motion.

CHANGES IN SEVERITY AND ETIOLOGY OF DYSPHAGIA WITH AGEING

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Introduction: Dysphagia is a relatively common disease with approximately 33.7% prevalence rate among age group of 65 years old or over. Various conditions such as stroke neurodegenerative disease can cause dysphagia. Increased incidence of these diseases is responsible for the frequent dysphagia in elderly. Even in healthy condition decline of central coordination associated with deglutition inadequate upper esophageal sphincter opening loss of muscle mass a reduction of tissue elasticity reduction of saliva production impaired dental status become apparent with ageing. In this study we tried to figure out if there are changes in severity and etiology of dysphagia with ageing.

Characteristics	Group 1	Group 2	p-value
Sex	male 77 (93.9%)	male 217 (89.7%)	0.253
Age (years)	63.60±8.55	79.09±6.65	0.000*
MMSE	19.93±9.37	15.59±8.75	0.000*
Duration of dysphagia (months)	15.60±18.16	12.46±18.46	0.029*
PAS	3.27±2.78	4.27±2.78	0.003*
VDS	19.74±14.98	27.00±16.05	0.001*

Material and Methods: Retrospective study was carried out through chart review of 324 patients who complained of the swallowing difficulty and confirmed with dysphagia via videofluoroscopic swallowing study (VFSS). General characteristics and etiology of dysphagia was collected. The patients were divided into two group according the age; age under 70 as group 1 (n = 82) age of 70 or older as group 2 (n = 242). Penetration aspiration scale (PAS) and videofluoroscopic dysphagia scale (VDS) were used as objective measures of VFSS finding.

Etiology	Group 1, number (% within group)	Group 2, number (% within group)	Total, number (%)
Stroke	51 (62.2)	129 (53.3)	180 (55.6)
Neurodegenerative disease	6 (7.3)	37 (15.3)	43 (13.3)
Poor general medical condition	2 (2.4)	31 (12.8)	33 (10.2)
Unknown	8 (9.8)	17 (7.0)	25 (7.7)
Traumatic brain injury	2 (2.4)	16 (6.6)	18 (5.6)
Local structural lesion involving head and neck	5 (6.1)	9 (3.7)	14 (4.3)
Other brain disorders	4 (4.9)	1 (0.4)	5 (1.5)
Spinal cord injury	1 (1.2)	1 (0.4)	2 (0.6)
Peripheral neuropathy	2 (2.4)	0 (0.0)	2 (0.6)
Brain tumor	0 (0.0)	1 (0.4)	1 (0.3)
Neuromuscular junction disorder	1 (1.2)	0 (0.0)	1 (0.3)
Total	82 (100.0)	242 (100.0)	324 (100.0)

Results: About 75% of all patients diagnosed with dysphagia was age of 70 or older. In general characteristic cognitive impairment was more apparent in group 2. Duration of dysphagia was shorter in group 2 maybe due to the more severe symptom According to PAS and VDS score group 2 showed more severe manifestation of dysphagia (Table 1). The ratio of neurodegeneraive disease and poor general medical condition was higher in group 2 (Table 2).
Conclusions: Dysphagis is more frequent and severe in elderly. Progression of neurodegenerative disease and poor general medical condition due to ageing seem to be responsible for this. Immediate and active evaluation for dysaphgia should be performed in elderly patients who complain swallowing difficulty.

Session 05 Poster session 1.6: Dysphagia in children I

EPIDEMIOLOGICAL PROFILE OF PEDIATRIC PATIENTS SEEN BY THE PHONOAUDIOLOGY TEAM IN A PRIVATE HOSPITAL OF SAO LUIS - MA BRAZIL

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Introduction: The purpose of this study was to trace the epidemiological profile of patients seen by the phonoaudiology team of the Pediatrics hospitalization sector.
Materials and Methods: A retrospective descriptive type of research performed in a private hospital in Sao Luis (MA Brazil). The data were collected in the Pediatrics statistical database and analyzed with the following variables: length of service age medical diagnosis speech therapy conduct and nutrition pathway.
Results: A total of 709 children were admitted to the pediatric service between June and December of 2015 aged between 4 months and 12 years with an average age of 8.7 years. From this total only 140 (19%) presented phonoaudiological demand. The pathologies described were: community-acquired pneumonia 90 (64.2%) epilepsy and seizure disorders 15 (10.7%) asthma crisis 13 (9.2) bronchiolitis 8 (5.7%) traumas 4 (28%) herpes zoster 3 (2.1%) acute respiratory failure 2 (1.4%) sepsis and septic shock 2 (1.4%) nosocomial pneumonia 1 (0.71%) laryngitis 1 (071%) CVA with sequels 1 (0.71%). The speech therapy conduct adopted for oral diet patients mixed 137 (97.8%) was the swallowing monitoring guidelines change in consistency and volume. Furthermore the dependents of alternative ways for exclusive nutrition orofacial sensorimotor stimulation constantly being stimulated by swallowing with nourishment 3 (8.1%).
Conclusion: The main cause of children's hospitalization was due to lower respiratory tract infections (pneumonia asthmatic crisis bronchiolitis) which may be related to dysphagia. Even patients with no neurological diseases nevertheless hospitalized with diagnosis of a respiratory illness should be evaluated by the speech specialist.
Keywords: swallowing disorders; pediatrics; health profile.

LARYNGEAL CLEFT AS ANATOMICAL CAUSE OF OROPHARYNGEAL DYSPHAGIA IN PAEDIATRIC AGE

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Oropharyngeal dysphagia (OD) in children is manifested with multiple symptoms being the cough with the feeding the main. Within the anatomical causes of OD the laryngeal cleft (LC) is a rare cause (less than 0.3% of laryngeal congenital malformations). Symptoms are non-specific and the delay in diagnosis leads to multiple complications. The objective of our study is to describe the clinical course management and outcomes of children with OD produced by type I laryngeal clefts. Methods: Patients with OD secondary to type I LC diagnosed between 2015 and 2016 in a tertiary-teaching hospital. Data from baseline characteristics clinical presentation analysis of feeding function treatment and prognosis were collected. Results: n = 13 Eight boys and five girls. Mean age of diagnosis: 52 years (Range 1–12 years) Comorbilities:69%Down's Syndrome 30% Extremely premature 15%. Symptoms Chronic pulmonary infections = 84% Cough after liquid ingestion = 100%. Feeding observation (FO) = 92% Videofluoroscopic swallowing study (VFSS) = 84% Three of them anatomical defect was suggested with later aspirations Videoendoscopic swallowing study (VEES) = 38% Four of them LC was suggested Direct laryngoscopy (DL) under sedation = 100%. Treatment: Adapted diet (liquids with thickening and volume control) n = 1 (8%) Cleft repair (injection laryngoplasty) n = 10 (76%) Feeding prior to surgery Nasogastric tube feeding n = 4 (40%) Adapted diet n = 6 (60%) Pending to surgery with adapted diet = 2 (16%). Evolution: Mean follow-up with treatment = 12 months (range 2–24 months). Has been remarkable all patients are feeding by mouth with a significant reduction in respiratory infections 5 continue with adapted diet: 4 with thickening1 with volume control. Conclusions: In children with dysphagia although VFSS and VEES help in the diagnosis process the definitive diagnosis should be made by DL. Cleft repair surgery is the procedure of choice as it is safe and effective.

ADMINISTRATION OF BOTULINUM TOXIN IN CRICOPHARYNGEAL ACHALASY IS A CAUSE INFREQUENT OF DISPHAGY OROPHARYNGEAL IN PEDIATRICS

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Introduction: Cricopharyngeal achalasia occurs due to the absence of relaxation of the cricopharyngeal muscle in the upper esophageal sphincter of unknown etiology an uncommon cause of oropharyngeal dysphagia in pediatric and neonatal age. We will describe a clinical case of an infant with oropharyngeal dysphagia and suspicion of chronic aspiration syndrome using videofluoroscopy (VFS) is oriented as cricopharyngeal achalasia and treatment with administration of botulinum toxin is performed.
Summary: Male patient 2 years personal history: DiGeorge syndrome tracheomalacia peripheral facial paralysis single left kidney. At 20 days of life: regurgitation of food through nostrils choking with intakes refusal of intake and low weight gain. It enters due to respiratory distress and suspicion of tracheoesophageal fistula that is discarded by esophagogram observing velopalatine insufficiency. In the VFS moderate to severe oropharyngeal dysphagia is objected to with alteration of efficacy and non-compensable safety requiring a nasogastric tube for feeding. It presents poor evolution with repetitive respiratory and clinical pictures of reflux so an antireflux surgery is performed with gastrostomy laparoscopy. It performs exclusive feeding by it. For global improvement at 16 months VFS is performed observing absence of relaxation of the upper esophageal sphincter without aspiration to airways thus suspecting cricopharyngeal achalasia treatment with botulinum toxin injection is decided. In VFS control: We aim to open upper esophageal sphincter without aspirations. Therefore it initiates oral feeding with speech-language supervision with a favorable evolution reaching complete feeding by mouth with subsequent withdrawal of the gastrostomy.
Comments: Cricopharyngeal achalasia is a rare cause of oropharyngeal dysphagia botulinum toxin treatment has been shown to be safe and effective in pediatrics avoiding surgery (myotomy) and/or esophageal dilatations.

NICU FEEDING: DEVELOPING AND IMPLEMENTING EVIDENCE-BASED MULTI-DISCIPLINARY CLINICAL PRACTICE GUIDELINES

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Introduction: Inconsistent feeding management practices in the Neonatal Intensive Care Unit (NICU) can affect patient safety contribute to delays in achieving infant feeding milestones and prolong length of stay.
Aim: This project aimed to develop clinical practice guidelines (CPG) for oral feeding management in the NICU to facilitate more consistent and evidence-based feeding practices.
Methods: An extensive literature review was performed by an expert panel of 15 clinicians experienced in infant feeding management (neonatal nurses developmental therapists dietitians and physicians). A CPG was developed based on best available evidence from the literature combined with clinical experience of the panel. The draft GPG was distributed to the wider NICU for feedback before being finalized.
Results: An evidence-based feeding CPG was developed for the NICU. Staff and family education materials have been developed and rolled-out. Since implementation of the NICU feeding CPG there has been an improvement in staff consistency and reductions in adverse feeding-related clinical events and number of children discharged home on tube feeds.
Conclusion: Evidence-based multi-disciplinary clinical practice guidelines result in improvements in staff consistency and patient care.

RISK FACTORS FOR DELAYED ATTAINMENT OF EARLY FEEDING MILESTONES IN PRETERM INFANTS

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Introduction: The establishment of oral (per os PO) feeding competence is a challenge for most infants born prematurely. Unlike full-term infants who are almost always able to successfully PO feed from birth most preterm infants will require some duration of tube feeding until they mature sufficiently and are medically stable enough to feed fully PO. Medical care in the NICU has changed significantly over the last decade but few studies have systematically investigated the effect of these changes on this important aspect of early development.
Aim: The current study aimed to investigate feeding development in a modern cohort of preterm infants and compare to a historical cohort born more than a decade prior.
Methods: A chart review was conducted for all infants born < 37 weeks gestational age (GA) admitted to a large tertiary level perinatal facility January to December 2016. These findings were compared with chart review findings from January-December 2003. Cox regression analyses were used to identify which variables were most strongly associated with age at commencement of PO feeds and age at attainment of exclusive PO feeding. Multivariable linear regression analysis was used to identify which variables were most strongly associated with transition time.
Results: Gestational age at birth the severity of respiratory disease and the type of respiratory management all significantly impacted on feeding outcomes in both eras. While overall survival improved in the modern era the proportion of infants surviving with moderate-severe respiratory disease increased as did the proportion who presented with feeding difficulties and delayed attainment of full PO feeding.
Conclusion: The survival of younger and more medically complex infants has implications for feeding outcomes in the NICU. Those working in this area need a thorough understanding of the impact of prematurity illness and modern medical management strategies on the developing feeding system.

INFANTS AND CHIDREN WITH GLOSSOPTOSIS: WHAT IS THE ASSOCIATION OF VIDEOFLUOROSCOPIC SWALLOWING FINDINGS WITH RESPIRATORY COMPLICATIONS AND FEEDING DISORDERS

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Introduction: To classify penetration and aspiration events using the penetration and aspiration scale during Videofluoroscopic Swallowing Study (VFSS) of children with glossoptosis and dysphagia and correlate them with respiratory complications as well as enteral feeding.
Materials and Methods: A cross-sectional prospective study was designed with children diagnosed with glossoptosis and dysphagia attending a tertiary hospital between the years 2010 and 2015.. Videofluanalysis and PEN-ASP Scale was performed by a blind researcher. Database was developed using variables obtained from medical records of these patients such as information about clinical swallowing evaluation glossoptosis classification feeding method information about clinical and pulmonary complications. suspected.Qualitative variables were expressed through median minimum and maximum values.The present study adopted a significance level of $p = 0.05$.
Results: The sample consisted of 24 patients between the ages of 0 and 5 years. There were 14 (58.3%) boys. The degree of glossoptosis was classified as mild (41.7%) while moderate (45.8%) and severe (12.5%). The most frequent medical diagnoses of glossoptosis was 54.2% of isolated Pierre Robin Syndrome (PRS) and 25% Syndromic PRS. The Penetration-Aspiration Scale score was associated with clinical swallowing evaluation ($p < 0.001$) and enteral feeding ($p < 0.001$). The osteogenesis mandibular distraction was the most prevalent eligible treatment for this sample (75%).
Conclusions: Most patients from this study demonstrated to have abnormalities in swallowing function. The alterations in the clinical swallowing evaluation and enteral feeding are associated with worst scores on the Penetration-Aspiration Scale in this studied sample. More research is needed to understand swallowing biomechanics in this children with glossoptosis.

VIDEOFLUOROSCOPY SWALLOWING FINDINGS IN INFANTS AND CHILDREN AND ITS ASSOCIATION WITH PULMONARY COMPLICATIONS AND CLINICAL FINDINGS

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Introduction: To describe the swallowing findings of pediatric patients from a tertiary hospital who were referred to a videofluoroscopic swallowing study (VFSS) and correlate the biomechanics of swallowing to history of clinical and pulmonary complications.
Materials and Methods: A cross- sectional prospective study has been conducted from March 2013 to July 2016. We included patients within the ages of 30 days to 5 years and 11 months old in this study. Data extracted from charts included medical diagnoses gender enteral feeding reactive airways disease recurrent respiratory tract infections pneumonia asthma and bronchiolitis. The consistencies tested in the VFSS were standardized and appropriate for the sample age.
Results: The sample used consisted of 217 VFSSs although 30 were excluded because their results were inconclusive thus remaining a total of 187 studies. Respiratory diseases were the most frequent medical conditions (51.3%) followed by preterm (50.3%) neurologic (42.2%) and 41.2% were structural. The patients could suffer from more than one medical condition. A total of 118 (63.1%) children were hospitalized for pulmonary disease and bronchopneumonia (30.5%). Penetration and silent aspiration were more prevalent with thin fluid being 21.5% and 45.1% respectively. Pooling in valleculae and pyriform sinuses was more prevalent with regular food (25%). Pneumonia was significantly associated with aspiration ($p = 0002$). Poor oral bolus control was significantly associated with enteral feeding neurologic and syndromic patients ($p = 0.041$; $p = 0.017$; $p = 0.019$). The pharyngeal phase of swallowing initiated in the pyriform sinus was associated with penetration (thin fluid) and aspiration (thick fluid).
Conclusions: Patients hospitalized with pulmonary complications in this sample demonstrated to have more swallowing disorders identified through VFSS.

DYSPHAGIA IN NEONATES: IS THERE AN ASSOCIATION BETWEEN VIDEOFLUOROSCOPY SWALLOWING AND CLINICAL FINDINGS

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Introduction: To describe swallowing biomechanics in a neonatal population referred to videofluoroscopic swallowing study (VFSS) in a tertiary hospital.
Materials and Methods: A cross-sectional has been conducted from March 2013 to July 2016. Patients up to 30 chronological days and up to 30 corrected age were included in this study. Data extracted from charts included medical diagnoses sex gestational age at birth gender enteral feeding before performing VFSS and at discharge weight at birth and at discharge APGAR score length of hospital stay transition time to oral feeding breast feeding at discharge. To researchers considered appropriate consistency for this population age and flow variables to compare sucking and swallowing performance during VFSS.
Results: The sample used consisted of 49 patients that were referred to VFSS. The most frequent medical diagnoses in this study was prematurity (71.4%) followed by neurologic (408%) and respiratory complications (22.4%). At the time of study 816% were dependent only on enteral feeding and at discharge only 36.6% of this sample. The average age at the time of study was 33.5 weeks corrected age weight at birth 2210 g and at discharge was 3600 g APGAR at the first minute was 5.7 and at five minutes was 7.9 length of hospital stay was 57.9 days. Penetration was more prevalent with thin fluid and standard flow (52.1%) than thicken fluid and slow flow (69.2%). Silent aspiration was more prevalent with thin fluid and standard flow (17.4%). Breast feeding rates were 44.9% at discharge.
Conclusions: Dysphagia was ubiquitous in this sample what emphasizes the need for a through clinical swallowing assessment and recommendation to a complimentary examination such as VFSS when needed.

Session 05 Poster session 1.7: Treatment I

TREATMENT OF CRICOPHARYNGEAL DYSFUNTION: AN EFFECT OF ELLIPTICAL BALLOON DILATATION

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Introduction: The balloon dilatation is the most cost effective and least invasive treatment for dysphagia due to the cricopharyngeal dysfunction(CPD). We developed an elliptical balloon catheter to efficiently expand the esophageal stricture. The primary aim of this study was to investigate the outcomes of an elliptical balloon catheter using the high resolution manometry(HRM).
Material and Methods: The catheter which we developed had two balloons 7 cm proximal to the tip of the catheter. The shape of the outer balloon was an elliptical with a longer axis of 5 cm. The inner balloon was located in the distal edge of the outer one and played the role of anchor in the distal UES. It's longer axix was 1/2 of the outer one and expanded spherically. The elliptical balloon catheter was inserted through the mouth until the balloon part was estimated to be under the lower margin of the upper esophageal sphincter (UES). The inner balloon was inflated and then the catheter was pulled upward until resistance was encountered. The operator inflated outer balloon at that position and keep 10 s. The procedure was repeated three times to each side of UES. We measured the esophageal pressure using HRM before and after the balloon dilation and confirmed improvement of bolus passage by VF.
Results: We evaluated 3 patients in the acute subacute and chronic phase. The high pressure zone of UES including Cricopharyngeus in HRM was 8 6 7 cm respectively. After initial expansion the esophageal pressure decreased distally of the UES. After expansion several times the UES pressure decreased and the opening time was extended on the healthy side compared with the affected side. All cases showed a reduction of the pyriform sinus retention in VF.
Conclusions: The elliptical balloon was able to continuously expand the UES high pressure part over a wide range. The HRM was useful for determining the effect of balloon dilation.

SWALLOWING DYSFUNCTION, NUTRITION AND REHABILITATION AMONG OLDER PEOPLE IN SHORT-TERM CARE

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Introduction: Many older people with different diagnoses are admitted to Swedish short-term care units but there is little knowledge on frequency of dysphagia and poor nutritional status. This study aimed to (i) describe and analyze relation between swallowing ability and nutritional status in older people admitted for Swedish short-term care; and (ii) study the effects of an oral screen training program among older people with impaired swallowing.
Materials and Methods: Part 1 was a cross-sectional descriptive study of older people in short-term care in five Swedish counties. Older people (age $\geq$ 65 years) were assessed regarding swallowing ability and nutritional status. Part 2 was a cluster randomized controlled trial (RCT). The older people with dysphagia (swallowing capacity $<$ 10 ml/s) were randomised to five weeks' neuromuscular oral screen (IQoro®) training of orofacial and pharyngeal muscles or to routine care without oral screen training. The participants were assessed at baseline after intervention and six months after end of intervention regarding swallowing ability swallowing related quality of life and nutritional status.
Preliminary results: Among 391 included older people (median age 84 years) dysphagia was present in more than half of the people residing in short term care and one forth were at risk of undernutrition. Older people with dysphagia were more likely to be at risk of undernutrition compared to those without dysphagia. In total 116 older people with dysphagia participated in the RCT. Preliminary results show significantly improved swallowing capacity after oral screen training. Detailed results will be presented during the congress.
Conclusion: The high prevalence of dysphagia and risk of undernutrition among older people in short-term care highlights the need of feasible treatment for improving swallowing function and food intake in this group of individuals.

THE USE OF MECHANICAL INSUFFLATION-EXSUFFLATION DEVICE FOR IMPROVING THE COUGH STRENGTH IN PATIENTS WITH POST-STROKE DYSPHAGIA NON-RANDOMIZED STUDY

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Introduction: Cough augmentation techniques have been shown to be safe and effective for increasing peak cough flow (PCF) in neuromuscular disease patients or spinal cord injury. Their efficacies in stroke patients need to be established. Therefore the objective of this non-randomized trial was to determine whether cough augmentation techniques using mechanical insufflation–exsufflation (MIE) could be helpful in improving the PCF in stroke patients with dysphagia.
Materials and Methods: 11 patients with dysphagia related to stroke (group A) were consecutively enrolled. Before their 14 sessions of treatment their cough strength and respiratory pressure meter were evaluated by a blind assessor to patient's medical and functional status. The patients underwent MIE treatment with a blind physiotherapist in accordance with published protocols and guidelines. A follow-up assessment after the MIE treatment was performed. These results were compared to 11 control patients (group B) who had received conventional treatment of respiratory physical therapy that included percussion inspiratory and expiratory muscle strengthening training but without cough augmentation training.
Results: After 2 weeks of treatment those with MIE showed significant increase of PCF (L/min) [60(33.25–91.75) to 153(117.5–194.25) p = 0.01)] Maximal Inspiratory Pressure(MIP)(cmH2O) [19(13–33.25) to 35(26.5–49.50) p = 0.01] and MEP(Maximal Expiratory Pressure (cmH2O) [32(24–51) to 53(42–62) p = 0.01] compared to baseline and even compared to the control group. Statistical analysis showed significant group differences in PCF [153(117.50–194.25) vs (86(80.50–132.25) L/min p = 0.04] with group A showing larger improvement compared to those with conventional respiratory treatment.
Conclusions: MIE may help improve the weakened PCF in post-stroke dysphagia patients. Further prospective trials at a larger scale are needed.

THERAPEUTIC EFFECT OF TRANSCUTANEOUS ELECTRICAL STIMULATION ON CHRONIC POST-STROKE OROPHARYNGEAL DYSPHAGIA: A RANDOMIZED CONTROLLED TRIAL WITH TWO STIMULATION INTENSITIES

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Introduction: Chronic post-stroke oropharyngeal dysphagia (OD) is associated with severely impaired pharyngeal sensory and motor function. We performed a randomized control trial to assess the therapeutic effect of transcutaneous electrical stimulation at two levels of intensity in chronic post-stroke patients with dysphagia.
Methods: Ninety post-stroke patients (74.13 $\pm$ 11.45 years) with chronic OD (NIHSS 3.6 $\pm$ 4.1 Rankin 2.6 $\pm$ 1.7) were randomly assigned to a) a control group with compensatory treatment: fluids and solids adaptation and posture recommendations; b) intervention group: compensatory treatment plus sensory electrical stimulation (SES 75% of motor threshold thyro-hyoid electrode placement); c) intervention group: compensatory treatment plus neuromuscular stimulation (NMES motor threshold supra-hyoid electrode placement). Patients received up to 15 sessions of 1 h stimulation during two weeks. A videofluoroscopy was performed before and after treatment and the Penetration-Aspiration Scale (PAS) pharyngeal residue and timing of the swallow response were assessed.
Results: Patients in the control group did not present any changes following treatment (PAS: from 4.5 $\pm$ 1.5 to 4.5 $\pm$ 1.7 P = 0.876; laryngeal vestibule closure (LVC) time: from 395.9 $\pm$ 116.8 ms to 375.2 $\pm$ 126.2 ms P = 0.975; prevalence of pharyngeal residue: from 29.21% to 26.96% P = 0.706). After SES mean PAS decreased from 4.7 $\pm$ 1.7 to 3.4 $\pm$ 1.9 (P = 0.0011) LVC time from

413.8 ± 123.9 ms to 353.1 ± 128.8 ms (P = 0.0013) and pharyngeal residue from 30.3% to 22.5% (P = 0.398). After NMES mean PAS score decreased from 4.6 ± 2.0 to 3.7 ± 2.3 P = 0.0205) LVC time from 379.3 ± 83.9 ms to 310.3 ± 73.0 ms (P = 0.0002) and pharyngeal residue from 21.3% to 19.1% (P = 0.3985). No major adverse effects were observed.

Conclusion: Transcutaneous electrical stimulation is a safe and effective therapy for post-stroke OD. Both SES and NMES significantly improve the safety of swallow and the biomechanics of the swallow response.

EFFECTS OF EFFORTFUL SWALLOW AND OROPHARYNGEAL STRENGTHENING EXERCISES IN A GROUP OF PARKINSON'S DISEASE PATIENTS

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Introduction: Effortful Swallow (ES) provides an immediate increase in pharyngeal pressure thereby facilitating bolus flow through the hypopharynx and upper esophageal sphincter and minimizing pharyngeal residual. However considering as a rehabilitative maneuver the technique increase muscle strength during pharyngeal swallowing. The purpose of this study wasto analyze the effects of ESplus oropharyngeal strengthening exercises in a group of patients with Parkinson's disease (PD).

Material and Methods: A convenience sample of PD patients from a physical and cognitive rehabilitation program. 11 PD patients aged 55–80 (mean 72.7) Hoehn&Yahr scores 1–3 no complaints of swallowing were undergone to Fiberoptic Endoscopic Evaluation of Swallowing (FEES) protocol during ON-phase of levodopapre and post-treatment of ESplus oropharyngeal strengthening exercises in group intervention. 26 sessions were performed in 9 weeks (three times a week) 1 h per day. FEES assessment was performed using thin liquid in 5 cc (spoon) and 50 cc (cups) of green-dyed water and solid (standard piece of green-dyed milk biscuit). The comparison of pre- and post-treatment was performed by location of Initiation of Pharyngeal Swallowing Pharyngeal Closure Penetration-Aspiration Scale (PAS) Pharyngeal Residue Scale and Clearance. McNemar and Wilcoxon test were performed.

Results: There was increase vallecular residue to solid swallowing in post-treatment (p = 0.018). There were no significant differences pre-versus post-treatment of Initiation of Pharyngeal Swallowing Pharyngeal Closure PAS and Clearance in thin liquid (5 cc and cup). However frequency of presence of Initiation of Pharyngeal Swallowing in valleculae for thin liquid in 5 cc demonstrated decrease in the post-treatment

Conclusions: This preliminary study suggests that ES in rehabilitative exercise revealed limited effects on swallowing biomechanics at early stages of PD and absence of swallowing complaints.

TRANSNASAL OESOPHAGOSCOPY AND BALLOON DILATATION: BLOODLESS TREATMENT OF CRICOPHARYNGEAL DYSPHAGIA UNDER LOCAL

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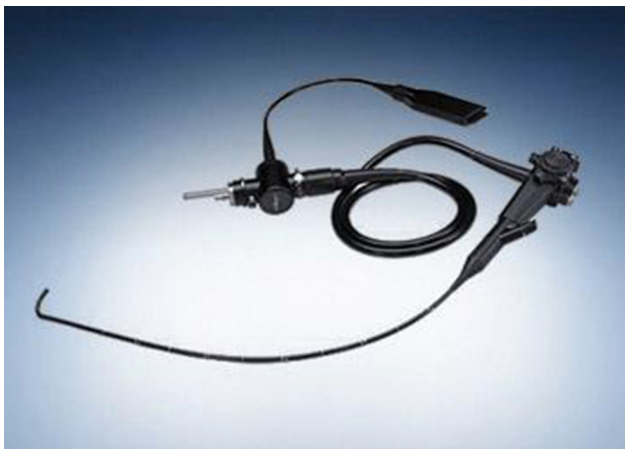
Introduction: Transnasal oesophagoscopy (TNO) refers to passage of flexible oesophagoscope through nose till the stomach for diagnosis and treatment of oesophageal and gastric disorders. Initially used by gastroenterologistsits use by ENT surgeons is becoming increasingly common. It is used for diagnosis of dysphagia reflux globus and foreign body. It is also effectively used for treatment of dysphagia by balloon dilatation of cricopharyngeal narrowing secondary to bar benign or malignant strictures. It is a quick theatre based procedure done under local anaesthesia with minimal blood loss and can be used for both simple and complex cases.



Materials and Methods: Study population comprised of 30 adult patients with dysphagia. The cohort included new referrals to specialist swallow clinic with or without previous interventions. Procedure was done between the period of November 2014–May 2017. All of them had dysphagia secondary to narrowing at the level of cricopharynx. 2 patients had complex multi-level narrowing. EAT-10 scores were obtained pre- and post-treatment. Procedure was performed under LA. Sedation was used in a minority of anxious patients. Cook's balloon was passed through TNO and dilated for up to 1 min 6 atmospheric pressure and 20 mm diameter to achieve adequate dilatation under constant vision. Minimal or no bleeding was encountered.

Results: All patients noticed significant improvement in their swallowing immediately after the procedure. 5 patients needed repeated surgery. Only 1 patient with post-radiation multi-level stricture had perforation.

Conclusion: TNO is a safe and cost-effective addition of tool to otolaryngologist's armamentarium. When combined with balloon dilatation it is an reliable and effective way of treating cricopharyngeal stenosis.

EFFECT OF IQORO TRAINING AND INFLUENCE OF OBESITY ON OROPHARYNGEAL DYSPHAGIA AND SYMPTOMS RELATED TO HIATAL HERNIA AND GASTROESOPHAGEAL DISEASE

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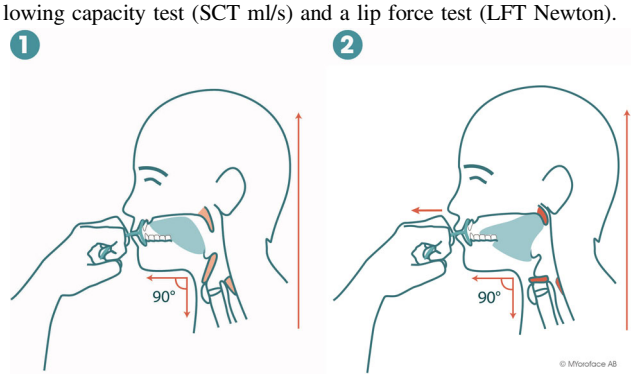
Introduction: The prevalence of obesity is increasing worldwide and physicians have considered obesity a cause of gastro-esophageal reflux disease (GERD) and sliding hiatal herniation (SHH) and treatment has been focused on weight loss. Studies have shown good results in GERD symptom relief after neuromuscular swallowing training with an IQoro® (IQST). However it was unknown whether there is any difference in the improvement rate between obese and normal-weight patients with these conditions when treated with IQST. This study therefore aimed to investigate whether there is any correlation between body mass index (BMI) and IQST results on HH-R GERD symptoms.

Material and Methods: Eighty-six patients with a SHH persistent reflux symptoms despite treatment with proton pump inhibitors and with intermittent oropharyngeal dysphagia (IOPD) were consecutively referred for 6 months' IQST. The patients were grouped according to their BMI: Group A normal weight BMI < 25 (n = 37); Group B moderately obese BMI 25–29 (n = 28); and Group C severely obese BMI 30–37 (n = 21). BMI was recorded before and after IQST and the patients completed a self-assessed questionnaire regarding their symptoms (score 0–3) of reflux heartburn chest pain IOPD globus sensation non-productive cough hoarseness and misdirected swallowing. The patients were also assessed on their ability to swallow food on a visual analogue scale (VAS 0–100) and to perform a water swallowing capacity test (SCT ml/s) and a lip force test (LFT Newton).



Results: All BMI groups showed improvement or relief of all symptoms and improvement of SCT LFT and VAS ($p < 0.001$ to $p < 0.0001$) after IQST. There was no significant difference between the BMI groups except for heartburn cough and misdirected swallowing that were significantly more reduced in Group C than in Group A.

Conclusion: IQST resulted in significant improvements in IOPD and HH-R GERD symptoms and obesity has no negative impact on these improvement.

TONGUE MUSCLE STRENGTH TRAINING INCREASES THE SUPRAHYOID MUSCLE MASS IN HEALTHY SUBJECTS

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Introduction: Although strengthening the suprahyoid muscle group is very important for improving swallowing disorder it was difficult to directly verify the effect of muscle strengthening exercise itself. In the current study we investigated its effect using ultrasonic muscle mass measurement.

Material and Methods: We conducted 8-week tongue muscle training with JMS tongue pressure measuring device for 7 young adult healthy adult volunteers (4 females aged 21.0 ± 1.3 y/o) for 8 weeks. We evaluated the training effect by measuring 1) the maximum tongue pressure value with the JMS tongue pressure measuring device and 2) the length contraction rate and area enclosing the muscle and fascial boundary of the geniohyoid muscle using the ultrasonic tomographic apparatus (SonoSite M turbo Fujifilm Co. Japan).

Results: After the period of the tongue muscular strength training the maximum tongue pressure value was 60.60 kPa on average compared with 43.49 kPa before training which showed significant increase. Ultrasound examination showed that there was no significant difference in the muscle length and contraction ratio of the geniohyoid muscle between pre- and post- training period. The area of the geniohyoid muscle was 2.58 cm2 after the training period whereas 2.34 cm2 before which showed significant increase.

Conclusions: Ultrasonic measurements revealed increase of the geniohyoid muscle mass by tongue muscle training.

Session 05 Poster session 1.8: Dysphagia in stroke and brain damage I

SWALLOWING FUNCTION PEAK EXPIRATORY COUGH FLOW AND RESPIRATORY MUSCLE FUNCTION IN ACUTE STROKE PATIENTS

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Introduction: Cough is an important mechanism to protect from aspiration stroke may affect it. Peak expiratory cough flow (PECF) is an objective tool to assess cough effectiveness. Aims:1) to assess the peak expiratory cough flow and respiratory muscle strength; 2)to examine the relationship between PECF and swallowing function in patients with acute stroke admitted in a neurorehabilitation unit.

Material and Methods: We prospectively assessed PEFC swallowing function and respiratory muscle strength in a cohort of 72 patients. Inclusion criteria: first-ever stroke event and time since stroke onset < 3 weeks. Each participant was asked to perform 5 cough into an analog PEFR meter respiratory muscle strength were assessed by maximal inspiratory and expiratory pressure. Swallowing function was assessed throughout videofluoroscopic examination (VFSS). Main outcomes were: PECF and maximal respiratory pressures. Statistical analysis performed were t-student test for independent sample and Pearson correlation.

Results: Stroke patients (63.4 y) presented respiratory muscle dysfunction (PImax 54.5 cmH2O and PEmax 82.9 cmH2O) and low values for PECF (248.1 ± 87.8 L/min). Of those 21 (29.2%) presented impairments on swallowing function (PAS ≥ 3). A cut-off of 250L/min for PECF were stablished and patients were stratified in two groups: PECF ≥ 250L/min (group A) and PECF < 250L/min (Group B). Patients in the group B presented greater impairment on respiratory muscle function: PImax 48.1 versus PImax 60.2 (95% CI − 23.9 to − 0.4) and PEmax 72.3 versus PEmax 92.2 (95% CI − 37.1 to − 2.5). We also observed a greater proportion of aspirators in the group B 17.6% versus 10.5% in the group A.

Conclusion: Stroke patients who have low values for PECF (PECF < 250L/min) have a significant impairment on respiratory muscle function in comparison with those patients with higher values for PECF. These patients also presented greater impairment on swallowing function.

*NEUROPHYSIOLOGICAL AND BIOMECHANICAL SWALLOWING EVALUATION IN POST-STROKE PATIENTS WITH OROPHARYNGEAL DYSPHAGIA

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Introduction: Oropharyngeal dysphagia (OD) is a frequent complication in post-stroke patients associated with several negative outcomes such as malnutrition respiratory infections and aspiration pneumonia. Our aim was to describe the pathophysiology of post-stroke OD through the assessment of swallowing alterations including the biomechanical elements of swallow function and afferent and efferent swallowing pathways.

Patients and Methods: We studied 20 patients with unilateral stroke (> 3 months from onset) and chronic OD (Penetration-Aspiration Scale—PAS- > 2). We evaluated the kinematics of swallow response (PAS and laryngeal vestibule closure time [LVCT]) with videofluoroscopy; sensory evoked potentials to pharyngeal electrical stimulation (pSEP; 200 μs 75%-tolerance threshold 0.2 Hz) recorded at CP3/CP4 and pharyngeal motor evoked-potentials (pMEP) to transcranial magnetic stimulation of both hemispheres.

Table 1. Demographics and stroke characteristics of the studied population.

	Stroke patients with OD (n=20)
Age	69.8±12.03
Sex (♀; %)	30 (6)
MNA-sf	11.37±2.36
Well-nourished (%)	5 (1)
At risk (%)	45 (9)
Malnourished (%)	50 (10)
Barthel (exploration)	81.25±19.12
mRS	2.5±1.5
NIHSS (admission)	4±4.71
NIHSS (exploration)	2.65±2.41
Stroke location	
Supratentorial (%)	85 (17)
Infratentorial (%)	5 (1)
Supra/infratentorial (%)	10 (2)

MNA-sf: Mini Nutritional Assessment short form; mRS: modified Rankin Scale; NIHSS: National Institute of Health Stroke Scale.

Results: Mean age of the participants was 69.80 ± 12.03 years (6 women). Participants presented good functional capacity high prevalence of malnutrition (50%) and mild stroke severity (Table 1). Highest PAS score was 5.10 ± 2.31 and 35% of patients presented aspirations associated with delayed LVCT (322.22 ± 87.28 ms). In the affected hemisphere we found delayed pSEPs in P1 (p = 0.09) and N2 (p = 0.005) peaks and reduced amplitude in P1-N2 (p = 0.024) and N2-P2 (p = 0.011) peaks and only slightly reduced pMEPs duration (ns) in comparison with the unaffected hemisphere (Table 2).

Table 2. Latency and amplitude of each of the pharyngeal sensory evoked potentials (pSEP). Latency, duration, amplitude and area under de curve of the pharyngeal motor evoked potentials (pMEP).

		Affected hemisphere	Unaffected hemisphere	P-value
	pSEP			
Latency (ms)	**N1**	78.89±21.59	84.69±20.07	0.406
	P1	158.23±29.95	142.83±37.26	0.097
	N2	237.32±60.47	216.65±49.41	**0.005**
	P2	335.32±60.37	320.09±62.13	0.188
Amplitude (μV)	**N1-P1**	1.54±1.89	1.97±2.33	0.294
	P1-N2	1.2±0.94	1.75±1.36	**0.024**
	N2-P2	1.15±0.86	1.68±1.28	**0.011**
	pMEP			
	Latency (ms)	7.63±1.09	7.5±1.15	0.418
	Duration (ms)	18.66±7.25	17.85±7.65	0.083
	Amplitude (mV)	0.027±0.024	0.027±0.027	0.809
	AUC (μV-sec)	0.71±6.52	0. 21±0.16	0.806

*pSEP: pharyngeal sensory evoked potential; pMEP: pharyngeal motor evoked potential; AUC: area under de curve. *p-values in bold are statistically significant, underlined results nearly reach significance.*

Conclusions: Our findings show severe impaired biomechanics of oropharyngeal swallow response with high prevalence of aspirations high mean PAS score and delayed LVCT in a population with mild stroke severity. Our neurophysiological studies showed generally preserved motor pathways and impaired conduction and integration of pharyngeal sensory inputs at stroke site as a key feature of chronic mildly-disabled post-stroke OD patients.

CLINICAL COURSE AND OUTCOME IN PATIENTS WITH SEVERE DYSPHAGIA AFTER LATERAL MEDULLARY SYNDROME

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Introduction: Although the prognosis of dysphagia in lateral medullary syndrome (LMS) is favorable there is little information about progression of severe dysphagia over time in perspective of video fluoroscopic study (VFSS) findings diet and/or postural modification. The purpose of this study was to verify the clinical course and outcome in patients with severe dysphagia after LMS.
Materials and Methods: The patients with 'severe dysphagia after LMS' who admitted in rehabilitation unit from December 2013 to December 2016 were collected by retrospective medical record review. The criteria of 'severe dysphagia after LMS' was defined as: (1) acute or subacute LMS patients (2) initially required tube feeding (3) decreased pharyngeal constriction and not showing any esophageal passage in VFSS findings. Data were collected including VFSS findings types of diet and postural modification.
Results: Eleven patients (6 men 5 women mean age 59.5 years; range 38–74 years) were identified who had 'severe dysphagia after LMS' among the 36 cases of LMS patients. The lesion side was left in 4 cases and right in 7 cases. Initial VFSS was performed at 16.1 ± 18.0 days after the onset and serially conducted at every 2 weeks interval. Esophageal passage was begun to show at an average 32.7 ± 18.5 days and the patients could begin partial oral diet feeding with postural modification (head rotation). There were 52.2 ± 21.8 days required to change into full oral diet feeding. After 68.1 ± days postural modification was not required any more in 7 cases.
Conclusions: Every patient with 'severe dysphagia after LMS' could start partial oral feeding approximately at about 5 weeks after the onset and they were allowed normal diet without any diet modification and limitation after 10 weeks. This clinical course and outcome might help in predicting the prognosis and planning the strategy of rehabilitation program in severe dysphagia after LMS.

*LESIONS RESPONSIBLE FOR DELAYED ORAL TRANSIT TIME IN POST-STROKE DYSPHAGIA

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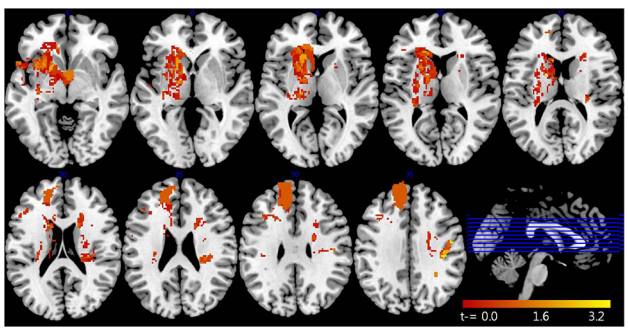
Introduction: Some stroke patients showed oral phase dysphagia especially characterized by a markedly prolonged oral transit time that hinders oral feeding. The aim of study was to clarify the clinical characteristics and lesion responsible for delayed swallowing.



Materials and Methods: We reviewed 90 patients with stroke. The oral processing time plus the postfaucial aggregation time required to swallow semisolid food was assessed. The patients were divided into 2 groups according to oral transit time and we analyzed the differences of the characteristics such as demographic factors lesion factors and cognitive function. Logistic regression analyses were performed to examine the predictors of delayed oral transit time. Lesion location and volume were measured on brain magnetic resonance images. We generated statistic maps of lesion related to delayed oral phase in swallowing using voxel-based lesion symptom mapping (VLSM).

Dependent Variable	Predictors	β	OR	CI	p-value
Oral processing time (liquid)	K-MMSE	-0.480	-5.058	-0.663~-0.289	0.000
Postfaucial aggregation time (liquid)	Age	0.238	2.407	0.002~0.023	0.018
	K-MMSE	-0.423	-4.284	-0.053-0.019	0.000
Oral transit time (liquid)	K-MMSE	-0.501	-5.350	-0.689~-0.316	0.000
Oral processing time (semisolid)	K-MMSE	-0.467	-4.684	-0.963~-0.389	0.000
Oral transit time (semisolid)	K-MMSE	-0.456	-4.807	-0.966~-0.401	0.000

Results: The group of patients who showed delayed oral transit time had significantly low cognitive function. Also in regression model delayed oral phase were predicted with low K-MMSE (Korean version of mini mental status exam). Using VLSM lesion location associated with delayed oral phase adjusting K-MMSE score were mainly distributed in left frontal lobe which is thought to be related in praxis.
Conclusion: Delayed oral phase in post-stroke patients was not negligible clinically. Patients' cognitive impairment affects on the oral transit time and when adjusting it the lesion responsible for delayed oral phase was mainly in left frontal lobe. It might be somewhat related to praxis function.

EFFECT OF RESTORING PRESSURE IN UPPER AIRWAY ON SWALLOWING FUNCTION AND BIO-FLUID DYNAMICS FOR PATIENTS WITH TRACHEOSTOMY AFTER ACQUIRED BRAIN DAMAGE

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Introduction: Acquired brain injury refers to any type of brain injury including stroke brain infection traumatic brain injuries etc. Tracheotomy is an important method to open airway and rescue acquired brain injury patients.Previous studies showed that tracheotomy may be a factors to elevate the risk of aspiration. And in recent years some studies found that wearing a Passi-Muir Speaking Valve (PMV) can improve the function of swallow of brain injury after tracheotomy patient with aspiration. However few studies have ever explored the effect of PMV on restoring pressure of upper airway.
Material and Methods: 12 dysphagia inpatients were recruited. All the inpatients have tracheostomy after acquired brain damage. All of them underwent video fluoroscopy swallowing study and high resolution manometry to acquire the penetration-aspiration scale pressure in pharynx and upper esophagus during swallowing before and instantly after wearing PMV. A 320-row dynamic volume CT was used to modeling upper airway calculated by computer fluid dynamics

method to acquire the deglutitive subglottic air pressure. The indexes were compared with the Matched-Pairs rank sum test.
Results: No significance was found in penetration aspiration scale before and instantly after wearing PMV ($P > 0.05$). However all the score of 12 patients is not increase. No statistical significance were found in peak pressures in pharynx increased rate of pharyngeal pressure pharyngeal pressure duration upper esophageal sphincter (UES) residual pressure and UES relaxation duration before and instantly after wearing PMV ($P > 0.05$). However there is significant difference ($P < 0.05$) between the deglutitive subglottic air pressure before (0.78 ± 22.70 Pa) and instantly after wearing PMV (697.79 ± 54.63 Pa).
Conclusion: PMV will not increase the risk of the aspiration in patients. It can improve deglutitive subglottic air pressure immediately. But it didn't show instant impact on swallowing functions.

THE EFFECTS OF PHARYNGEAL FUNCTION AND COGNITIVE FUNCTION FOR DYSPHAGIA IN POST STROKE PATIENTS

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Introduction: Dysphagia is one of common symptoms after stroke. It has been reported that stroke patients with dysphagia has poor cognitive function. However it is still unclear how the cognitive function affect dysphagia in stroke patients. In this study we examined relationships between pharyngeal function and cognitive function to clarify factors which affect dysphagia.
Material and Methods: Subjects were 34 stroke patients (13 females and 21 males mean age 70.2 years mean time from onset to admission 37.4 days) who admitted rehabilitation hospital. Videofluorography (VF) was performed while patients drunk nectar thick liquid barium. We investigated the pharyngeal transit times(PTT) for pharyngeal function and eating status scale (ESS: Score is from 1 to5 and lower means severe) for severity of dysphagia. Functional Independence Measure cognition (FIM) was also evaluated for cognitive function. correlation coefficient was performed between PTT and FIM and Kruskal–Wallis test was performed for investigating effect of pharyngeal and cognitive function.
Results: There was no significant correlation between PTT and FIM however lower FIM tend to have longer PTT. PTT had no significant differences among ESS however ESS1 had longer PTT than others. For FIM ESS4 was higher than ESS1 significantly.
Conclusions: Localization of brain function of pharynx is close to that of cognitive area and brain damage can affect pharynx and cognition simultaneously therefore PTT showed slight negative correlation with FIM. Only FIM showed significant differences therefore cognition might be one of the important factor for dysphagia.

PREDICTIVE FACTORS FOR POST-STROKE RESUMPTION OF COMPLETE ORAL INTAKE IN A REHABILITATION SETTING

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Introduction: Several studies have investigated predictive factors for recovery of oral intake after stroke providing inconsistent and sometimes contradictory results and overlooking the role of dysphagia rehabilitation. We aimed to identify predictors of successful tube removal in patients admitted to a rehabilitation ward and understand the role of dysphagia rehabilitation in the recovery of oral intake.
Materials and Methods: A retrospective chart review was conducted over the course of 7 years. Data analyzed included demographic information stroke characteristics length of stay type of tube feeding presence of comorbidities functional independence measure (FIM) body mass index Glasgow Coma Scale (GCS) clinical swallow evaluation (BLB) FEES findings frequency and modalities of dysphagia rehabilitation. Univariate analysis was conducted to define significantly different variables between the groups with and without resumption of complete oral intake at discharge. Predictive factors for oral intake recovery will be indentified using a stepwise multiple logistic regression model.
Results: 308 patients were included in the analysis (mean age 75 4 y; mean length of stay 83 d). 52% resumed complete oral intake at discharge; 75% undertook FEES; 844% had dysphagia rehabilitation. Univariate analysis showed significant differences between the groups: stroke lateralization($p = 0.014$) length of stay($p = 0.021$) type of tube feeding ($p = 0.000$) presence of cognitive or language disorders ($p = 0.000$) FEES ($p = 0.000$) presence of penetration/aspiration or pooling($p = 0.013$; $p = 0.000$) cognitive rehabilitation ($p = 0.013$) dysphagia rehabilitation ($p = 0.000$) number of dysphagia rehabilitation sessions ($p = 0.007$) FIM and BLB score at admission ($p = 0.000$) GCS score at discharge ($p = 0.000$).
Conclusions: Numerous statistically significant differences were identified. A stepwise multiple logistic regression model will be used to investigate predictors of complete oral feeding recovery.

THE SOONER THE BETTER: DOES EARLY SPEECH AND LANGUAGE THERAPY INVOLVEMENT IN STROKE MANAGEMENT RESULT IN BETTER DYSPHAGIA OUTCOMES?

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Introduction: Dysphagia is present in approximately two-thirds of patients within the first three days of onset of stroke. Early detection of dysphagia reduces pulmonary complications length of stay and healthcare costs. National Clincial Guidelines recommend that patients are seen by Speech and Language therapists (SLTs) for initial assessment within 48 h of admission. The objective of this audit was to ascertain if patients admitted to our hospital were assessed by SLT within 48 h of admission and whether those patients had improved dysphagia outcomes compared with those seen after 48 h as measured by the Therapy Outcome Measures (TOMs) occurrence of LRTIs on admission and rate of readmissions with LRTIs.
Methods: Retrospective database review of all stroke admissions from January to December 2016. Descriptive analysis carried out with Microsoft Excel and quantitative analysis carried out using GraphPad Software—Prism 7. TOMs is a 6-point scale for dysphagia (0 = Severe 5 = No Dysphagia).
Results: SLT received referrals for 70% (n = 137) of all stroke presentations (N = 195). Of patients referred: 66% referred within 48 h with 98% seen by SLT within 48 h of receipt of referral. Day of admission impacted average length of time awaiting referral to SLT which was significant ($p = 0.0015$). 64% of patients were seen within 48 h of admission (Group A) and 36% were seen after 48 h (Group

B). Group A showed greater improvement in TOMs score (x̄=1.6) compared to Group B (x̄=0.6) had significantly fewer LRTIs prior to SLT involvement (13%) than group B (27%; p = 0.0424) and had a lower rate of readmissions with LRTIs (17% versus 21%).
Conclusions: Patients who are seen by SLT within National Guidelines timeframe have better dysphagia outcomes. This audit highlights the need for early recognition of dysphagia in the acute stroke setting.

Session 05 Poster session 1.9: Physiology and neurophysiology I

SWALLOWING IN HEALTHY ADULTS: ACOUSTIC CHARACTERISTICS OF TIME INTENSITY AND FREQUENCY

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Introduction: Swallowing is a neuromuscular function its evaluation is performed to verify the presence of dysphagia and/or the occurrence of larynx tracheal aspiration aiming at the possibility of oral diet safely. Physiologically the high position of the larynx is associated with the swallowing process functioning as a sphincter valve a mechanism of airway protection inferring in moves that generate frequency and intensity in the transfer of the food bolus. Cervical auscultation is a complementary method of this noninvasive evaluation that allows the inference as to the integrity of the airway protection process in addition to characterizing the noise found.

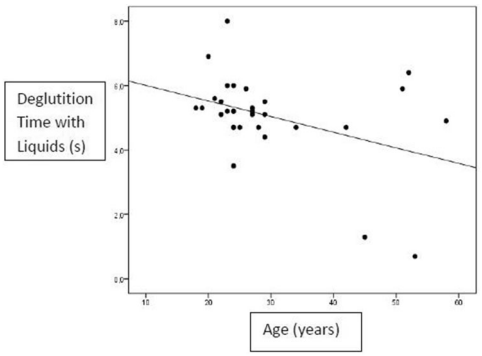

Figure 1 – Association between age and swallowing time of liquid (rs=-0,404, p=0,024)

Objective: The aim of this study is to characterize the acoustic parameters of frequency intensity and swallowing time of saliva and for the liquid consistency (thin liquid) in healthy adults.
Material and Methods: This is a retrospective observational clinical study approved by CEP under opinion number 995/12. The individuals performed swallowing of saliva and 50 ml of water. The values were captured by the electronic stethoscope and transferred to DeglutiSom® software. The results were considered at a significance level of 5% ($p \leq 0.05$) and the analyzes were performed in the SPSS program (Statistical Package for the Social Science) version 21.0.

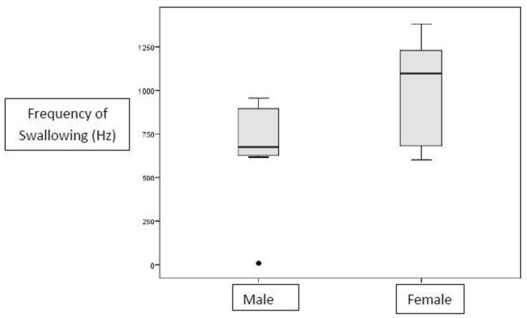

Figure 2 - Comparison between genders regarding the frequency (Hz) of swallowing of liquid (p=0,018)

Results: The data on swallowing of 31 adults with a mean age of 29.6 years were compared. There was a significant difference between saliva and fluid swallows in relation to intensity. As for age there was a significant association with the time of swallowing with liquid (Fig. 1). Women had significantly higher swallowing times and frequency with liquids than men (Fig. 2).
Conclusions: This study characterized the acoustic parameters of frequency intensity and time in healthy adults by swallowing saliva and 50 ml of liquid in 896 Hz 473 dB in 52 s. These data show that the greater age lower time is necessary for swallowing of liquid. The frequency of saliva (691 Hz) and intensity (31 dB) were lower than liquid and the time of swallowing was similar.

SWALLOWING SOUNDS ANALYSIS IN CHILDREN WITH BRONCHIOLITIS

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Introduction: Swallowing and breathing are processes that must occur synchronously and coordinated through oral reflexes from swallowing to stop breath. In respiratory disorders may be found swallowing disorders caused by the adjustment to the coordination of breathing and swallowing and thus present a risk for dysphagia and aspiration. Bronchiolitis is characterized by infection of the lower airways being a diffuse inflammation bronchiolar caused by respiratory syncytial virus.

Variables	N=22 Media ±SD
Frequency (Hz)	744 ±146
Intensity (dB)	52.0 ±24.1
Number of swallowings md	2(1-4)
Time of swallowing s	5.3 ± 2.7

Objective: Checking the acoustic characteristics of the swallowing noises in children with bronchiolitis.

Variables	Female N=7 Media ± SD	Male N= 15 Media ± SD	p-valor
Frequency (Hz)	708 ±107	761 ± 161	0.442
Intensity (dB)	50.2 ± 19.1	52.5± 26.7	0.842
Number of swallowings ? md	4 (2-4)	1 (1-3)	0.033*
Time of swallowings	5.2 ±2.9	5.4 ±2.8	0.903

Materials and Methods: *Database analysis* The acoustic signals were collected through the Littmann ® electronic stethoscopes 4100 model. After storage the sounds were opened and rotated in the Deglutisom ® software settling the peak frequency intensity and intervals of swallowing—time of swallowing. This study was approved by the Ethical Committee in Research under numbers 336.347 and 1.499.911.
Results: This study counted with the data of 22 children median of 81 days of life and both gender. The characteristics found in the sample were mean swallowing frequency of 744 Hz mean intensity of 52 dB mean swallowing time of 5.3 s and median of 2 swallowing's (Table 1). There was significant difference between the acoustic characteristics of deglutition compared to the gender as the number of swallows. The female gender showed the highest number of swallows compared to male. The results of the association of the acoustic characteristics of the swallowing noises between the data did not show statistical significance (Table 2).
Conclusion: It is considered that the higher frequency intensity and shorter time of swallowing more efficient is the process of swallowing. When we look at children's issues the patterns of neurological maturation and age should be taken into consideration.

SHORT-TERM EFFECTS OF BLACK PEPPER OIL INHALATION ON PHARYNGEAL MOTOR SYSTEM IN HEALTHY HUMANS

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Introduction: Previous reports revealed that nasal inhalation of black pepper oil (BPO) possibly improved swallowing function in elderly people. The aim of this study was to examine how the BPO application affects excitability of pharyngeal motor cortex.
Materials and Methods: Five healthy volunteers (2 male age range 22–31 years) participated in this study. The intraluminal catheter was intubated for recording EMG and infusing distilled water onto the pharynx to evoke swallowing. Bipolar surface EMG electrodes were attached to the skin over the anterior surface of the digastric muscle and masseter muscle on the left side. Single-pulse TMS was delivered over the pharyngeal and thenar motor cortices to induce respective motor evoked potential (PMEP and TMEP). Distilled water was injected onto the pharynx at 0.05 mL/s and the onset latency of the first swallow (Latency) was measured. MEPs and Latency were obtained before (baseline) immediately after and every 15 min after 1-min BPO inhalation up to 30 min. The mean values of the percent change in MEPs amplitude and Latency were compared between baseline and follow up measurements by one-way repeated measures ANOVA.

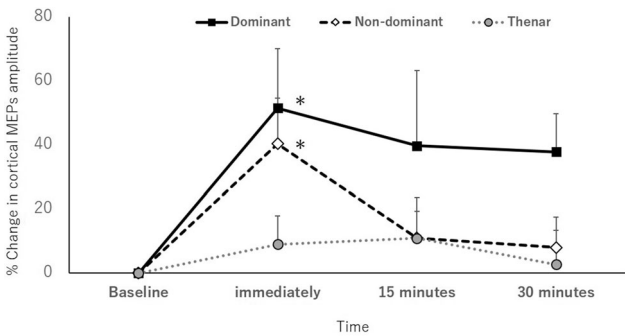

Fig. 1 Changes in excitability of MEPs

Results: PMEPs of either pharyngeal motor cortex (dominant and non-dominant hemispheres) showed significantly increase immediately after 1-min BPO inhalation ($p < 0.05$) whereas there was no difference in TMEP (Fig. 1) and Latency.
Conclusions: Inhalation of BPO at least showed immediate and facilitatory effects on excitability of pharyngeal motor cortex in the healthy adults. Further studies should be conducted to find the efficient strategy of swallowing therapy.

CURRENT SITUATION OF PHARYNGEAL AND TRACHEAL SUCTION TRAINING PROGRAM AT DENTAL HYGIENIST TRAINING INSTITUTES IN JAPAN

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Introduction: Japan is one the fastest aging countries and number of elderly patients who require nursing care due to comorbid disorders of their primary illness. When dental hygienists perform oral care and swallowing training for elderly patients preparation for pharyngeal and tracheal suction is necessary to prevent suffocation and aspiration. It is necessary to strengthen educational program on pharyngeal and tracheal suction at the dental hygiene training institutes. The purpose of this study was to grasp the present situation concerning education of pharyngeal and tracheal suction of dental hygiene institute in Japan.
Material and Methods: We did a questionnaire survey to 160 training institutes across nation and received the answers from 107 institutes responded (response rate was 66.9%). The questionnaires included implementing training programs occupations of the assigned trainers training practice program and content of the training. When the institute does not have training program we also asked whether training program was planned.
Results: There were 39.2% of institutes which had the training program. Among them 71.4% included training practice program. Practical training program used a medical training dummy (47%) practical demonstration (35%) and actual practical training between students (18%). Trainers assigned from faculty members in the institutes were the largest (43.9%) followed by nurses (19.5%). There were 46% of the total institutes planning the training program.
Conclusions: Although demand of suction by the dental hygienist appears to be increasing the current number of dental hygienists who completed pharyngeal and tracheal suction training remains small. Our results suggest that it is necessary to increase the number of institutes which had the pharyngeal and tracheal suction training program before graduation by collaborating with multi-occupation such as nurse and to introduction more realistic education on the job.

DIAPHRAGM ACTIVITY DURING SWALLOWING IN RATS

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Introduction: Swallowing is well coordinated to ventilation in order to prevent aspiration. In healthy adults the deglutition interrupts the

respiration and induces an apnoea. This swallowing apnoea occurs usually during expiration and lasts between 0.5 and 1.0 s. The swallowing and ventilatory coordination could be explained by the interaction between the two central pattern generators. Hardemark-Cedborg et al. found a diaphragmatic activity during the apnoea so that the swallowing apnoea is an "active breath hold" and not a cessation of respiratory activity. The aim of this current study was to study the diaphragmatic activity during swallowing in rats.
Materials and Methods: The study was carried on 11 male Sprague–Dawley rats using whole-body plethysmography and video recordings to identify the swallowing apnoea. The rats were given water via a baby bottle fitted with a nipple after 24 h without drinking. The experiment was continued until rest ventilation and swallowing periods were identified on the video recordings. The diaphragmatic activity was studied using a sterilized telemetry transmitter body inserted in the abdominal cavity. The biopotential leads were implanted in the diaphragm muscle. The electromyography (EMG) brust duration as well as the area under the curve were compared in rats at rest and during swallowing.
Results: At rest the EMG brust during each inspiration with no EMG activity was objected during expiration. Despite the decrease of the inspiratory time the EMG brust duration increase significantly during swallowing when compared to the period at rest. We also objected an increase of the area under the curve of the electromyography activity.
Conclusion: The diaphragm muscle participates actively during the apnoea swallowing by increasing its activity. These results confirm the coordination of swallowing and ventilation and suggest that the alteration of the diaphragm activity could alter the swallowing.

DOES SWALLOWING A PILL WITH THIN LIQUIDS VERSUS PUREE CHANGE SWALLOWING SAFETY AND/OR EFFICIENCY?

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Introduction: Many individuals not only those with dysphagia report difficulties swallowing pills. Very few studies have investigated the influence pills on swallowing function. We compared within-subject changes to post-swallow residue using the normalized residue ratio scale (NRRS)1 and penetration-aspiration scale (PAS)2 in thin and puree boluses swallowed with and without a barium-filled capsule on videofluoroscopy (VF).
Material and Methods: VF data was collected from 22 adults (8 male) with mixed neurological etiologies (mean age = 69.7 SD = 11.8). Swallows with and without pills were included from 2 bolus conditions: thin liquid (naturally-occurring sips; 21 subjects) and puree (5 ml apple sauce; 8 subjects). Pill (barium-filled capsules) presentation was randomized. Swallows (n = 237) were spliced into clips for randomized rating of the NRRS and PAS. Worst PAS scores across bolus conditions represented swallowing safety (≤ 2 safe ≥ 3 unsafe). Paired t-tests compared average NRRS scores by pill condition and McNemar's test compared safe vs unsafe swallows by pill condition.
Results: Inter-and intra-rater reliability (20% of data) achieved ICC > 0.75 for all measures. No significant differences were observed for residue (vallecula or pyriforms) by pill condition for thin or puree boluses. Similarly no significant differences were observed between the proportion of safe vs unsafe swallows by pill condition for thin or puree boluses.
Conclusions: In this sample the addition of a barium-filled capsule did not significantly influence residue or swallowing safety regardless of bolus type (thin or puree). It appears that clinicians may not need to test a pill under VF and may extrapolate patient performance in a particular bolus condition to representative of the same condition with a pill. Limitations include a small sample size and the skewed distribution to safe swallowing at baseline. Future research should include individuals with more severe swallowing impairments.

*VOLITIONAL CONTROL OF RESTING PRESSURE AT THE UPPER OESOPHAGEAL SPHINCTER IN HEALTHY ADULTS: AN EXPLORATORY STUDY

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Introduction: Resting pressure (RP) of the upper oesophageal sphincter (UOS) provides a barrier between the pharynx and the oesophagus. Modulation of pressure historically is considered to be controlled reflexively. This exploratory study investigated the potential for volitional manipulation of pressure at the UOS in healthy adults.
Material and Methods: Six participants (average age 30.7 years all female) completed two training tasks daily for two weeks: increasing and decreasing RP using high-resolution manometry (HRM) contour plots as biofeedback. Tasks trials were two minutes in duration each alternated and repeated for one hour including breaks between trials. Pressure outcomes were assessed with HRM measured prior to training start (T0) and after one (T1) and two (T2) weeks of training. After a training break of two weeks (T3) task retention was evaluated.
Results: Analyses at T1 T2 and T3 represent a difference in pressure to T0. For the pressure increase task there was a significant overall effect of training on task performance (95% CI [11.35–86.49] p = 0.02 at T1 95% CI [1.96–74.51] p = 0.06 at T2 and 95% CI [15.29–88.07] p = 0.01 at T3). For the pressure decrease condition there was no significant overall effect of training on task performance [X2(3) = 7.04 p = 0.07]. Intra- and inter-rater reliability of RP were high (with single measures intraclass correlation coefficient of 0.98 and 0.89 respectively).
Conclusions: There was evidence of potential for volitional increase of pressure at the UOS. Different findings between the two tasks suggests that there is greater potential to volitionally intensify contraction of the UES muscles rather than volitionally disrupt this presumably reflexively controlled behaviour.

THE IMPACT OF AGE ON BOLUS ACCOMMODATION IN HEALTHY ADULTS

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Introduction: Bolus accommodation is the automatic adjustment of swallowing physiology in response to different materials that are swallowed. This study utilized sEMG to evaluate motor changes in two age groups of healthy adults while swallowing different materials.

	Middle-aged group	Senior-aged group	
Age	52.80 (SD=5.47)	66.67 (SD=5.33)	n.s.
Gender (Male : Female)	4 : 11	7 : 8	n.s.
Weight (pounds)	186.70 (SD=53.11)	187.59 (SD=34.49)	n.s.
Body mass indx (BMI)	29.57 (SD=6.00)	28.99 (SD=3.60)	n.s.
Neck skin thickness (mm)	13.27 (SD=3.62)	12.93 (SD=4.15)	n.s.
sEMG baseline	3.33 (SD=0.49)	3.40 (SD=0.63)	n.s.

Material and Methods: 30 healthy individuals between 40 and 90 years of age were recruited. Participants were categorized into two groups: middle-aged group (59 ≤) and senior-aged group (≤ 60). The two subgroups were equivalent for gender distribution weight BMI neck skin thickness and sEMG baseline (Table 1). sEMG obtained from the submental region was used to assess the neuromotor activity for each swallowing condition. Four materials were evaluated: 1) dry/saliva 2) 10 ml water 3) 10 ml pudding and 4) a small pill. Participants were instructed to swallow each material in one swallow. Each material was swallowed three times in random order. sEMG measures included peak amplitude (μv) swallow duration (s) and integrated amplitude over time (sμv). Repeated measures analysis of variance were completed to evaluate age effects across the various swallowing conditions.

	Peak amplitude (μv)		Swallow duration (s)		Integrated amplitude over time (sμv)	
Dry swallow						
Middle-aged group	55.15 (SD=23.59)	n.s.	1.85 (SD=0.42)	n.s.	35.77 (SD=15.51)	n.s.
Senior-aged group	53.53 (SD=23.29)		1.81 (SD=0.36)	*	38.00 (SD=17.26)	*
10ml water						
Middle-aged group	54.00 (SD=20.28)	n.s.	1.92 (SD=0.31)	n.s.	35.62 (SD=12.18)	n.s.
Senior-aged group	49.60 (SD=11.80)		1.76 (SD=0.34)	**	34.07 (SD=11.74)	**
10ml pudding						
Middle-aged group	61.31 (SD=18.69)	n.s.	2.22 (SD=0.37)	p = 0.003	48.15 (SD=14.79)	n.s.
Senior-aged group	57.80 (SD=18.91)		1.93 (SD=0.32)		43.07 (SD=16.94)	
A small pill						
Middle-aged group	62.77 (SD=21.76)	n.s.	2.47 (SD=0.45)	p = 0.02	57.38 (SD=21.60)	n.s.
Senior-aged group	68.33 (SD=34.96)		2.05 (SD=0.39)	*, **	49.40 (SD=24.37)	*, **
*, ** Materials with significant different amplitude values						

Results: A significant interaction was noted between material and age only for duration. Senior-aged demonstrated significantly shorter swallow durations for pudding and pill. Peak amplitude did not demonstrate any significant effect from material or age. For integrated amplitude a significant main effect for material was observed but no main effect for age nor any interaction between material and age. The significant main effect for material reflected differences between dry and pill and water and pill (Table 2).
Conclusions: Swallow duration in healthy adults is dependent upon age and material swallowed. Older healthy adults depicted shorter swallow durations for materials that require more effort to swallow. In this regard both age and material swallowed impact bolus accommodation in healthy adults relating only to swallow duration.

Session 05 Poster session 1.10: Dysphagia after HNC treatment I

*RELATIONSHIPS BETWEEN ORAL HYPOFUNCTION AND MALNUTRITION IN HOSPITALIZED CANCER PATIENTS IN AN ACUTE HOSPITAL

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Introduction: Cancer patients often fall into undernutritional condition due to cancer treatment which increase the risk of complications. Oral functions have important roles in mastication and swallowing. The present study investigated the association between oral functions and nutritional status in hospitalized cancer patients in an acute hospital.
Material and Methods: Cancer patients who admitted to an acute hospital and referred to its dental clinic were prospectively recruited from October 2015 to February 2016. The quantitative data of five variables related to oral functions were collected: oral wetness tongue pressure tongue-lip motor function bite force and poor oral hygiene. Nutritional status was measured using Mini Nutrition Assessment—Short Form (MNA-SF). The Comorbidity was scored with Charlson Comorbidity Index. Bivariate and multiple linear regression analyses were performed to examine the relationships between MNA score and oral functions.
Results: A total of 113 cancer patients were participated in this study. With bivariate linear regression analysis MNA score was significantly correlated with oral wetness tongue pressure tongue-lip motor function and bite force. In a multiple regression model MNA score had moderate correlation with oral functions ($R = 0.63$). In the model tongue pressure and tongue-lip motor function had significant partial correlation coefficients with MNA score. Age and comorbidity were not significantly associated with MNA score.
Conclusions: Our findings suggest that declined oral functions were significantly associated with malnutrition in hospitalized cancer patients. Our findings indicate that supports for oral functions would be needed for cancer patients to improve their nutritional status.

DISCUSSING SWALLOWING AND DYSPHAGIA DURING THE PRETREATMENT COUNSELING OF PATIENTS WITH HEAD AND NECK CANCER: IS VIDEO-ANIMATION A USEFUL EDUCATION TOOL?

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Objective: Patients preparing to undergo treatment for head and neck cancer (HNC) should be informed about the ramifications to their eating drinking and swallowing function. We aimed to establish the acceptability and usefulness of video-animation to educate patients about the process of swallowing as part of their pre-treatment counselling.
Methods: Thirteen patients previously treated for HNC participated in this study. Think-aloud a type of qualitative methodology was used to encourage patients to verbalize their thoughts while watching a short video-animation showing the process of swallowing. Transcripts were analyzed using thematic content analysis.
Results: Four main themes were identified. (1) patient interest and engagement (2) acceptability of visual imagery and narration (3) information provision and learning (4) personal relevance and intended action. Patients appeared interested and engaged in the video-animations asking several spontaneous questions about how to maintain or improve swallowing function. Learning was evident from patients' recognition and verbalizations of grossly disordered swallowing patterns. Most patients reported the images to be visually acceptable and could often relate what they were seeing to their own swallowing experience. Many patients also verbalized recognition of the need to keep muscles active through exercises.
Conclusions and Practice Implications: These results suggest that the video-animation was acceptable interesting informative and relevant for most patients. Patients who learn about the process of swallowing using the video-animation may better understand their own swallowing x-ray. This increases the scope to use patients' own diagnostic x-ray swallow as a part of their rehabilitative or behaviour change interventions.

*FACTORS AFFECTING SWALLOWING OUTCOMES AFTER TOTAL LARYNGECTOMY: PARTICIPANT SELF-REPORT USING THE SOAL (SWALLOWING OUTCOMES AFTER LARYNGECTOMY) QUESTIONNAIRE

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Introduction: The prevalence of dysphagia after total laryngectomy and the subsequent impact on quality of life (QOL) is now well reported in the literature. The aim of this study was to identify whether patient demographics surgical variables use of adjuvant treatment and time since surgery were associated with patient reported swallowing outcome.
Methodology: A cross-sectional questionnaire survey of laryngectomees was undertaken at eight UK hospitals. A validated measure the swallowing outcome after laryngectomy (SOAL) questionnaire was used to provide a patient reported swallowing score. Relevant patient and treatment related information was obtained from medical records by clinicians at the time of administering the questionnaire.
Results: Two hundred and sixty-eight people with total laryngectomy took part in the study. 228 (85%) were male and 40 (15%) were female. Age range was 38 –95 [mean of 66.6 (SD) = 10.12]. Participants were at least three months post treatment (3–420 months [mean 60.35(SD) = 68.81]). A preliminary analysis identified the following factors for inclusion in a regression model: age gender adjuvant treatment reconstruction type and time post-surgery. Swallow outcomes were negatively affected by the type of reconstruction used and adjuvant treatment. Regression analysis was performed on 239 participants. The model explained 23% of the variance of the scores on the SOAL ($R2 = 0.23$ $p < 0.001$). The variables contributing most individual variance were chemo-radiation (13%) followed by reconstruction using a free jejunum flap (6%).
Conclusions: Alteration in swallow function following total laryngectomy is affected by type of closure used and adjuvant treatment. Patients with total laryngectomy who require adjuvant chemo-radiation and who have had reconstruction have poorer swallowing. Patients do adjust over time to an altered swallow but swallowing changes should be targeted more consistently for improved patient management

HEAD AND NECK CANCER PATIENT'S ADHERENCE TO PREVENTIVE SWALLOWING EXERCISES IN A RANDOMISED CONTROLLED TRIAL

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Introduction: Head and neck cancer (HNC) patients suffer from substantial complications related to swallowing during and after radiotherapy treatment. In recent years preventive swallowing exercises are being increasingly investigated as a means to limit swallowing difficulties (dysphagia) in this patient group. However adherence to exercise regimes is poorly documented in most trials restricting the conclusions drawn on the effects of the interventions. The aim of this study is to investigate adherence to a preventive swallowing exercise program and to identify possible associations between adherence and selected baseline data.
Material and Methods: The study is a retrospect nested cohort sub study under an ongoing randomized controlled trial (SYNK trial). Participants in the intervention group are offered supervised training sessions 3 times weekly by occupational therapist (OT) and asked to exercise 3 times daily while keeping a training log. Adherence is defined as: $\geq$ 80% of days where $\geq$ 50% of exercises are performed twice.
Results: From May 2015 to March 2017 119 HNC patients were included in the SYNK trial and randomized to either standard care (n = 60) or preventive swallowing exercises and resistance training (n = 59). 16 (27%) training logs are non-available due to drop-out (56%) change in treatment plans that compromised inclusion criteria (13%) or not submitted by patient (31%). 43 (73%) training logs were collected and are in the process of being analyzed (expected finalized by August 2017). To our knowledge the SYNK trial offers more frequent supervision and requires more detailed training logs from participants than in previous similar prehabilitative trials. Thus it provides a unique opportunity to gain in-depth knowledge about HNC patients' adherence to swallowing interventions. Naturally (non)adherence in exercise trials will greatly influence the results as high adherence will allow to draw more reliable conclusions on the intervention investigated.

*SWALLOWING PROFILES OF PATIENTS WITH HEAD AND NECK CANCER

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Introduction: The purpose of this study was to evaluate the swallowing function of patients with head and neck cancer (HNC) and define their profile of swallowing disorder.
Material and Methods: One hundred-eleven patients with HNC who were referred for swallowing complaints were included. Descriptive information including age height weight sex diagnosis were recorded. Modified Barium Swallowing Study (MBSS) was performed to evaluate swallowing function. Penetration and Aspiration Scale (PAS) was used to determine penetration and aspiration severity.
Results: Sixty-three percent (n = 70) of patients were male and 37% (n = 41) were female. The mean age was 55 ± 13.5 years and mean body mass index was 22.4 ± 4.38. 50.5% (n = 56) of the patients were laryngeal 29.7% (n = 33) were nasopharyngeal and 19.8% (n = 22) were oral cancer. The first feeding-type was 44.1% oral 2.7% liquid-restricted 36% nonoral-feeding. The mean PAS liquid was 5.68 ± 2.87 and pudding was 4.41 ± 3.18 according to MBSS. While liquid aspiration was 19.8% aspiration in liquid and pudding consistency was 36%. After MBSS 18.8% of the patients were recommended to oral 40.6% to liquid-restricted and 40.6% to nonoral-feeding. A significant difference between the first and recommended feeding-type was found (p = 0.001).
Conclusion: Swallowing disorders at different degrees can be seen during and after diagnosis and treatment of patients with HNC. The airway protection has a primary importance to prevent serious complications of swallowing disorders. In our study about half of the patients with HNC had airway aspiration and their current feeding-type was not appropriate. Thus it is important to evaluate the swallowing function in the early period and determine the appropriate feeding-type in HNC patients.

EVALUATION OF PERIOPERATIVE SWALLOWING FUNCTION IN PATIENTS WITH HEAD AND NECK CANCER

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Introduction: In July 2015 a conference on oral function was conducted at Kyushu Dental University to enhance multi-clinical department collaboration in the treatment of patients with head and neck cancer. The conference evaluated pre- and postoperative swallowing function. Therefore this report describes perioperative swallowing function in patients with head and neck cancer.
Methods: This study was approved by the institutional ethics committee at Kyushu Dental University (No.15-2). A total of 43 patients (21 men 22 women; mean age of 66.6 years; primary tumor sites: tongue (n = 19) gingiva (n = 13) floor of oral cavity (n = 5) palate (n = 3) and buccal mucosa (n = 3)) who underwent surgical resection and evaluation of swallowing function (Repetitive Saliva Swallowing Test [RSST] Modified Water Swallowing Test [MWST] Food Test [FT] tongue pressure measurement and Video endoscopic examination of swallowing[VE]) were included in the study.
Results: Preoperatively swallowing function evaluation results (mean ± SD) were as follows: RSST: 4.8 ± 2.2/30 s MWST: 4.4 ± 0.9 FT: 4.6 ± 0.8 tongue pressure: 31.7 ± 9.6 kPa and penetration: 22 cases aspiration: 4 cases and choke: 4 cases. Postoperatively swallowing function evaluation results were as follows: RSST: 4.1 ± 1.9 times/30 s MWST: 3.8 ± 1.1 FT: 4.2 ± 1.1 tongue pressure: 16.6 ± 10.5 kPa average decreasing rate: 53% penetration: 28 cases aspiration: 6 cases and choke: 15 cases.
Conclusions: These results imply that swallowing function tended to deteriorate postoperatively. On the other hand dysphagia occurred preoperatively. Preoperative evaluation is important for devising an appropriate rehabilitation plan. We intend to examine the change in swallowing function that occurs over time and the effect of a rehabilitation intervention in future work.

WHAT MADE WITH DYSPHAGIA AFTER TREATMENT FOR HEAD AND NECK CANCER?

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Introduction: Dysphagia is a common complication of surgery radiotherapy and chemotherapy in head and neck cancer. This could appear immediatelly after the treatment or years after it. Swallowing therapies before and after traetment could help for this problem.
Materials and Methods: We present 21 patients with dysphagia after treatment for squamous cell cancer: treated by radiotherapy and chemotherapy or by surgery and radiotherapy or by chemoradiotherapy; between 1995 and 2016 in our institution. All the patients were evaluated with FEES and/or with videofluoroscopy.
Results: The patients were free for cancer illness. They present dysphagia. The patinets with tongue cancer showed a higher incidence of inadequate tongue control inadequate chewing delayed oral transit time. And in 80% to our patients there are aspiration or penetration vallecular pouch and pyriform residue and inadequate laryngeal elevation. They were classified as a moderated or sever dysphagia; three patients need a gastrostomy tube; and the majority of patients improved with adapted oral diet and rehabilitation.
Conclusions: Radiotherapy chemoradiotherapy and surgery for head and neck cancer can result in severe swallowing disorders with potential risk for aspiration. Moreover extensive tumor resection a higher node stage and more extensive lymph node were major risk for aspiration. This patients have difficulties in pharyngeal phase as well as the oral phase of swallowing. Physicians sould take these risk factors into account administering swallowing therapy before and after treatment.

Session 09 Poster session 2.1: Screening and clinical assessment II

*QUANTITATIVE MEASUREMENT OF SOLID BOLUS INGESTION IN POST-RADIATION HEAD AND NECK CANCER PATIENTS

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Introduction: The Test of Masticating and Swallowing Solids (TOMASS) is a recently developed quantitative measure of solid bolus ingestion with strong test–retest and inter-rater reliability as well as validity to instrumental measures. This study examines the utility of the TOMASS in a small cohort of post-radiotherapy H&N cancer patients.
Materials and Methods: The study included 40 patients post-radiotherapy with or without adjuvant chemotherapy for head and neck malignancy. Only 29 were able to complete the TOMASS which required ingestion of a dry cracker and quantification of four measures: 1) time taken for ingestion and number of 2) discrete bites 3) masticatory cycles and 4) swallows per cracker. Patients were classified by tumour site and stage. Data were also collected on age unstimulated salivary flow radiation dose and a measure of perceived global xerostomia.
Results: All four TOMASS measures were significantly and negatively correlated with salivary flow (range from -0.397 to -0.524; all $p < 0.05$)). Radiation dose perceived xerostomia and age were not significantly correlated with any TOMASS measures. Categorical variables of tumour site and disease stage did not differ on measures of the TOMASS. A secondary analysis revealed that salivary flow did not correlate with perception of dry mouth.
Conclusions: The effects of radiotherapy on salivary flow impacts solid bolus ingestion as measured by the TOMASS. Although hypothesised that radiation dosage would correlate with TOMASS measures the minimum dosages were higher than those needed for salivary gland sparing suggesting a celling effect. A lack of correlation between salivary flow and perception of dry mouth confirms prior research. Future work will examine the utility of the TOMASS as a clinical measure in this population with a larger sample and will validate findings against fluoroscopic evidence of swallowing pathophysiology.

*VALIDATION OF THE DUTCH MD ANDERSON DYSPHAGIA INVENTORY FOR PATIENTS WITH NEUROGENIC DYSPHAGIA

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Introduction: Patients' reported outcome of the impact of swallowing disorders on their quality of life (QoL) is an important measurement in the assessment and treatment of patients with neurogenic dysphagia. The aim of this study was to validate the Dutch version of the MD Anderson Dysphagia Inventory (MDADI) for patients with neurogenic oropharyngeal dysphagia (OD).
Materials and Methods: One hundred and seventy-eight patients with neurogenic OD and ninety-two healthy control subjects completed the MDADI and the SWAL-QoL-NL. Exclusion criteria: suffering from a concurrent head-and-neck oncological disease scoring below 23 on a Mini Mental State Examination being older than 85 years and being illiterate or blind. None of the patients were in a palliative state of disease. Floor and ceiling effects known-groups validity (Mann–Whitney U test) internal consistency (Cronbach's alpha) construct—and criterion validity (Spearman's correlation coefficient) were assessed.
Results: The MDADI total score showed no floor and ceiling effects. Known-groups validity was confirmed by statistically significant group differences between patients vs healthy subjects. The internal consistency showed Cronbach's alphas ranging from 0.77 to 0.92. Correlations between domains of MDADI and SWAL-QoL-NL domains which measure similar constructs were strong 0.71 0.70 and 0.62 (convergent construct validity). Moderate to strong correlations between the MDADI-scores and the SWAL-QoL-NL domains Burden Food selection Eating duration Communication Mental health Social functioning and Symptoms were found ranging from 0.41 to 0.75. Weak correlations (< 0.4) were found between the MDADI-scores and the SWAL-QoL-NL domains Eating desire Sleep and Fatigue.
Conclusion: The results of this study suggest that the Dutch version of the MDADI is a psychometrically validated dysphagia-related quality of life questionnaire for patients with neurogenic OD.

EARLY MULTIDISCIPLINAIRY SCREENING OF DYSPHAGIA AT ADMISSION TO THE EMERGENCY DEPARTMENT – A PILOT STUDY

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Introduction: Knowledge about effect of early dysphagia screening is limited. The aim of this study is to examine the prevalence of dysphagia in the Emergency Department (ED) population.
Material/Methods: This study included consecutively hospitalized patients in a period of 10 days from 2 pm until 10 pm at the ED of our hospital. The screening took place within 4 h of admission. Inclusion criteria were any of the following: age $\geq$ 65 years neurological disorders alcoholism COPD pneumonia dyspnoea diabetes or unexplained weight loss. Fasting patients were excluded. Patients were screened by a nurse with a water test of 5 ml and 50 ml. Positive signs of dysphagia issued a referral to the occupational therapist who tested the patient using the V-VST and the MEOF-II.
Results: Of 140 eligible patients (56% male median age 75 years (SD 17.0)) 93 (66%) were screened. It was impossible to screen 12 patients (9%) because of limited time and 30 patients (21%) due to poor health condition and these patients were not included. A group of 5 (4%) declined participation. The prevalence of dysphagia by water test screening in the study population was 15% (14 patients). The results from the water test were confirmed with V-VST and MEOF-II in all patients with dysphagia. In patients with lung related diseases (pneumonia COPD dyspnoea) and in patients with circulatory diseases (dehydratio chest pain hypertension dizziness fainting) the prevalence was respectively 25% and 24%. Patients not screened due to poor health condition were tested during hospitalisation and the prevalence of dysphagia was 64% in this group of patients.
Conclusions: Patients with respiratory and circulatory diseases were at highest risk of dysphagia. Patients who were transferred to other departments due to poor health condition have a high prevalence of dysphagia. It is possible to screen medical patients in the EM. The water test is a useful screening tool in an acute sett

PERCEPTUAL AND ACOUSTIC EVALUATION OF PITCH ELEVATION TO PREDICT ASPIRATION STATUS IN ADULTS WITH DYSPHAGIA OF VARIOUS AETIOLOGIES/BEYOND STROKE

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Introduction: Initial research has been conducted to determine the utility of pitch glide during the bedside clinical exam to predict swallow safety and efficiency in adults post stroke. This study aimed to identify the predictive values of the pitch glide in detecting aspiration pharyngeal residue and hyolaryngeal excursion during swallowing in adults with dysphagia of various causes during videofluoroscopy (VFS).

Table 1: Acoustic and Perceptual Evaluation of the Pitch Glide in Predicting Aspiration on 10ml of Liquids

	Sensitivity		Specificity		PPV		NPV		LR+		LR-		DOR
Imaging Test	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%
Max F_0 /a/	90	(82-99)	90	(80-99)	95	(75-99)	82	(64-94)	9.1	(1.4-58)	0.1	(0.03-0.4)	81
Max F_0 /i/	90	(82-99)	81	(68-98)	90	(72-97)	82	(54-94)	5.1	(1.4-17)	0.1	(0.03-0.5)	79
Range /a/	91	(86-99)	89	(78-98)	85	(69-95)	94	(82-99)	9.7	(2.3-33)	0.01	(0.01-0.6)	82
Range /i/	92	(81-100)	94	(89-100)	92	(82-99)	95	(83-99)	17	(2.6-118)	0.09	(0.01-0.5)	84
Duration /a/	70	(46-88)	36	(11-69)	67	(54-77)	40	(19-65)	1.1	(0.6-1.9)	0.8	(0.3-2.3)	52
Duration /i/	68	(43-87)	75	(43-94)	81	(61-92)	60	(42-76)	2.7	(0.9-7.6)	0.4	(0.2-0.8)	49
Perceptual /a/	42	(20-66)	42	(15-72)	53	(35-70)	31	(17-49)	0.7	(0.3-1.5)	1.4	(0.6-3.0)	37
Perceptual /i/	47	(24-71)	58	(28-85)	64	(44-80)	41	(27-57)	1.1	(0.5-2.6)	0.9	(0.5-1.7)	39

Material and Methods: 31 participants with different aetiologies of dysphagia were recruited (COPD = 8; LRTI = 3; dementia = 1; etc.). Patients with tracheostomy tube acute pneumonia cognitive impairment and professional voice users were excluded. Participants completed pitch glides/a/and/i/(index test) immediately before a VFS (reference standard). Pitch glides were analysed acoustically (Praat software) to obtain maximum F0 and pitch range and perceptually using a binary scale ("normal" or "abnormal"). Clinicians blinded to pitch glide measures used the Penetration-Aspiration Scale Bolus Residue Scale and MBSImP Scale to rate swallow parameters.

Table 2: Acoustic and Perceptual Evaluation of the Pitch Glide in Predicting Aspiration on a Sip of Liquids

	Sensitivity		Specificity		PPV		NPV		LR+		LR-		DOR
Imaging Test	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%
Max F_0 /a/	96	(89-99)	83	(75-99)	96	(86-99)	83	(51-97)	5.8	(1.1-34)	0.05	(0.01-0.3)	81
Max F_0 /i/	80	(59-93)	67	(32-96)	91	(76-97)	44	(42-68)	2.4	(0.8-7.6)	0.3	(0.1-0.8)	72
Range /a/	83	(61-88)	76	(44-95)	90	(74-97)	36	(20-57)	2.2	(0.7-6.9)	0.4	(0.2-1)	72
Range /i/	72	(51-88)	67	(22-96)	90	(74-97)	36	(20-57)	2.2	(0.7-6.9)	0.4	(0.1-0.9)	57
Duration /a/	68	(46-85)	57	(18-90)	85	(70-93)	33	(17-54)	1.6	(0.6-3.9)	0.5	(0.2-1.3)	53
Duration /i/	71	(49-87)	43	(10-81)	81	(68-89)	30	(13-55)	1.2	(0.6-2.5)	0.7	(0.2-1.9)	59
Perceptual /a/	48	(28-69)	50	(12-88)	80	(62-91)	19	(9-36)	0.9	(0.4-2.3)	1.1	(0.4-2.5)	36
Perceptual /i/	48	(28-69)	67	(22-96)	86	(64-95)	24	(14-38)	1.4	(0.4-4.8)	0.8	(0.4-1.5)	37

Results: Maximum F0 and pitch range of/a/and/i/had high sensitivity and specificity in predicting aspiration on 10 ml and a sip of liquids (Tables 1 2). However they had low accuracy in predicting residue and hyolaryngeal excursion. Furthermore perceptual analysis had weak accuracy in predicting swallow parameters. Eventually there were no correlations between acoustic and perceptual ratings of/a/ and/i/(r = 0.120 [− 0.252 0.459] r = 0.082 [− 0.297 0.439] respectively).

Conclusion: Acoustic pitch glide (/a/and/i/) is an accurate way to predict aspiration on small volumes of liquids in a mixed population. As there is still little evidence on that field more research is required.

THE EFFICACY ALTERATION IN COPD PATIENTS

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Introduction: Chronic Obstructive Pulmonary Disease (COPD) is a progressive decline in lung function characterized by a persistent airflow limitation. The COPD exacerbation accelerates the decline of the pulmonary function and causes the greatest proportion of its economic burden. Oropharyngeal Dysphagia (OD) risk increases in COPD patients and could induce aspiration. The aim of this study was to estimate the risk of the alteration of the efficiency and security in COPD patient using a bed screening test (V-VST).

Material and Methods: The current study was carried on 117 subjects subdivided in 2 groups (G1: 46 smoking subject with no COPD G2: 71 COPD patients. The COPD was confirmed by a post bronchodilatator FEV1/FCV < 07. To screen OD the V-VST was used as well as the EAT 10.

Results: No differences were observed in age BMI and EAT10 tests when we compared the 2 groups. Among the 71 COPD patients 63% have an abnormal V-VST (11 with safety alteration and 34 with efficacy alteration). In control group only 30% have an abnormal V-VST with 2 patients with safety alteration. These differences are statistically significant ($p < 0.05$). In patients with efficacy alteration the number of swallows per bolus increased in G2 when compared to G1($p < 005$). In the COPD group when we compared the patients with stable COPD (G3) to those with COPD during exacerbation (G4) no differences were observed either for the ventilatory parameters or for the V-VST.

Conclusion: The COPD patients are more likely to alter the efficiency more than the security of the swallowing by especially increasing the number of swallows per bolus. No V-VST differences were found during exacerbation. These conclusions could be explained by the skeletal muscle dysfunction observed in COPD patients.

DEVELOPING AN ARABIC QUESTIONNAIRE EVALUATING THE ADHERENCE OF PATIENTS WITH DYSPHAGIA AND THEIR FAMILY CAREGIVER TO THE SPEECH THERAPIST RECOMMENDATIONS (AQA DP-FC): STAGE 1 PER FDA RECOMMENDATIONS

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Introduction: Evaluation of the adherence of family caregivers (FC) and patients with oropharyngeal dysphagia (OD) to the speech therapist (ST) recommendations isn't possible among the Lebanese patients due to the lack of tools. The aim of this study is to create a simple easy and short Arabic questionnaire that can evaluate the adherence of FC and patients with OD to the ST recommendations following the FDA recommendations for patients reported outcome measures 1.

Material and Methods: This study was conducted between December 2016 and May 2017. Following the FDA recommendations

patient interviews focus groups and a comprehensive review of the literature were performed. The Caregiver Mealtime Dysphagia Questionnaire (CMDQ)2 is the only questionnaire assessing the adherence to the ST recommendations found in the literature. However it is a long questionnaire difficult to complete and difficult to score. The AQA DP-FC was created by the focus group composed of 2 ST and one ENT physician inspired by some items of the CMDQ patients' comments as well as 2 ST feedback. It is composed of 3 sub-questionnaires. -The first sub-questionnaire for the FC is composed of 10 questions. -The second sub-questionnaire for the patient is composed of 3 questions. -The third sub-questionnaire for the ST is composed of 4 questions evaluating the accessibility of the questionnaire and 2 scales assessing the adherence of the patient and FC to the recommendations. The AQA DP-FC was administered to 15 Lebanese patients with OD and their FC as well to the 6 ST treating the patients.
Results: 93–100% of ST working with dysphagia patients declare that the AQA DP-CF is useful and easy to score. 66% of the FC and 86% of the patients declare that it is easy to understand and quick to fill.
Conclusion: The first stage in the development of the AQA DP-FC is now complete. Stage II & III will follow involving field-testing and psychometric evaluation of the questionnaire respectively.

THE CONSTRUCT VALIDITY OF THE TOR-BSST FOR NURSING HOME RESIDENTS

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Introduction: A screening tool for dysphagia in nursing homes should be short easy and applicable to the majority of the nursing home population. Ideally the nursing staff and/or SLT's can administer it. In 2011 the Toronto Bedside Swallowing Screening Test (TOR-BSST) by Martino et al. (2009) was adapted to the needs of a long-term care facility and proven feasible and reliable for people suffering from dementia and/or stroke (Kaiser & Degutsch 2011; Heide & Kroll 2013). The purpose of this study was to evaluate the construct validity of the adjusted Dutch version of the TOR-BSST in a nursing home population.
Material and Methods: A cross-sectional study was performed in 91 nursing home residents (62 females) with a mean age of 85 (sd = 6.7) suffering from stroke (23%) dementia (22%) or (multiple) other neurological disorders. According to pre-existing medical records 24 (26%) patients were treated for subjective oropharyngeal dysphagia. 89 residents were screened with both the TOR-BSST and the Volume Viscosity Swallow Test (V-VST) (Clavé et al. 2008) in a randomized order within 24 h by 3 blinded independent SLT's.
Results: According to both screening tools 25 (28%) residents were at risk for dysphagia and it was most prevalent in the group with multiple neurological disorders (n = 9). Most at risk patients were detected within the first 3 sips of the TOR-BSST (n = 17) and the thin liquid items 5 ml or 10 ml of the V-VST (n = 20). In 79 (89%) cases there was an absolute agreement between the TOR-BSST and the V-VST. The convergent validity as assessed by correlations between TOR-BSST and V-VST was strong (r = 0.75).
Conclusion: The TOR-BSST proved to be a valid and feasible screening that could be used throughout the nursing home population. However a good implementation protocol including staff training is necessary to guarantee optimal care in dysphagia screening and management. Criterion validity still needs to be confirmed with more objective measurements such as FEES or VFSS.

THE CLINICAL "BEDSIDE" ASSESSEMENT OF THE DYSPHAGIA PATIENT DIFFERENCES WITH FOOD AND FLUIDS INTAKE

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Background: Dysphagia is common in the aging population and aspiration pneumonia is one of the leading causes of death in dysphagia patients. Proper diagnosis of aspirating patients can lead to appropriate intervention and decrease the likelihood of aspiration pneumonia. Clinical "bed side" assessment of swallowing is the common practice for evaluation of patients at risk for aspiration however doubts about it sensitivity to detect clinically relevant aspiration exists.
Methods: A retrospective study was performed on 106 consecutive dysphagia patients who presented to a tertiary rehabilitation center dysphagia clinic. The patients underwent evaluation by a multidisciplinary team including a speech pathology therapist and an otolaryngologist. Clinical assessment included a number of aspiration risk factors such as cough on or after swallowing throat clearing choking or voice change and those factors were compared with a Penetration Aspiration Score (PAS) on functional endoscopic evaluation of swallowing (FEES) which was considered the gold standard.
Results: Of the 106 patients 37 aspirated (PAS more than 6) 28 of them aspirated silently (PAS 8). In comparison the clinical assessment showed a sensitivity of 66% and specificity of 83%. For the examination for water and puree sensitivity for aspiration was 64% and 83% and specificity was 80% and 84% respectively. Positive and negative predictive values for prediction of aspiration by clinical bedside examination was 67% and 78% for fluids and 23% and 99% for puree consistency respectively.
Conclusion: The present study demonstrated a dramatic difference between the ability to predict aspiration on water versus puree consistency on a bedside clinical exam. With water the clinical examination missed 22% of aspirators but missed only 1% with puree. Furthermore 67% of the bedside exams correctly predicted aspiration with water intake but only 23% of patients considered aspirators actually aspirated.

Session 09 Poster session 2.2: Instrumental assessment and dysphagia diagnosis II

*THE RISK OF LARYNGEAL PENETRATION OR ASPIRATION DURING VIDEOFLUOROSCOPIC EXAMINATION OF SWALLOWING IN A SEQUENTIAL SWALLOW FROM A CUP

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Introduction: Videofluoroscopic examination of swallowing (VF) is the gold standard in diagnosis and management of dysphagia. Laryngeal penetration and aspiration during VF in patients with dysphagia depend on clinical variables as well as various food parameters such as consistency viscosity adhesiveness cohesiveness or bolus volume. Combining solid and liquid phases in a single food is common during an ordinary meal. We found that the risk of

penetration was more in one swallow from a cup of thin liquid barium (one CUP) than a two-phases mixture of 4 g of corned beef hash with barium and 5 ml of thin liquid barium (MX) while the aspiration risk was more in MX than one CUP. In this study we compared the risk of laryngeal penetration or aspiration during VF among thin liquid barium 10 ml (LQ10) MX and sequential swallow of 30 g thin liquid barium from a cup (CUP30).

Material and Methods: Between January 2011 and May 2016 136 patients with suspected dysphagia underwent VF by using LQ10 MX and CUP30 in an upright posture without compensatory maneuvers. We evaluated the presence or absence of laryngeal penetration or aspiration during each trial and classified the aspiration according to the type of aspiration; aspiration before the swallow (B) aspiration during the 1st swallowing reflex (D-1) aspiration during the 2nd or subsequent swallowing reflex (D-2) or aspiration after the swallow (A).

Results: The paired comparison revealed that the laryngeal penetration risk was MX < LQ10 < CUP30 while the aspiration risk was LQ10 < MX < CUP30. In addition D-2 aspiration was more than D-1 aspiration during CUP30.

Conclusions: The risk of both laryngeal penetration and aspiration are the highest with sequential swallow of CUP30. The sequential swallow may cause aspiration during the 2nd or subsequent swallow.

THE GOTHENBURG THROAT, EVALUATION OF BOLUS FLOW IN VITRO

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Fluid thickening is a well-established management strategy for dysphagia. Fluid foods are thickened with hydrocolloids which provide increases shear and extensional viscosity. However the effects of thickening on swallowing are not fully understood and the relations to basic rheology are scarce. The new swallowing device "The Gothenburg Throat" can simulate the pharyngeal swallowing process meanwhile monitoring bolus velocity profile and shape together with pressures at three locations in the pharynx and at one location in the naso-pharynx. The oral phase is modelled by a syringe which delivers a bolus of fixed volume and speed into the pharynx mimicking the actual tongue thrust movement. The device is based on the actual human pharyngeal geometry with measures taken from the literature and the elliptical flow channel is rigid mimicking the geometry at the instance the bolus passes through the pharynx. The device can simulate closing of the larynx by a valve and a moving epiglottis. The upper esophageal sphincter is modelled by a clamping valve and another valve is opening or closing the channel to the nasopharynx. Thus the device is designed for the ability to also study the breathing-swallowing relationship. The velocity profile movement and location of the bolus are monitored in real-time by a moving ultrasonic transducer. The technique is based on ultrasonic pulses transmitted through the wall of the pharynx model and reflected by the fluid elements of the flowing bolus giving their location and speed in real time.

EVALUATION OF SWALLOWING FUNCTION IN PATIENTS WITH CLEFT LIP AND PALATE

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Introduction: Palatoplasty is used to improve deglutition and speech function in patients with cleft lip and palate (CLP). Although this can correct the shape of the oropharynx it might not resolve velopharyngeal deficiencies such as rhinophonia or deglutitory nasal regurgitation. Cineradiography studies have suggested that patients exhibit swallowing pattern adaptations but it is unclear how intraluminal pressures propel the deglutitory bolus. We thus aimed to evaluate deglutitory pharyngeal pressure profiles in patients with CLP and to reveal compensatory mechanisms.

Material and Methods: In this prospective study 10 healthy controls and 10 patients with surgically closed single-sided cleft palate (19–27 years 5 female and 5 male respectively in each group) swallowed 2 and 10 ml of water. Deglutitory parameters of the pharynx and upper esophageal sphincter (UES) were measured using high-resolution manometry.

Results: Compared to the healthy controls the patients with CLP had lower velopharyngeal closing pressures and shorter contraction times in the velopharyngeal and tongue base regions. No significant differences were observed in UES opening or closing functions. Results were the same for both bolus volumes.

Conclusions: The velopharyngeal region alterations observed in CLP are due to impaired velopharyngeal muscle force and function. The shortened tongue base contraction time may be a compensatory mechanism to allow bolus transportation without nasal regurgitation. However deglutition is not completely altered since UES function remains normal. To improve their deglutition patients with velopharyngeal insufficiency should receive training to strengthen the velopharyngeal closing muscles as a part of their therapeutic regimen.

ROLE OF VIDEOFLUOROSCOPY IN EVALUATION OF NEUROGENIC DYSPHAGIA

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Introduction: For many years videofluoroscopy was considered the gold standard for studies on swallowing disorders and only recently has its role been challenged due primarily to the widespread use of flexible endoscopy in the evaluation of dysphagia. Yet videofluoroscopy still maintains its key role in this area and in particular in studies on dysphagia of neurological origin on account not only of the possibility with this procedure to achieve complete and dynamic evaluation of all phases of deglutition but also the high sensitivity and specificity in revealing the presence of aspiration.

Aim of the Study: To introduce (VFSS) in assessment of patients with neurogenic dysphagia to detect and assess abnormalities in these patients in order to outline proper diagnosis and plan rehabilitation strategies for every patient in an effort to improve quality of life for these patients.

Subjects: This study was conducted on 25 adult neurogenic patients of both sexes 15 central and 10 peripheral neurogenic dysphagic patients attending Phoniatrics Unit in Alexandria Main University Hospital complaining of dysphagia.

Methods: Patients were assessed by Arabic version of dysphagia handicap index screening by trial of water test then the mobility of the vocal folds was assessed by rigid indirect laryngoscopy. Dysphagia was assessed by videofluoroscopy and flexible nasopharyngoscopic assessment of swallowing.

Results: The study showed effectiveness of videofluoroscopy in evaluation of neurogenic dysphagia. It compared between central and peripheral neurogenic dysphagic patients. There was significant difference between the studied groups in age sex and diagnosis. All neurogenic patients showed delayed initiation of swallowing

penetration with fluids and 60% of them showed aspiration with fluids with no significant difference between both studied groups.
Conclusion: FEES was complementary to VFSS to detect neurogenic dysphagia as VFSS is the gold standard in eval

FINDINGS FROM THE SWALLOWING VIDEOFLUOROSCOPY IN A PATIENT WITH CHIKUNGUNYA DIAGNOSIS

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Introduction: Chikungunya fever is an acute infection transmitted by the Aedes Aegypti mosquito. Characterized by rash fever arthritis conjunctivitis meningoencephalitis lymphopenia thrombocytopenia and hypotonia which may cause oropharyngeal dysphagia affecting stomatognathic functions and compromise the individual's diet. Symptoms may manifest at any stage of the disease acute or chronic. The aim of this study was to describe the findings from the swallowing videofluoroscopy of a 40-year-old patient with diagnosis of chikungunya in the acute phase.
Materials and Methods: A retrospective descriptive and qualitative case study. The data of the anamnesis and the result of the swallowing videofluroscopy examination were collected in the patient's record.
Results: During the anamnesis the patient reported swallowing difficulties feeling as the food was stuck in the throat loss of 7 kg and reduction of muscle strength. The swallowing videofluoroscopic evaluation presented in the oral phase: increased oral transit time for solids and inefficient chewing. In the pharyngeal phase: it was observed reduction of laryngeal elevation increased pharyngeal transit time stasis in the vallecula posterior wall of the pharynx and piriform recesses for the consistencies of nectar: honey and pudding whitening occurred with the intercalated fluid swallowing. It was not observed laryngotracheal penetration or aspiration.
Conclusion: Chikungunya fever can cause dysphagia due to the reduction of muscle mass and strength and may be present at any stage of the disease. Further studies will be needed to better understand the causes of dysphagia.
Keywords: chikungunya fever; swallowing; swallowing disorders.

EXAMINATION OF SWALLOWING DISORDERS USING CONTRAST MEDIUM IN THREE DIFFERENT TEXTURES

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Introduction: In our clinic a wide variety of patients with swallowing disorders is diagnosed and treated. Especially geriatric patients often suffering from dementia and patients of the ENT-department benefit of the radiolocical examination not only with liquid texture. If necessary the patient is carefully prepared and even accompanied by a speech language pathologist.
Material and Methods: Radiolocial swallowing examinations are mostly provided with liquid texture. We often feel that a examination with different textures allows more conclusions concerning the diagnostic procedure as well as for the therapeutic strategy. Therefore we established a strategy that allows a three-step-examination with the textures viscous paste-like and solid. To The prearrangement contains a survey that helps the physician to decide wheter different textures would be helpful in the inspection. Costs length of the examination and clinical question are weighted up. The department of speech language pathology offers counselling—previously to avoid aborted examination and to care for the patient through preparing the exmination e.g. in applying a swallowing technique. Speech language pathologists also attend the examination if neccessary to make sure that a learned swallowing technique is used properly in the situation or that the test is repeated at once with another texture.
Conclusions: Especially geriatric patients multimorbid patients and patients after ENT-surgeries benefit of this established clinical procedure because the swallowing test does not only provide information concerning the diagnosis but supports the arrangement of a efficient therapy strategy. A single case is presented.

COMPARISON OF PHARYNGEAL AIR SPACE CHANGE IN DYSPHAGICS DURING SWALLOWING ACCORDING TO DYSPHAGIA SEVERITY SCALE

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Introduction: Pharyngeal air space is detected before swallowing reflex by lateral view of Videofluoroscopy; VF. Just before Upper Esophageal Sphincter; UES opening upper side of pharyngeal air column is closed by both of the velum and the glossopalatal seal. After then the air might pass into the trachea or esophagus according to swallowing pattern or severity of dysphagia. We examined the pharyngeal air space change during swallowing according to Dysphagia Severity Scale; DSS and compared the air space at the upper esophagus to the swallowing pattern.
Subjects: 20 individuals with dysphagia including two patients after anti-aspiration surgery (age: 23 to 82 DSS: 3 to 5).
Methods: Retrospective observational study using VF findings of 20 subjects. The DSS of the subjects were as follows. DSS3; 5 DSS4; 7 DSS 5; 6 others (2 patients after anti-aspiration surgery). The change of pharyngeal air space during 4 ml of thick liquids swallowing which was detected by lateral view of VF were examined. We examined the volume of air column just before UES-Openig and detected the occurrence of air space at the upper esophagus during swallowing.
Results: All of the air in the pharyngeal air column in two patients after anti-aspiration surgery (removal of pharynx) passed into the esophagus after closing the glossopalatal sphincter. Only 8% of the subjects who could close the larynx before UES-Opening like the super-supraglottics maneuver showed the air space with the bolus at the upper parts of esophagus which explained the air passing into the esophagus during swallowing. Just before UES-Opening major part of pharyngeal air might passed into the larynx or trachea in other 92% cases. There were no significant correlation of pharyngeal air space change to DSS.

Conclusions: The pharyngeal airspace change during swallowing suggests that a large part of air might pass into the trachea just before UES-Opening which may be one of the important cause of penetration and aspirati

SPEECH AND LANGUAGE PATHOLOGIST AND MEDICAL-SURGICAL APPROACH IN DYSPHAGIA FOR APRAXIC DISORDER AND ZENKER'S DIVERTICULUM: THE IMPORTANCE OF THE COLLABORATIVE AND INSTRUMENTAL EXHAUSTIVE ASSESSMENT

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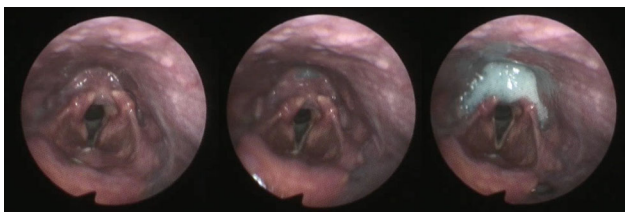
Introduction: Swallowing Apraxia (SA) is a neurologic disorder characterized by an impairment in the capacity to program the necessary commands for directing movements mainly observed during the oral stage of swallowing. Dysphagia associated to Zenker's Diverticulum (ZD) is caused by aspiration as a consequence of regurgitation being complex his identification through clinical assessment. Instrumental assessment in swallow is highly effective in dysphagia diagnosis. This study reports on a patient with SA who showed persistent dysphagia as a consequence of ZD diagnosed and treated by speech and language pathologist (SLP) and medical-surgical procedures.



Patient and Methods: A 70 year-old man Dutch native speaking. In 2015 coursed with Dysarthria and SA resulting from right cerebral ischemia. Treated at the ENT Department Head and Neck Surgery of the University Medical Centre Groningen (The Netherlands) through gastrostomic feeding (PEG) and at Rehabilitation Centre of Groningen by SLP through swallowing training reaching near normal speech and swallow but persists aspiration of thin liquids after swallow. Fiber-optic endoscopic evaluation of swallowing (FEES) performed by the SLP and ENT department concludes normal sensivity normal vocal cords movement post-cricoid residues and regurgitation and Videofluoroscopy concludes ZD. Surgical procedures consisted in diverticulotomy transoral diverticuloscope and GIA (gastrointestinal application).

Results: Neurogenic swallow impairment recovery confirmed associating the dysphagia to a mechanical disorder by ZD. Post-operation assessment concludes near normal swallow.

Conclusions: This study reports on a patient with near total swallow recovery highlighting the importance of trying to find other causes of swallowing disorders when the swallowing disorder persist after CVA but the other disorders resolve. The benefit of the collaborative clinical and instrumental assessment approach is confirmed.

Session 09 Poster session 2.3: Dysphagia in neurodegenerative diseases III

*A SYSTEMATIC REVIEW OF REHABILITATION FOR CORTICOBULBAR SYMPTOMS IN ADULTS WITH HUNTINGTON'S DISEASE

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Introduction: Huntington's Disease (HD) is an autosomal dominant progressive neurodegenerative disease characterised by cognitive motor and behavioural impairments. Corticobulbar symptoms have been reported in all stages of the disease with aspiration pneumonia reported as the most common cause of death. There has been a recent shift to examine corticobulbar rehabilitation in other neurodegenerative conditions. This systematic review will determine if evidence exists to justify rehabilitation for corticobulbar symptoms in HD.
Materials and Methods: Two investigators independently searched relevant electronic databases for literature related to corticobulbar rehabilitation in HD published in English until April 2017. Included studies were critically appraised using the OCEBM Levels of Evidence Cochrane Risk of Bias Tool and Scottish Intercollegiate Guidelines Network checklists. Primary outcomes included reported changes in function or neuromuscular physiology evidenced by validated measures.
Results: Sixty-eight publications were screened. Three studies were excluded as they described compensatory management only. Eight studies matched the inclusion criteria. Two randomised control trials and six intervention studies evaluated rehabilitative approaches aiming to improve corticobulbar symptoms; however; there was limited use of validated or objective outcome measures.
Conclusions: The few studies which focused on the effectiveness of rehabilitation programs in HD indicated no adverse effects and positive clinical outcomes. As corticobulbar symptoms and associated pneumonia are among the most debilitating in terms of quality of life and caregiver burden this review highlights the need for further research into the feasibility and potential of rehabilitation approaches for corticobulbar symptoms in HD.

*PREDICTORS OF PENETRATION-ASPIRATION IN PARKINSON'S DISEASE PATIENTS WITH DYSPHAGIA—A RETROSPECTIVE ANALYSIS

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Introduction: Penetration-aspiration is considered to be the most severe symptom of oropharyngeal dysphagia with aspiration pneumonia as one of its consequences. Parkinson's Disease (PD) is one of the most common neurodegenerative disorders. More than half of PD patients suffer from dysphagia. Aspiration pneumonia is among the primary causes of mortality in PD patients. However the identification of predictors of penetration-aspiration in PD patients remains an understudied topic. The purpose of this study was to identify predictors of penetration-aspiration in these patients.
Material and Methods: Data extracted from results of routinely conducted videofluoroscopic studies of swallowing (VFSS) and from health records of 89 PD patients with dysphagia were included in this retrospective study. The occurrence of penetration-aspiration was defined as scores ≥ 3 on the Penetration-Aspiration Scale. Four commonly reported symptoms of dysphagia in PD patients were evaluated as possible predictors. Furthermore the relationship between the occurrence of penetration-aspiration and the liquid bolus volume (swallowed during VFSS) as well as clinical severity of PD (modified Hoehn and Yahr stages) were examined.
Results: Logistic regression showed that 'delayed triggering of the swallowing reflex' (OR 7.47 $p = 0.008$) and 'reduced hyolaryngeal elevation' (OR 5.13 $p = 0.012$) were associated with penetration-aspiration. Correlation analysis revealed a strong positive correlation between liquid bolus volume (2.5 ml 5 ml 90 ml) and penetration-aspiration ($\gamma = 0.71$ $p = 0.000$). No correlation was found between severity of PD and penetration-aspiration.
Conclusions: Results of this study enable a better assessment of penetration-aspiration risk in PD patients. The findings can be used when planning therapy or preventive procedure and reducing the risk of penetration-aspiration.

THE SWALLOW PROFILE OF PATIENTS ACCESSING A UK RESPIRATORY CENTRE

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Introduction: Motor Neurone Disease (MND) is a fatal progressive disorder with few interventions proven to improve prognosis or quality of life. Our respiratory clinic has robust protocols for starting home ventilation which can prolong life but patients die between assessments often due to aspiration pneumonia. We have determined to improve surveillance and interventions for swallow dysfunction to address this issue. We present our baseline data.
Materials and Methodology: Over a period of 6 months patients accessing our MND clinic for respiratory assessment were interviewed by the Speech and Language Therapist (SLT). The details of previous access to SLT history of swallowing difficulties including the severity of the abnormality using the ALS Swallow Severity Scale were collated and analysed.

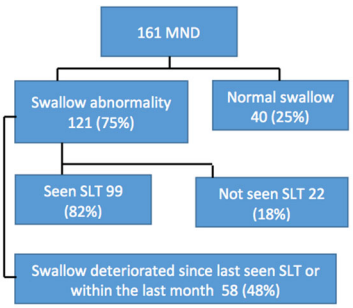

Figure 1 Distribution of swallow abnormality and access to SLT for patients accessing a UK respiratory centre

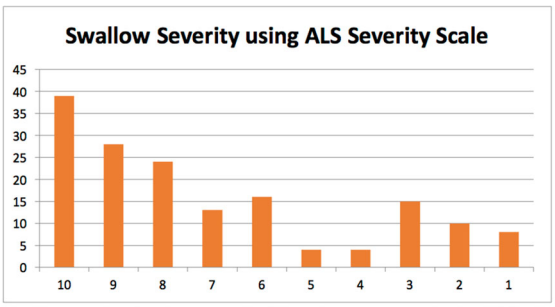

Figure 2. Swallow severity of patients accessing UK respiratory centre using the ALS Swallow Severity scale (Yorkston, 2004)

Results: The SLT interviewed 161 people attending the MND clinic; 121 (75%) reported swallowing difficulties of whom; 22 (18%) had not seen a SLT before. Of the patients with swallow abnormalities 58 (48%) reported their swallow had deteriorated within the previous month or since they had last seen SLT (figure 1). The incidence of swallow difficulties reported by type of MND at diagnosis was: bulbar 100% cognitive 100% spinal 67% and respiratory 55%. Severity of swallow difficulties is shown in figure 2 ranging from 10 (normal) to 1 (no reflexive swallow).
Conclusion: When appropriately assessed the large majority (75%) of patients accessing our MND clinic reported symptoms of an abnormal swallow. As aspiration pneumonia malnutrition and dehydration are known causes of death in MND early identification of swallowing difficulties is key to enabling patients in making informed decisions. Our results confirm a high level of need for formal SLT assessment and we now plan a series of studies to report the association of risk with swallowing abnormality and trials of interventions against meaningful patient centred outcomes.

EXPLORING SWALLOW EFFICIENCY AND SAFETY FOR THIN-LIQUID AND SEMI-SOLID BOLUSES IN PERSONS WITH DEMENTIA

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Introduction: Persons with dementia frequently experience dysphagia. In 2010 Humbert described differences in swallow timing residue and brain activation in this population; however quantitative data representing swallowing physiology in persons with dementia is remains sparse. Our objective was to contribute population-specific data regarding swallowing efficiency using the Normalized Residue Ratio Scale1 (NRRS) and swallowing safety using the Penetration-Aspiration Scale2 (PAS) across two bolus viscosities from videofluoroscopies (VFSS).
Material and Methods: Thin and semisolid boluses were spliced out of VFSS studies from 60 patients with dementia (33 male; mean age = 85 range 67–100) for randomized rating using NRRS and PAS on 628 swallows (initial and clearing). Initial swallow NRRS scores were averaged for each participant within each bolus condition. Binary swallowing safety scores were represented by the worst PAS scores by condition (≤ 2 safe ≥ 3 unsafe).
Results: Inter- and intra-rater reliability (20% of data) achieved ICC > 0.75 for all measures. Paired t-tests did not reveal differences in NRRSv by bolus condition; however significantly worse NRRSp was observed with thin liquid (0.09 SD 0.16) compared to semi-solid (0.02 SD 0.05) [p = 0.004]. McNemar's Chi Square revealed a significantly different proportion of swallows that were unsafe with thin and were safe on semi-solids (48.6%) compared with the proportion of unsafe swallows with thin that were also unsafe with semi-solids (100%) [p = 0.000].
Conclusions: Post-swallow residue is considered a risk factor for aspiration. Interestingly we found that within the same individual with dementia thin liquids caused greater pyriform sinus residue than semi-solids Further subjects whose swallows were determined unsafe for semi-solids were always unsafe for thin liquids. This study contributes robust objective measures of residue to better determine the risk for penetration/aspiration in persons with dementia.

HOW CAN WE IMPROVE DYSPHAGIA-RELATED SERVICES FOR PEOPLE LIVING WITH MOTOR NEURONE DISEASE?

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Introduction: Motor Neurone Disease (MND) is a rare progressive neurodegenerative illness of unknown etiology for which there is no cure. Dysphagia often occurs as a consequence of MND and has a severe impact on persons affected from a medical social and psychological perspective. A review of literature revealed that little is known about how people living with MND perceive and experience dysphagia and no study to date focused on general exploration of the experiences of dysphagia related services in MND from patient and caregiver perspectives. This knowledge is required to optimise patient centred approach and to identify potential improvements in the services currently provided for dysphagia in MND.
Materials and Methods: 10 people with MND (PwMND) were included based on their cognitive status and level of dysphagia (FOIS 1–5). In addition 10 caregivers of PwMND were recruited. Maximum variation sampling was applied. 57 individual interviews were completed. Interpretative Phenomenological Analysis was adopted to analyse the data. The findings were interpreted from an SLT's perspective.
Results: A problem solving approach was applied by the PwMND when dealing with their dysphagia rather than looking for professional help. There is a discrepancy between participants' perception of dysphagia and the real impairment. Both PwMND and the caregivers related the terms dysphagia or swallowing impairment to pharyngeal phase of swallowing only. Communication impairment was reported as being much more concerning than dysphagia for the PwMND but not for the caregivers. Caregivers experience dysphagia differently to PwMND and have different expectations from professional services. Participants had some suggestions to improve the services currently provided for dysphagia.
Conclusions: People living with MND may experience and approach dysphagia differently than other populations therefore they often require a unique professional input.

DYSPHAGIA IN AUTOSOMAL RECESSIVE SPASTIC ATAXIA OF CHARLEVOIX-SAGUENAY (ARSACS)

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Background: Autosomal recessive spastic ataxia of Charlevoix-Saguenay (ARSACS) is rare neurodegenerative disease that typically affects muscle movement and control. Dysphagia is anecdotally described as a key feature of this disease but the nature severity and impact of these deficits is not known. A comprehensive quantitative and qualitative characterization of swallowing function in ARSACS will support diagnostics provide insights into the underlying pathology and establish the foundation for future therapy trials.

Methods: 10 consecutive patients with ARSACS and matched controls were recruited. Swallowing function was assessed via the Clinical Assessment of Dysphagia in Neurodegeneration Swallowing related quality of life (SWAL-QOL) and videofluoroscopy.
Results: The swallowing profile of individuals with ARSACS was characterized by delayed initiation of swallowing reflex and late epiglottic closure. Three out of ten participants were observed aspirating on thin liquids. Clinical bedside revealed participants regularly coughed or choked on thin liquids and solids during mealtimes and that no compensatory strategies were employed. Swallowing related quality of life was worse than healthy controls on domains of overall burden and eating duration.
Conclusions: The dysphagia profile of ARSACS is symptomatic of impaired coordination and timing. Dysphagia contributes to a reduction of functional quality of life. There is a need for evidence based treatments in this population.

COMPUTATIONAL SPEECH ANALYSIS AS A TOOL FOR EARLY DETECTION OF BULBAR DYSFUNCTION IN ALS PATIENTS

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Introduction: In amyotrophic lateral sclerosis (ALS) the initial symptoms of dysarthria are subtle and there is no objective method for assessing them which can be difficult to early detection. We propose the computational analysis of speech as a method for the early detection of bulbar impairment in ALS patients.
Methods: An analysis of different speech acoustic variables using Praat software was performed; ALS patients with no apparent bulbar impairment (according to El Escorial criteria) were compared to healthy controls (H) and to pathological controls (dysarthria in stroke patients). Lingual strength measured with IOPI system was also included as alternative measure of bulbar involvement expression.
Results: 9 patients were evaluated and compared to 20 healthy volunteers as well as to a pathological control group of 6 acute stroke patients affected of dysarthria. ALS patients compared to volunteer group presented a greater number of pauses ($p = 0.016$) longer duration during the reading of a text ($p = 0.005$) as well as a lower verbal fluency ($p < 0.001$). In addition they presented a significant decrease in the lingual movement in the horizontal plane ($p < 0.001$) with a trend towards a lingual anterior position ($p = 0.005$) and inferior ($p = 0.003$) during phoneme emission. Compared with dysarthria of vascular origin the lingual position during phoneme emission had a greater tendency to be more anterior ($p = 0.02$). The decrease in lingual strength was related ($r = 0.80$) with a decrease in lingual movement ($p = 0.003$).
Conclusion: ALS patients without apparent bulbar dysfunction had an affectation of the lingual movements in the horizontal plane. The computational analysis of speech is a simple and objective tool that seems useful for an early detection of bulbar dysfunction in ALS and even allows to distinguish from other etiologies of dysarthria

FIBEROPTIC LARYNGOSCOPIC EVALUATION OF BULBAR SYMPTOMS IN AMYOTROPHIC LATERAL SCLEROSIS

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Introduction: Amyotrophic lateral sclerosis (ALS) presents limb weakness respiratory failure dysarthria and dysphagia. Although bulbar symptoms are common in the advanced stage of ALS a few studies have reported their investigation using fiberoptic laryngoscope. Here we aimed to clarify the features of bulbar symptoms in patients with ALS by using fiberoptic endoscope.
Subjects and Methods: Between May 2012 and January 2017 we retrospectively analyzed medical records of patients with ALS admitted to our hospital. Thirty-four patients presented with bulbar symptoms and were examined with fiberoptic laryngoscope.The following findings were considered in all 34 cases: (1) food intake level scale (FILS) (2) velopharyngeal closure during speech and swallowing (3) vocal cord movement during speech (4) unilateral weakness of the pharyngeal constrictor (curtain movement) during speech (5) pharyngeal contraction during swallowing ("whiteout") (6) salivary retention and (7) salivary penetration/aspiration.
Results: Twenty-four participants were men. The median age was 70.5 years. Since the endoscopic examination was performed in the early stage of bulbar symptoms the median FILS score was 8.0. Salivary retention was the most common abnormal finding (85.3%). None of the patients showed vocal cord paralysis. Fifteen patients (44.1%) presented with velopharyngeal dysfunction during speech. Ten out of 15 patients showed normal velopharyngeal closure in swallowing; hence velopharyngeal function was different between speech and deglutition. Mild curtain movement was observed in 7 cases (20.6%).
Conclusions: Our results suggest a dissociation of velopharyngeal dysfunction between speech and swallowing. Although curtain movement is very rare on the examination of the oral cavity in ALS it is not an unusual finding under fiberoptic laryngoscopic evaluation.

Session 09 Poster session 2.4: Dysphagia in geriatric patients II

INVOLVEMENT OF ORAL HEALTH PROFESSIONALS AND SPEECH THERAPISTS IN LONG-TERM CARE INSURANCE (LTCI) BENEFITS INCREASED THE LTCI FACILITIES INCOME IN A JAPANESE PREFECTURE

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Introduction: In Japan the long-term care insurance (LTCI) system includes benefits for oral ingestion-related services of LTCI facility residents with swallowing dysfunction: transition from tube feeding to

oral ingestion retention of oral ingestion (type 1 and 2: basic and additional fees which are claimed for meal rounds by multidisciplinary teams including oral health professionals (OHPs) and speech therapists (STs)). They are claimed in addition to the nutrition management benefit. This study investigated the claim rates and estimated monthly billing amounts for the abovementioned benefits and the relation between billing amounts and OHPs/STs involvement in those services.

Material and Methods: An original questionnaire on statuses of residents claims for the abovementioned benefits and OHPs/STs involvement as of July 2016 was mailed to all LTCI facilities (304) in Niigata Prefecture Japan. Collected data on OHPs/STs involvement and estimated billing amounts for each benefit was analyzed by multiple linear regression.

Results: Collection rate was 44%. Benefits for nutrition management transition from tube feeding to oral ingestion retention of oral ingestion type 1 and 2 were claimed by 97% 9% 44% and 25% of facilities respectively. The average estimated monthly billing amount per facility ($\times$ 1000 JPY) for nutrition management transition from tube feeding to oral ingestion and retention of oral ingestion type 1 and 2 were 368 JPY 11 JPY 78 JPY and 20 JPY respectively. Factors significantly associated with estimated monthly billing amounts per resident were the involvement of OHPs ($p = 0.016$) and STs ($p = 0.019$) in those services ($R = 0.290$).

Conclusions: OHPs and STs involvement in nutrition management and oral ingestion-related services provided at the LTCI facilities in Niigata Prefecture was significantly associated with estimated monthly billing amounts for those benefits and thus also positively contributed to the facilities' income.

*THE PREVALENCE OF OROPHARYNGEAL DYSPHAGIA IN ACUTE GERIATRIC PATIENTS

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Background: Oropharyngeal dysphagia (OD) is underdiagnosed and undertreated in many geriatric centres. The aim of this study was to explore the prevalence of OD in patients admitted to a geriatric department.

Material and Methods: A total of 313 consecutive patients (44.1% male mean age 83.1 years (SD 7.8)) hospitalized in the geriatric department from the 1st of March 2016 to the 31st of August 2016 at North Denmark Regional Hospital were included in this study. The volume-viscosity swallow test and the Minimal Eating Observation Form-II were conducted to assess OD. All patients with OD got a rehabilitation plan by discharge.

Results: A total of 50% patients had OD. Within the group of patients with OD there was a significant larger amount of patients who lived in nursing homes ($P = 0.004$) had a higher BMI ($P < 0.001$) increased DEMMI score ($P < 0.001$) fewer repetitions in 30 s. chair stand ($P = 0.001$) less circumference of arm ($P = 0.001$) and leg ($P = 0.001$) versus not-OD patients. There was no significant difference according to Charlson Comorbidity Index handgrip strength or Barthel100. Patients with OD presented an increased length of stay in hospital with 0.8 day. The mortality rate was higher 48 patients with OD died within 30 days after discharge versus 23 not having OD. The frequency of rehospitalisation between the two groups was equal. Dehydratio (OR = 3.23) fall (OR = 2.09) dyspnoea (OR = 1.39) and pneumonia (OR = 1.12) age $>$ 85 years (OR = 0.86) BMI $\leq$ 25 (OR = 2.77) and nursing home (OR = 3.62) were observed as independent predictors for OD.

Conclusion: Patients in an acute geriatric setting are in high risk of OD and the mortality is very high: 31% within 30 days after discharge. The frequency of rehospitalisation was equal between the two groups which may be due to the rehabilitation plan and follow up in their residence. The results clarify the importance of a systematically screening for OD in all geriatric patients to optimize the treatment.

PLEASURE OF EATING DESPITE DYSPHAGIA IN NURSING HOMES : A MULTI-DISCIPLINARY PLAN

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Pleasure and security is a difficult balance to find in order to preserve the quality of life In nursing homes. Daily meals must remain a pleasure despite dependence dysphagia and the risks of malnutrition pneumonia and asphyxia. Speech therapists doctors dentists dieticians a 3 star chef and catering managers have conceived a multi-disciplinary prevention plan in nursing homes: Screening carried out by nurses identifies risks of complications then preventative actions are put into work for these frail patients. Autonomy: for posture at the table and self-feeding helped by appropriate facilities and assistance at mealtimes. Mouth: rigorous hygiene efficient chewing are monitored. Kitchen: recipes are being developed to prevent choking hazards without using mixed food and puree according to the criteria published by International Dysphagia Diet Standardisation Initiative. Pleasure is stimulated by tasty dishes that maintain the identity texture and appearance of the products and served in a agreeable manner. This plan of prevention has been deployed in 6 nursing homes in 2016. The health and pleasure impact has been observed comparing results from 4 Homes in the treatment group and 2 Homes in the control group. Every 3 months pleasure of residents and staff was evaluated the amount of uneaten food was weighed. Malnutrition asphyxiation and pulmonary complications were observed. The number of meals served mixed or chopped is reduced by 87% and the nutritional supplements by 50%. THose supplements are served to 2.5 times fewer residents. Residents' satisfaction has increased by 12% in one year and that of the carers 95% without anymore cases of pneumonia and asphyxia. Only 20% of people are malnourished with the plan while 46% are without it. The pleasure of eating appears to be powerful in preventing the malnutrition of frail elderly people in nursing homes. It must be supervised in a comprehensive conception of the quality of life

PERCEPTION OF FEEDING PHENOMENON AND ORGANOLEPTIC PROPERTIES OF FOOD BY A GROUP OF ELDERLY PEOPLE WITH PRESBYPHAGIA AND POST-STROKE DYSPHAGIA

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Introduction: Elderly people lose sensory functions as they get old. Psychosocial factors affect the perception and determine the food consume. In addition aging is associated with dysphagia being its main cause secondary neurological alterations after a stroke increasing morbidity and mortality in this population.
Purpose: To know the perception of older adults with presbyphagia and post-stroke dysphagia about food phenomenon considering physiological and non-physiological factors along with the organoleptic properties of foods that they prefer.
Metodology: Qualitative study with phenomenological design. A semi-structured interview was applied to eight older adults with presbyphagia attending at the "Centro de Actividades Prácticas" sampling by saturation) and eight older adult with post-stroke dysphagia attending at Hospital Clínico Herminda Martin de Chillán. Chile. The speech was processed through axial coding in two levels: formation of codes (through appointments of the interviewee) memos (concepts of researchers) and selective coding through the integration of family codes applying the method of constant comparisons using Atlas.ti 6.
Results: There are differences between both groups; subjects with presbyphagia prefer salty taste hot temperature and semi-solid consistency; subjects with post-stroke dysphagia prefer sweet taste warm temperature and fluid consistency. Psychosocial factors are those that present more opposites considering the difficulties in social participation by the subjects with dysphagia post stroke.
Conclusions: Health and pathological conditions determine the differences in perception of the food phenomenon and preferences of the organoleptic properties of foods between both groups being the psychosocial characteristics that present the most differences.

ORGANOLEPTIC PROPERTIES OF FOODS CHOSEN BY ELDERLY WHO LIVE IN CHILLÁN CHILE

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Introduction: The aging population is increasing geriatric disease's prevalence such as presbyphagia. Aging affects both digestive and stomatognathic system which may influence on elderly's food preferences. There are many factors that encourage the choice of foods for example biological psychological social cultural and economic factors. Therefore does relationship between aging food preferences and organoleptic properties of food exist? The objective of this study was to associate aging with organoleptic properties of foods chosen by elderly who live in Chillán Chile.
Material and Methods: 86 subjects with 60 years old or more without brain damage were studied by Gugging Swallowing Screen (GUSS) and a questionnaire created by authors that asked for preferences about organoleptic properties of foods chosen.
Results: 76.7% had presbyphagia. Regarding preferences about organoleptic properties of foods 59.3% chose the flavor. The chosen flavor was "sweet" (40.7%) the chosen consistency was "liquid" (44.2%) the chosen color was " mix of colors" (59.3%) the chosen smell was "vegetable odor" (47.7%) and the chosen texture was "soft foods" (44%). When we associated sex with presbyphagia women had 3.41 more times to have presbyphagia ($p = 0.048$). In addition we found an association between age and color of chosen foods ($p = 0.020$). Finally multinomial logistic regression showed that person with presbyphagia has 5.54 more probabilities to prefer semisolid food.
Conclusions: Apparently there is association between age and organoleptic properties of foods. Flavor is the most important organoleptic property of food for elderly with presbyphagia. In addition we believe that a good food for elderly should have semisolid consistency and a mix of color.

*EFFECT OF AGING TOOTH LOSS PERIORAL AND SKELETAL MUSCLE MASS ON OCCLUSAL FORCE IN HEALTHY ELDERLY

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Introduction: Recent studies have reported the muscle weakness of perioral muscles due to sarcopenia and such patients showed deterioration of chewing ability jaw opening force and tongue pressure. When it comes to occlusal force that reported to have relation to the number of tooth masseter muscle thickness and craniofacial form. Given these background we have reported that masseter muscle thickness in healthy elderly men was affected by tooth loss and grip strength while in women it was only affected by tooth loss. However to date it is unknown that occlusal force is susceptible to which of the following three factors : tooth loss or perioral muscle mass or whole skeletal muscle mass and muscle strength. Therefore the aim of the present study is to determine the most influential factor on occlusal force in healthy elderly subjects.
Material and Methods: Sex age skeletal muscle mass index (SMI) grip strength walking speed occlusal force tooth loss (Eichner classification) masseter muscle thickness during contraction were obtained in community dwelling elderly subjects over 65 years (men : n = 44 women : n = 53). Occlusal force was set as the dependent variables while sex age grip strength SMI tooth loss masseter muscle thickness during contraction were the independent variables. Multiple regression analysis was performed using the stepwise regression method.
Results: The results of the analysis showed that independent variables were masseter muscle thickness during contraction and tooth loss ($P < 0.01$). Standard partial regression coefficient of masseter muscle thickness during contraction and tooth loss was |0.35| either. Adjusted R square was 0.28.
Conclusion: The present study indicated that masseter muscle thickness during contraction and tooth loss rather than age whole body skeletal muscle mass had greater effect on the occlusal force.

Session 09 Poster session 2.5: Dysphagia in geriatric patients III

THE PROCESSING BEHAVIOUR OF DRUG ADMINISTRATION VEHICLES IN AN IN VITRO ARTIFICIAL "THROAT" MODEL

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Introduction: Thickened fluids is often used as vehicles to administer crushed tablets or capsule contents for patients unable to swallow their medicines. The aim of this project is to compare the processing behavior of thickened fluids to other swallowing aids used for drug administration using an in vitro artificial throat model.

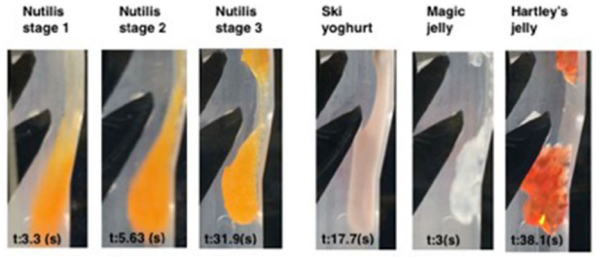

Figure 1: The flow of Nutilis, Ski yoghurt, Magic jelly and Hartley's jelly though the in vitro throat model.

Method: Movie photography captured images of the flow of a commercial free-standing jelly an agar-based Ryukakusan 'magic jelly' yoghurt and thickened fluids in an in vitro mechanical throat model. Samples were characterised using a TA 1500 EX controlled-stress rheometer with a 40 mm parallel plate. Rheological data on the steady state flow linear viscoelasticity and frequency sweeps were obtained. Texture parameters such as cohesiveness and surface adhesion were obtained using a back-extrusion rig on a TA.XT Plus Texture analyser.

Table 1. Summary of flow times and rheological characteristics of Nutilis, Ski yoghurt, Hartley's jelly and magic jelly.

Product	Time taken to reach the oesophagus (s)	Apparent viscosity (Pa.S) at $50s^{-1}$	Yield stress (Pa)	Cohesiveness (g)
Nutilis stage 1	1.58 ± 1.69	0.612	1.02	9.47±1.40
Nutilis stage 2	5.5 ± 3.1	2.580	19.99	21.95±4.02
Nutilis stage 3	32.56 ±10.67	4.033	50.21	48.16±2.01
Ski smooth yoghurt	19.27±10.74	0.2505	2.52	13.25±0.98
Magic jelly	8.086±9.63	0.3145	10.02	14.89±0.03
Hartley's ready to eat jelly	48.32±24.15	0.2477	12.61	17.07±0.58

Results and Discussion: All of the products showed the same characteristic rheological features with shear-thinning flow and G' dominance indicating gel-like structure at low shear. An increase in transit time and decrease in bolus length was observed for each incremental stage of thickened fluid in the in vitro "throat" model (Figure 1 Table 1). Stage one and two thickened fluids showed fast flow and long bolus length indicating less cohesive flow and increased risk in aspiration compared to stage 3 fluid (Figure 1). The time taken for thickened fluid "boluses" to reach the oesophagus in the in vitro model was found to correlate with viscosity cohesiveness and yield stress. Yoghurt showed similar flow behavior as stage 2 thickened fluid whilst the jellies showed cohesion of bolus movement similar to stage 3 thickened fluids despite having low viscosity yield stress and cohesiveness.
Conclusions: Commercial jellies displayed similar flow behaviour to stage 3 thickened fluids indicating promise as an alternative swallowing aid and potential to improve patient acceptability.

KNOWLEDGE AND PERCEPTIONS OF FEEDING PEOPLE WITH ADVANCED DEMENTIA AMONG HEALTHCARE PROFESSIONALS IN ISRAEL

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Introduction: Advanced Dementia (AD) is a medical term that refers to an acquired neurocognitive disorder affecting cognitive function and independence in daily living. Eating and swallowing abilities are also affected by the disorder. Managing eating and swallowing difficulties usually involves strategies that do not require patients' cooperation. Two common methods used in this population are: (1) utilizing a feeding tube or (2) hand feeding techniques. Selecting a feeding method is a complex issue due to the many factors involved such as the person's medical condition feeding ability swallowing function as well as the healthcare professional's personal values and social and religious influences. The purpose of this study was to examine the factors that influence treatment decisions made by healthcare professionals regarding feeding people with AD.
Methods: Self-administrated questionnaire was filled by 86 healthcare professionals: 25 speech therapists 30 nurses & 25 dieticians.
Results: The results demonstrated the effects of several factors including proficiency in current evidence-based professional knowledge profession of the respondent degree of personal experience in professional and family settings attitude and beliefs concerning feeding and positions regarding artificial feeding. In addition when asked about artificial feeding we found a gap between treatment decisions for the patient and the professionals' preference for themselves if they were a patient with AD. These findings reflect the complexity of making decisions about feeding patients with AD as they are influenced by a myriad of factors that are not just professional-based.
Conclusions: It is suggested that guidelines that contain moral social and ethical aspects in addition to professional and clinical aspects will be created and used. Also it is important to involve the patient and his/her family as much as possible in order to decide on the best feeding method to suit th

HOW WELL DO MEASURES OF TONGUE STRENGTH CORRELATE WITH OROPHARYNGEAL DYSPHAGIA IN OLDER PERSONS?

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Introduction: Tongue strength is a key component of an efficient and safe swallow but has been shown to decline with age. Acutely unwell older adults often exhibit difficulty swallowing leading to aspiration pneumonia malnutrition dehydration and increased mortality. We hypothesised that acutely unwell older adults may experience further decreases in tongue muscle strength contributing to the increased levels of dysphagia seen in older inpatients. This pilot study sought to determine the correlation between tongue strength and oropharyngeal dysphagia in older adults presenting to an acute hospital.
Methods: A retrospective study was completed to analyse 3 months of clinical data from suitable inpatients referred to Speech and Language Therapy (SLT) for a swallow assessment. A clinical swallow evaluation EAT-10 dysphagia questionnaire and lingual strength & endurance as measured using the Iowa Oral Performance Instrument System (IOPI) were completed. The relationship between these measures were analysed to determine whether reduced tongue strength was a reliable indicator of oropharyngeal dysphagia and/or the severity of same in older hospitalised patients.
Results: Data from 15 older adults have been analysed. Initial results suggest that reduced tongue strength and endurance are highly predictive of the presence of an oropharyngeal dysphagia. Further

analysis is required to determine if tongue strength correlates with severity of the dysphagia and its sequelae.
Conclusions: Reduction in tongue strength correlates with the presence of dysphagia and measures of these parameters may prove a useful addition to dysphagia assessment. Further work is ongoing to determine if strength correlates with severity of dysphagia and if specific therapeutic interventions directed at increasing tongue strength may reduce dysphagia associated morbidity.

A FOLLOW-UP INTERVENTION IN ELDERLY DIAGNOSED WITH DYSPHAGIA

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Introduction: In the period March 2015 to April 2016 the nutrition unit of Roskilde Denmark conducted an intervention including n = 126 elderly suspected with dysphagia of which 84 elderly were diagnosed with dysphagia. The focus of the intervention was the correlation between early identification of dysphagia unintended weight loss insufficient oral hygiene and particularly the multidisciplinary efforts in this context. There was a close relation between the above mentioned nutrition related complications why early identification of dysphagia requires a multidisciplinary approach including meal adaptation guidance about sufficient nutrition and oral care (Rofes L. et al.). Present intervention is a follow-up including n = 84 elderly earlier diagnosed with dysphagia. On the basis of Melgaard D. et al. current intervention illuminates the mortality among the following:
Subgroup 1: elderly with dysphagia (n = 84)
Subgroup 2: elderly with dysphagia and unintended weight loss (n = 34)
Subgroup 3: elderly with dysphagia and insufficient oral hygiene (n = 37)
Subgroup 4: elderly with dysphagia unintended weight loss and insufficient oral hygiene (n = 17). Based on Serra-Prat M. et al. present intervention in addition illuminates weight status among subgroup 2.

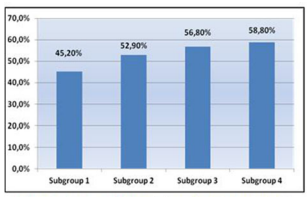

Figure 1: Illustrates the mortality among subgroup 1-4 in one year. The mortality of the elderly increases the more complications.

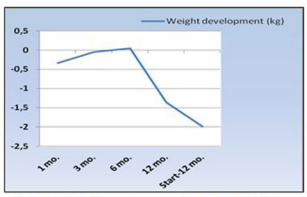

Figure 2: Illustrates the weight status among subgroup 2 (n=34). The weight loss is in average 2 kg.

Materials and Methods: Current intervention is completed using audit. In weight status the follow-up is divided into five periods of time. Concerning mortality the follow-up period is one year. There is a risk of bias as it has not been possible to collect data from the total group of 84 elderly earlier diagnosed with dysphagia.
Conclusion: It has become clear that elderly with dysphagia in average have a weight loss in 2 kg in one year. In addition the mortality increases as the nutrition related complications become more. Early identification of nutrition related complications is extremely important thus a prolonged multidisciplinary approach can be initiated.

DO MODIFIED DIETS INFLUENCE MEALTIME DURATION IN RESIDENTS OF LONG TERM CARE?

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Purpose: Many long term care (LTC) residents are at risk for dysphagia and receive modified texture diets. Recently a large Canadian study (M3: Making the Most of Mealtimes) showed that both dysphagia risk and reduced tongue pressures during swallowing were associated with longer mealtime duration. The use of modified food textures was also associated with reduced nutritional intake. In this analysis we explored the association between diet restrictions (represented using International Dysphagia Diet Standardization Initiative Functional Diet Scale [IDDSI-FDS] scores) meal duration physical assistance and dysphagia risk. We hypothesized that more restrictive diet modifications would be associated with longer meal durations and dysphagia risk but that physical assistance would allow residents to complete meals faster.
Materials and Methods: Data were collected from 639 LTC residents (199 male) aged 62–102 (mean 87 $\pm$ 7.4). Nine meal observations provided measures of meal duration food and liquid consistencies consumed coughing and/or choking at meals and assistance provided at meals. Participants were screened for dysphagia using the Screening Tool for Acute Neurological Dysphagia. IDDSI-FDS scores were derived based on consistencies consumed.
Results: Residents with dysphagia risk (59% of the full sample) had significantly longer mealtime durations than those without (44 min versus 39 min respectively; $p < 0.05$). Neither physical assistance nor diet restriction were associated with mealtime duration. Physical assistance was more common for residents with more restricted diet textures (70% of residents with IDDSI-FDS scores $\leq$ 5). Residents with dysphagia risk were 1.7x more likely to be receiving physical assistance than those without dysphagia risk.
Conclusions: Prolonged mealtime durations were associated with dysphagia risk rather than with diet texture restriction or the provision of physical assistance with eating.

TREATMENT WITH NEURMUSCULAR ELECTRICAL ESTIMULATION (VOCASTIM) IN PACIENTS WITH POSTSTROKE OROPHARYNGEAL DYSFUNCTION (O D)

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Background: Poststroke oropharyngeal dysfunction (OD) is a common condition leading to severe complications including death. Treatments for Poststroke OD are scarce. The aim of our study was to assess and compare the efficacy and safety of treatment with NEURO Electrical stimulation (NMES) with VocaSTIM in patients with VocaSTIM in patients with Methods
Methods: From March 2013 until May of 2016 were 32 treatments only 20 completed all of the treatment (13 men 7 women) average age between 62 to 78 years.Patients were treated during 8–10 sessions of 20 min average 2 times a week. Videofluoroscopy (VFSS) was performed at the beginning and end of the study to assess signs of impaired efficacy and safety of swallow and timing of swallow response.

Results: Patients presented advanced age 65% were men.. After motor stimulation the number of unsafe swallows was reduced by 60%. the laryngeal vestibule closure time by reduced and maximal vertical hyoid extension There was slight increase. the upper esophageal sphincter opening time by 40% and increased bolus propulsion forceNo serious adverse events were detected during the treatment.
Discussion: NMES (Neuromuscular Electrical Stimulation)is a new treatment for dysphagia involving the application of electrical current across the skin to excite nerve or muscle tissue during a functional task. NMES can increase the suprahyoid muscle size and improve the range of motion circulation and muscle endurance by increasing the aerobic capacity of the muscle. The action mechanisms of NMES have not been fully elucidated yet. NMES is postulated to improve the hyolaryngeal elevation restore motor function of weak muscles combat disuse atrophy enhance sensory awareness and facilitate the muscle contractions. This study has several limitations. First the study was conducted with a small number of patients. Second we only measured the functional improvement.

PROBLEMS OF FEEDING AFTER STROKE

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Introduction: Dysphagia is caused by a disease or disease or dysfunction in one or more areas of the swallowing process. It may improve over time or require lifelong treatment. It is a serious prolem that when left untreated can lead to dehydration malnutrition feeding or aspiration. The article pressens the fidings of the research on problems occuring in feeding the patients after stroke.
Matherial/Methods: The research study was carried out in two old peoples homes by means of inquiries for 82 patients and personnel helping them with their feeding.
Goal research: The goal of the research was to find out kinds and severity of the problems and the attitude of patients towards them.
Conclusion: It has been found out that problems with feeding fallowing stroke are a frequent and severe problem occurring in 79% of the cases having also deep psyhological and social consequences.
Keyword: strokedysphagiafeeding

AGEING WITH SEVERE DISABILITY: THE BIG PICTURE OF SWALLOWING DISORDERS

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Introduction: Changes in the swallowing function of adults with severe disability as they age may impact on their health safety and well-being. The coexistence of physical and intellectual disabilities poses individuals at a high risk of dysphagia complication namely choking/asphyxiation and aspiration pneumonia.
Material and Methods: The aims of the study were (i) to characterize the swallowing function of people with severe disabilities using a functional evaluation (ii) identify the incidence of swallowing complications due to physical and/or intellectual disabilities (iii) Based on the results propose a set of good practices. Data were collected in a residence for people with severe physical and intellectual disabilities. The sample was constituted by 100 individuals. Their swallowing function was evaluated regarding the motor and sensory function of swallowing. The 3 oz water swallow test the TOMASS and the FOIS were also used. Episodes of aspiration pneumonia airway obstruction asphyxiation during meals and malnutrition and dehydration were recorded.
Results: Results pointed to a high percentage (about 80%) of impairment in the motor/sensory swallowing function. Of the sample 5% have no oral feeding. The difficulty in communication basic wants and needs and request for assistance was highly correlated with swallowing disfunction. Despite of this only ten episodes of aspiration pneumonia were reported in a year.
Conclusions: Adults with severe disability may experience gradual changes in their swallowing and mealtime capacities during their life cycle Regular evaluation and collaborative assessment and involvement of all the team in decisions are important to facilitate the maintenance of oral feeding compliance with recommendations safety and a better well-being.

Session 09 Poster session 2.6: Dysphagia in children II

*ORAL FEEDING READINESS IN PRETERM INFANTS: HOLISTIC CONSIDERATIONS

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Recently there has been a push towards earlier initiation of oral feeding for preterm infants. This practice does not take into account the impact of immaturity of the gastrointestinal and respiratory systems on oral feeding. Research data suggest that oral feeding may be introduced before 34 weeks gestational age (GA); however these neonates are subject to gastroesophageal reflux poor gastric emptying and immature small intestinal motility. Gastric emptying is also slower leading to greater residual volumes closely tied to reflux (Neu 2007). Adequate function of the upper esophageal sphincter and primary peristalsis aren't present until approximately 33 weeks GA undergo further maturation during the postnatal period and are significantly different from those in adults (Cochetiere et al. 2007). The immature intestine is susceptible to injury after introduction of feeding likely related to infants less than 34 weeks GA being at greatest risk for necrotizing enterocolitis (Clark & Mitchell 2004). There is also limited evidence regarding gastric capacity in preterm infants. The commonly encountered "feeding intolerance" may more likely be "volume intolerance" (Bergman 2013). Frequently preterm infants present with an underdeveloped swallowing reflex lack of the lactase enzyme activity and an immature motility pattern for digestion (Commare & Tappenden 2007). Interruption of lung development may result in less effective gas exchange and increased susceptibility to disease (Maritz Morley &Harding 2005). Immaturity of the neonate's lungs prior to 36 weeks GA results in altered lung function

increased risk of respiratory disease and impacts the ability to coordinate respiration during oral feeding (Colin McEvoy & Castile 2010). This presentation will discuss how the immature gastrointestinal and respiratory systems may impact feeding success. Clinical considerations to encourage a holistic approach to assessing feeding readiness will be presented.

DOES SWALLOW PHYSIOLOGY IMPACT DIETARY DIVERSITY IN CHILDREN?

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Chronic feeding problems have the potential to significantly impact nutrition and hydration status required for adequate growth and development. Currently there are no research findings that have investigated if specific physiologic patterns of swallowing are related to refusal of certain consistencies in the pediatric population. Further investigation regarding the possible underlying cause of these chronic feeding problems is essential to develop evidence-based assessment and treatment approaches to support best clinical practice. Available research evidence has demonstrated that bolus characteristics including taste and viscosity impact swallow physiology in adults; however no such research has been conducted in children. There are no comprehensive studies investigating if dietary diversity is impacted by specific bolus characteristics which change the biomechanics of swallow function and thus leads to chronic feeding refusal. Treatments focused on oral-motor function in children with food selectivity and aversion have been found to increase food repertoire; however there has been no investigation into potential pharyngeal swallow function as a component of food selectivity. This study is the first to objectively assess all phases of swallowing to assess if there is a relationship between swallow physiology and limited dietary intake. This presentation will provide preliminary study data.

WATER SWALLOW TESTS IN CHILDREN: FEASIBILITY AND NORMAL VALUES

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Introduction: To evaluate dysphagia when swallowing thin liquid two tests are available for adults: (1) Timed Test for Swallowing capacity (TTS)1; (2) Dysphagia Limit (DL)2. However no data are available to use these tests in children. The aim of this study was to test the feasibility in children for both tests and to collect normal values in children (> 4 years of age) for the TTS and DL.
Materials and Methods: Data were collected for the TTS and DL in healthy children from 4 to 18 years of age. For the TTS 216 children (101 boys) and for the DL 352 children (172 boys) were included equally distributed over the age groups per year. Instruction for the TTS was to drink 100 ml tap water as fast as possible. Total time and amount of swallows were recorded and swallowing capacity (ml/s) was calculated. The DL (the volume of water that can be swallowed at once) was determined by offering increasing volumes of water (3–60 ml). During both tests the swallows were detected by cervical auscultation.
Results: Only in the 4 years age group 2 children (20%) had difficulty to complete the TTS. For this test no significant differences were found between boys and girls for total time ($p = 0.224$) and amount of swallows ($p = 0.70$). Age was a significant predictor for the swallowing capacity ($p = 0.00$). Results ranged from 37 ml/sec (SD $\pm$ 31) in the 4 year age group to 201 ml/sec (SD $\pm$ 92) in the 18 years age group. For the DL significant differences were found between boys and girls ($p = 0.02$). Age was a significant predictor for the DL ($p = 0.00$) ranging from 433 ml (SD $\pm$ 12) (age group 4 years) to 55 ml (SD $\pm$ 200) (age group 18 years).
Conclusion: Both tests are feasible in children and are easy to perform except for the TTS in the 4 years age group. This study provides normal values for the DL and the swallowing capacity measured by the TTS in children. Further research to assess the sensitivity of both tests for dysphagia in the pediatric population is necessary.

THE EFFECT OF CEREBRAL PALSY ON MASTICATORY PERFORMANCE IN CHILDREN

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Introduction: Children with cerebral palsy (CP) can have problems with mastication. We explored the usability of the mixing ability test (MAT) outcomes for mastication in children with CP and typically developing children. The MAT results were compared to outcomes of the Mastication Observation and Evaluation (MOE) instrument ultrasound and kinematic measurements.
Material and Methods: Eight children with CP spastic type (mean age 9;08 years) and 14 typically developing control children (mean age 9;01 years) participated in the study. Two bicolored wax tablet were offered to bite for 20 times on it. One tablet trial was video recorded for the MOE analyses and recorded by ultrasound measurement; the other one was combined with kinematic measurements. Correlations were tested with Spearman and Pearson tests and differences between groups were tested with independent t-tests.
Results: The wax index for children with CP was 23.3 (SD 2.5) and for the control group 193 (SD 1.9). A higher wax index indicates less mixed colors. The correlation between the MOE and the wax index was significant for all items (p ranged from 0.002 to 0.027). The correlation between the wax index and ultrasound outcomes was significant for displacement of the tongue movement in vertical and horizontal direction ($p = 0.003$) velocity in vertical ($p = 0.001$) and horizontal ($p = 0.033$) direction and up-down frequency ($p = 0.02$). The correlation between the wax index and kinematic outcomes was significant for occlusion cycle duration ($p = 0.015$) and horizontal mandible movement ($p = 0.012$). Differences between groups were found for displacement tongue horizontal direction and Up-Down frequency ($p = 0.02$) anterior mandible movement ($p = 0.016$) chewing cycle duration ($p = 0.021$).
Conclusion: The MAT MOE ultrasound and kinematic measurements showed differences in masticatory performance between children with CP and controls. The various measurement instruments provide information about different aspects of mastication.

*EARLY DETECTION OF DYSPHAGIA AND DYSARTHRIA IN CHILDREN WITH NEUROMUSCULAR DISORDERS: DIAGNOSTIC ACCURACY OF A SCREENING LIST FOR REHABILITATION PHYSICIANS

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Introduction: In pediatric neuromuscular disorders (pNMD) dysphagia and dysarthria are often reported[1]. Early detection and monitoring of dysphagia is necessary to avoid consequences as malnutrition choking or aspiration pneumonia and might improve quality of life[2]. Reduced intelligibility due to dysarthria often causes problems in communication[3] and might hamper the social participation. While no validated screening tools for swallowing and speech in pNMD exist a project was started to develop an extensive screening tool in pNMD: Logopedic Instrument NMD-Children (LINMD-C). LINMD-C consists of a two-step diagnostic process. First a 9 yes–no questions screening list for the rehabilitation physician (Screening list RP) and a diagnostic part by the speech language therapist subsequently. The aim of this study was to test the diagnostic accuracy of the Screening list RP in p-NMD.
Material and Methods: Data were collected on 132 children (mean age 10;06 range 2;0–19;0) with pNMD at the Radboud University Medical Center Nijmegen and at Klimmendaal Rehabilitation Center. All children were screened on dysphagia and/or dysarthria by both the rehabilitation physicians (Screening list RP) and experienced speech language therapists.
Results: Using the theoretical cut-off point of ≥ 1 the sensitivity resp. specificity of the Screening list RP was 87% and 61%. The percentage of children being correctly identified as non-dysphagic and/or non-dysarthric was 81% (negative predictive value) and the positive predictive value of the Screening list RP was 72%. The prevalence of dysphagia and/or dysarthria was 53%. The area under the ROC curves was 0.81.
Conclusions: The Screening list RP has excellent sensitivity whereby the chances are very small that children with dysphagia and/or dysarthria are missed. The list is a valuable and valid tool for both scientific research and clinical practice.

*STANDARDIZED PROCEDURE FOR THE START OF ORAL FEEDING IN INFANTS WITH BILATERAL CHOANAL ATRESIA

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Introduction: Choanal atresia is a rare congenital obstruction of the posterior nasal choanae[1]. It presents after birth with immediate respiratory difficulties because newborns are obligate nasal breathers. Syndromes with congenital malformations such as CHARGE or Treacher Collins are commonly associated with bilateral choanal atresia. In our hospital the pediatric surgeons are restrained in surgical treatment beneath the age of 2 years because of the risk of restenosis[2]. Infants get an oral mayotube (figure 1a) to maintain the airway open and an oral feeding tube. We developed a standardized procedure to reduce the use of a mayotube and to start oral feeding. The aim of this study was to evaluate this procedure.

Figure 1a. mayo-tube; 1b 1/4 – abdominal posture

Methods: To stabilize the infants and get them comfortably breathing with a mayotube we use the ¼-abdominal position (figure 1b) so gravity ensures a forward position of the lower jaw and tongue base. A systematic procedure (figure 2) was developed to reduce the use of the mayotube and create conditions to introduce (non-)nutritive sucking. The criteria to start this procedure are: (a) the infant is physiologically and medically stable; (b) tube feeding can be given in portions. A retrospective study was conducted in 9 infants with bilateral choanal atresia: not associated with any syndrome (N = 3) with CHARGE (N = 3) with Treacher-Collins (N = 2) and with 22q11 deletion (N = 1).

Figure 2. Standardized procedure

1.	Offering optimal posture (if necessary: ¼-abdominal position)
2.	2 moments of usual care of mayotube (changing, cleaning): stable (oxygen saturation:92%; increase of breathing frequency: 15% or less) during 5 minutes without mayotube?
3.	If yes: Extend duration of self-regulation during these two moment. When > 120 minutes without mayotube is possible, then start tube feeding during these moments. When it is not possible start tube feeding after replacing mayo-tube.
4.	If the infant is able to self-regulate > 60 minutes, non nutritive sucking can be started. Pacing is provided after 3-5 non-nutritive sucking bursts to ensure the physiologically stability of the infant
5.	When stabile during non nutritive sucking, start fingerfeeding with 0,1 ml per burst. Only after breathing (cervical auscultation) a new bolus is offered (practice suck-swallow-breath).
6.	Increase bolus size to 0,3 ml and start with series of 3-5 times suck-swallow before pacing (restart breathing).
7.	If fingerfeeding is possible without problems, introduce bottle with a non-flow nipple. Pacing may be still necessary.

Results: Five infants (without trachea cannula) were treated with the procedure from figure 2. After starting the procedure they were able to start non-nutritive sucking (mean 1 day after start) and finger-feeding could be introduced as a functional training of nutritive sucking (mean 9 days after start). Four infants got a trachea cannula and could not start with the procedure.
Conclusion: Infants born with bilateral choanal atresia can learn to breath by mouth and it is possible to introduce oral feeding via a standardized procedure before they get surgical treatment.

INVESTIGATION OF THE RELATIONSHIP BETWEEN CHEWING PERFORMANCE LEVEL AND TONGUE THRUST SEVERITY IN CHILDREN WITH CEREBRAL PALSY

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Introduction: Chewing disorders are frequently seen in cerebral palsy (CP) which cause inability to intake solid food texture and may result in insufficient food intake and behavioral feeding problems during mealtimes. It is important to detect the reason of chewing disorders to plan appropriate rehabilitation protocol. Tongue control and movement is crucial for sufficient chewing function. The specific nature and severity of chewing disorders may differ in relation to problems in tongue functions. Thus we aimed to investigate relationship between chewing performance level and tongue thrust severity in CP.

Table 1. The Karaduman Chewing Performance Scale and Tongue Thrust Rating Scale

	Level	Parameters
Karaduman Chewing Performance Scale	0	Normal chewing function
	I	The child chews, but there are some difficulties in transition food to bolus
	II	The child starts to chew, but he/she cannot hold the food in the molar area
	III	The child bites but cannot chew
	IV	The child cannot bite and chew
	Level	**Parameters**
Tongue Thrust Rating Scale	0	No tongue thrust. The tongue tip rests on the lingual part of the dentoalveolar area.
	1	Mild tongue thrust. The tongue is positioned between teeth.
	2	Moderate tongue thrust. The tongue is positioned between lips.
	3	Severe tongue thrust. The tongue is positioned out of the mouth.

Material and Methods: Fifty children with CP were included. Observational oral motor evaluation was performed. The Karaduman Chewing Performance Scale (KCPS) was used to evaluate chewing performance. The tongue thrusting severity was scored with Tongue Thrust Rating Scale (TTRS) for (Table 1).
Results: The mean age was 43.35 ± 20.26 months (56% male). Open mouth open bite high palate were seen in 64, 38 and 74% of children respectively. The median KCPS score was 3 (min = 0 max = 4) and median TTRS score was 1.5 (min = 0 max = 3). A strong positive correlation was found between the TTRS and KCPS ($r = 0.75$ $p < 0.001$).
Conclusion: Tongue thrust severity associated with chewing performance level in children with CP and children who had more severe tongue thrust had more severe chewing disorders.

DYSPHAGIA MANAGEMENT OF A CHILD WITH CHARGE'S SYNDROME

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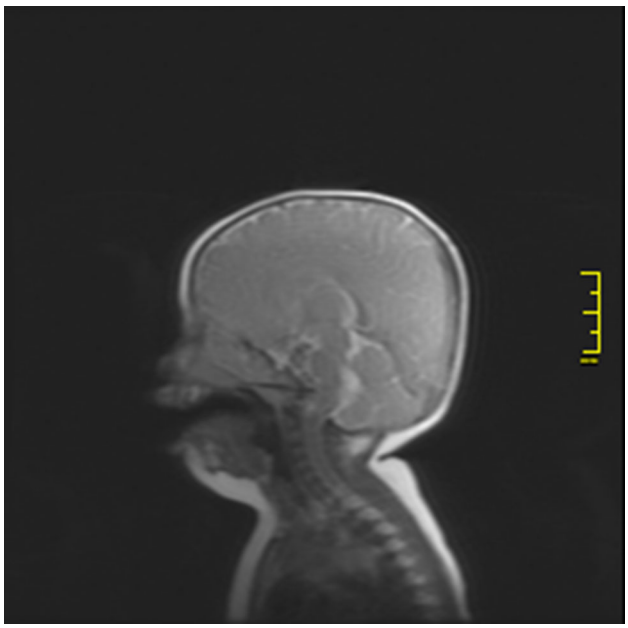
CHARGE's syndrome is a complex and rare genetic disease. The term CHARGE is an acronym that describes a constellation of clinical features including Coloboma Heart defects choanal Atresia Retardation (of growth and/or development) Genitourinary malformation and Ear abnormalities. The challenges of eating and drinking for children with CHARGE are complex due to motor and sensory dysfunction. There are clear relationships between motor and sensory-based feeding difficulties. Individuals with hypersensitivities are overly sensitive to oral stimulation which can lead to texture/food aversions picky eating and speech and feeding delays. We report the case of an 18 months old female. At birth she was diagnosed with characteristic ear anomalies (low set) cleft palate gastro-oesophageal reflux (GOR) cranial nerve dysfunction and displayed severe oropharyngeal dysphagia. Soon after clinical observation found a weak suction pattern and an impaired suck-swallow-breathe synchrony. Oral defensiveness was observed and she showed food aversions even on a purée diet.Magnetic resonance imaging (MRI) and cranial ultrasound (CU) were performed for the diagnosis and follow-ups. The patient was submitted to a specific swallowing rehabilitation plan with the main objective of promoting positive mealtimes.A proactive management approach was stablished in order to improve oral motor control and develop a rotary chewing pattern. By working on oral strength and endurance within a sensory integration approach the patient showed significant improvement in reduction of oral defensiveness which encouraged texture acceptance. However further swallowing rehabilitation to develop proper feeding skills was still required. In conclusion in this reported case the improved muscular performance in the oral phase leads to an increased function thus remarking the importance of a sensory integrative approach to manage eating and drinking.



Session 09 Poster session 2.7: Treatment II

THERAPEUTIC EFFECTS, RHEOLOGICAL PROPERTIES AND α-AMYLASE RESISTANCE OF A NEW MIXED XANTHAN GUM-BASED THICKENER IN OLDER PATIENTS WITH OD

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Introduction: Oropharyngeal dysphagia (OD) is pandemic among people over 70 years and leads to severe complications. Thickeners are evidence-based treatments to avoid aspirations; however the therapeutic effect of starch-based thickeners is strongly reduced

following oral hydrolysis by salivary α-amylase. Our aim was to assess the therapeutic effects and α-amylase resistance of a new gums and starch thickener (Fresubin Clear Thickener® [FCT] Fresenius Kabi) in older patients with OD.

Table 1. Videofluoroscopic findings and oropharyngeal swallow response

	Liquid (N=35)	Nectar (N=32)	Honey (N=35)	Pudding (N=35)	p-value
Impaired safety (%)	57.14 (20)	34.38 (11)	17.14 (6)**	2.86 (1)****	**<0.0001**
Impaired efficacy (%) (PR)	51.43 (18)	59.38 (19)	54.29 (19)	57.14 (20)	0.921
Higher PAS	3.63±2.29	2.63±1.95*	1.86±1.52****	1.11±0.53****	**<0.0001**
OSR					
LVC (ms)	342.5±99.51	336.25±84.31	282.50±79.31	278.71±78.98*	**0.003**
UESO (ms)	245.00±95.71	238.75±78.36	230.00±53.76	264.52±89.25	0.253
KE (mJ)	1.06±1.27	0.94±0.60	0.94±0.55	0.83±0.89	0.401
Force (mN)	17.34±20.04	15.80±9.17	15.16±7.53	12.84±11.04	0.187
Mean bolus vel. (m/s)	0.27±0.13	0.27±0.08	0.27±0.08	0.25±0.10	0.510

*OR: oral residue; PR: pharyngeal residue; OSR: oropharyngeal swallow response; LVC: laryngeal vestibule closure; UESO: upper esophageal sphincter opening; KE: kinetic energy. * p<0.05; ** p>0.01; **** p>0.0001 vs. liquid viscosity.*

Table 2. Effect of saliva on viscosity measured with a rotational viscometer at a shear rate of 50 s^{-1}.

	Control sample (N=9)	Sample + saliva (N=9)	p-value
Nectar (mPA·s)	342.15±83.02	446.40±134.24	0.062
Honey (mPA·s)	880.44±65.42	935.84±75.60	0.115
Pudding (mPA·s)	2031.43±211.55	1984.97±227.26	0.659

Patients and Methods: We studied 35 older patients with OD. Therapeutic effect of FCT was assessed with videofluoroscopy (VFS) using the Penetration-Aspiration Scale (PAS) for 5 and 20 mL boluses at 4 levels of viscosity at a shear rate of 50 s-1 (thin liquid < 50mPas nectar 342.15 ± 83.02mPas honey 880.44 ± 65.42mPas; spoon-thick 2031.43 ± 211.55 mPas). The effect of α-amylase on each level of viscosity was assessed by a rotational viscometer (HAAKE™ Viscotester™ 550) after 30 s oral incubation of 15 mL bolus in each patient.
Results: Mean age was 82.6 ± 7.6y. a) Therapeutic effect: FCT strongly improved safety of swallow (PAS ≤ 2) from 42.9% in liquid viscosity to 97.1% in pudding viscosity ($p < 0.0001$) reduced PAS from 2.69 ± 2.32 to 1 ± 0 ($p < 0.0001$) and did not increase pharyngeal residue (51.43% vs. 57.14% ns) (Table 1). b) Mechanism of action: At nectar and honey viscosities FCT did not affect laryngeal vestibule closure (LVC) time; at spoon-thick LVC time decreased ($p < 0.05$). Mean bolus velocity remained stable across the tested viscosities (0.27 ± 0.13 m/s-0.25 ± 0.10 m/s ns). c) The viscosity of the thickener was not affected by the salivary α-amylase of older patients at any of the viscosity levels (Table 2).
Conclusions: Increasing bolus viscosity with FCT has a strong therapeutic effect in older patients with OD by improving the safety of swallow without increasing pharyngeal residue and by being resistant to salivary amylase two advantages versus starch thickeners.

THE EFFECTIVENESS OF THE CHIN TUCK MANOEUVRE IN ADULT ACQUIRED DYSPHAGIA

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Introduction: Chin tuck is a broadly used compensatory strategy in dysphagia employed primarily to promote swallow safety. The evidence base regarding this intervention appears limited however and a review of the evidence for this technique is warranted.

Methods: A systematic review was carried out in accordance with PRISMA guidelines on papers examining chin tuck in adult dysphagic populations (excluding patients with swallowing disorders resulting from head and neck cancer) published between 2001 and 2017. Bias was assessed using the Cochrane Risk of Bias Tool and study quality appraised via the McMaster quality assessment tool. A data extraction framework was developed based on the PICO framework with outcomes centred on penetration/aspiration bolus transport and functional impact.
Results: Nine papers were included in the final analysis of which seven were deemed to have a high risk of bias. The overall quality of included studies was poor. Two studies reported inconclusive findings with the remaining studies reporting that the effectiveness of chin tuck was variable and dependent on issues such as severity and population.
Conclusions: The evidence for the chin tuck manoeuvre is not robust has been under explored and on the whole is based on studies of low quality. Further research is required to support its continued and specified use.

SEVERE DYSPHAGIA IN A PATIENT WITH MTOCHONDRIAL DISEASE: A CASE REPORT

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Introduction: The primary source of ATP is the mitochondrion and because mitochondria are the main source of energy production in mammalian cells clinical features typically involve tissues with the highest energy requirements. In certain mitochondrial myopathies the patients present with dysphagia owing to the primary involvement of the pharyngeal constrictor muscles but also with weakness for the oropharyngeal musculature. As other neuromuscular disorders solid foods seem to cause more problems than liquids. It is very common to prescribe thickened drinks which will aggravate dysphagia in mitochondrial patients and will take more energy to consume.
Aim: To describe a clinical case of severe oropharyngeal dysphagia (OD) in a mitochondrial myopathy. Methods: One patient presenting severe OD due to a mitochondrial myopathy and literature review.
Results: 75-year-old male previously diagnosed with a mitochondrial myopathy admitted at the hospital with nosocomial pneumonia and partial respiratory failure. At admission the patient was on a total per os diet with no swallowing complaints. After a clinical swallowing assessment the patient presented: reduced posterior lingual movement cough after swallowing with the possibility of pharyngeal residue and wet voice before and after swallowing. Instrumental assessment (FEES) was preformed which confirmed the clinical findings: changes in pharyngeal constriction and reduced mobility of the base of the tongue with silent aspiration after swallow (FOIS 1 and DOSS 1). Traditional motor and sensory swallowing therapy was performed and after 3 months the patient presented FOIS 4 and DOSS 4. With the continuation of traditional swallowing therapy the patient evolved to FOIS 6 and DOSS 6.
Conclusions: In this clinical case traditional swallowing therapy was efficient and 9 months after it was suspended the patient maintains a safe and effective swallowing which shows the efficacy of the selected approach.

*"DECISION-MAKING MEANS TO ME…I CAN DECIDE…WHAT I EAT": EXPLORING EXPERIENCES OF DECISION-MAKING IN ADULTS WITH CEREBRAL PALSY AND DYSPHAGIA- AN INTERPRETATIVE PHENOMENOLOGICAL ANALYSIS

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Introduction: There is a paucity of research into the meal-time experiences of adults with cerebral palsy (CP) who have dysphagia a condition impacting on their underlying health and their dignity self-esteem and quality of relationships with family and carers (Kaatzke-McDonald 2003). It also impacts negatively on social opportunities and meal-time pleasures (Ekberg et al. 2002).
Aims: Explore experiences of meal-time decision-making of adults with both CP and dysphagia and understand key values which empower or limit autonomy. Draw conclusions on the findings to support clinical practice and service-providers.
Methods: In this qualitative research methodology Interpretative Phenomenological Analysis (IPA) was employed. A semi-structured interview was used for data collection. The four recruited participants were over 30 years and had CP had a swallow assessment by SLT in past two years (Level III-IV on the Eating Drinking Ability Classification System (EDACS) (Sellers et al. 2013) and communicated (using any mode) with competence at conversational level.
Findings: Seven superordinate themes emerged from the data: Self-identity Responsibility Autonomy Loss Coping Dependence and Risk. In line with IPA verbatim extracts will be used to support the themes.
Conclusions: IPA encourages a 'less is more' approach utilising fewer participants to ensure its premise of in-depth analysis is embraced. The researcher suspects the possibility of an experience of exclusion—or limited autonomy—for the adult relating to true decision-making power. The adult with CP may require additional time and consideration to ensure their autonomy in decision-making for their meal-times is respected. The concept of choosing to not adhere to dysphagia recommendations may suggest non-compliance when in fact it may be a fully informed decision. Understanding this may enhance the duality of roles between the SLT and the adult with CP in their dysphagia management.

EFFECTIVITY OF PHONOAUDIOLOGICAL THERAPY IN POST-EXTUBATION DYSPHAGIA: CLINICAL AND ELECTROMYOGRAPHIC FINDINGS

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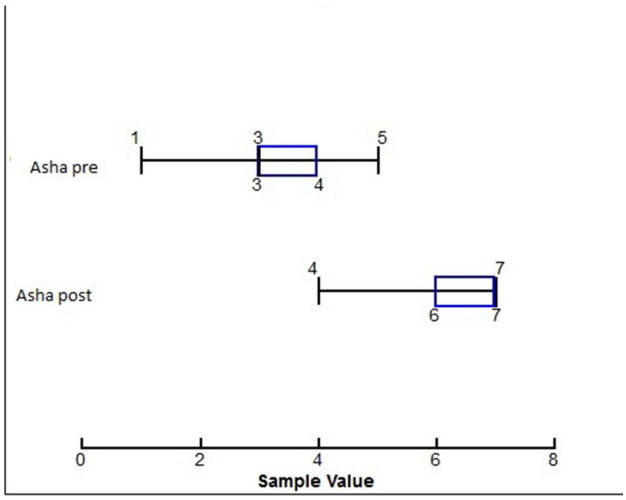
Introduction: The objective was to assess therapy effect of the swallowing function in patients extubated after prolonged mechanical ventilation considering the findings in clinical and electromyographic evaluations.



Materials and Methods: A interventional prospective type of study was carried out in a public hospital. It was approved by the ethics committee (n° 107/2013). Fifteen patients participated (age average of 486 ± 165 years) five of them women and ten men. Inclusion criteria: ≥ 48 h of orotracheal intubation tracheotomy absence Glasgow scale (1974) of ≥ 14 haemodynamic and respiratory stability. The study comprised three phases: (1) Clinical evaluation and surface electromyography (sEMG) of swallowing with employment of the Phonoaudiological Protocol for Dysphagia Risk Evaluation (2007) swallowing level determination ASHA NOMS (1998) and sEMG with the use of a four-channel Miotool appliance during the following tasks: maximum voluntary isometric contraction of the masseter and suprahyoid muscles; swallowing of saliva; swallowing of liquid (5 mL); and swallowing of pudding (5 mL). (2) Employment of the swallowing rehabilitation programme muscular training during five consecutive days two sessions/day. In the first two days it was performed the swallowing exercise with superimposed effort and in the last three days the swallowing exercise with superimposed effort and Mendelsohn maneuver. (3) Reevaluation after treatment. The Wilcoxon test paired with level of significance of 5% was used.

EMGs	Pre	Post	P.value	Sig
M1	43.39	60.44	0.3303	ns
M2	37.66	81.34	0.4543	ns
SH3	32.46	56.09	0.0067	*
SH4	37.56	65.02	0.0215	*
DS1	19.61	22.48	0.0256	*
DS2	18.67	32.70	0.0043	*
DS3	29.48	53.10	0.0413	*
DS4	36.77	50.15	0.0413	*
DL1	13.30	20.05	0.2524	ns
DL2	10.60	19.93	0.0413	*
DL3	39.90	70.35	0.0479	*
DL4	39.64	56.44	0.0215	*
DP1	20.29	17.20	0.7615	ns
DP2	15.28	23.16	0.0833	ns
DP3	33.95	49.52	0.1688	ns
DP4	37.13	52.09	0.1514	ns

Results: Results of ASHA NOMS scale and sEMG in pre and post-therapy of swallowing are described in Fig. 1 and Table 1 respectively.

Conclusions: The execution of swallowing exercises in patients extubated after prolonged mechanical ventilation evaluated in this study resulted in an increase of neuromuscular recruitment of muscles involved in the swallowing process in addition to reduced dysphagia level of the participants in the current research.

IMPACT OF A DEVICE OF CUSTOMIZABLE AND FLEXIBLE TRANSPORTABLE SEATED POSITIONING ON SWALLOWING DISORDERS (DATP-DEG)

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Positioning adaptations in terms of positioning of the head are recognized as fundamental in the management of swallowing disorders (SD). To reduce the cervical constraints and supply supports stabilizing the cervical position a global positioning adapted of the body is a required meadow. A device customizable and flexible positioning seated transportable (DTAP) to place on a standard seat was finalized and its profit on SD is to be validated. The aim of this work is to compare the the patients outcomes reported in a population of SD benefiting from a DTAP with regard to a SD population by not benefiting after 1 month of management. It is a comparative clinical trial randomized by superiority in 2 parallel groups. The arm without DTAP will benefit as the arm DTAP of an educational session but will have no device to support the positioning correction to be applied during the period following the session. Assessment criteria are the scores of the several domains of the Dysphagia handicap index (DHI) the measures of the seated adaptation positioning control and the satisfaction to a technical help. 30 patients were included in each arm : 39 men and 21 women. The average age is of 62 years (min 30 max 82). The aetiologies of the SD are varied. 26 patient ended the protcole in the arm with DATP 28 in the arm without DATP. A significant difference is highlighted in favour of the arm with DATP for the score of the physical domain of the DHI (difference averages of 2.08/1.03 $p = 0.02$) and the positioning measures (difference averages 13/0 $p < 0.001$). The questionnaire of satisfaction with regard to the device is very satisfactory. In conclusion the device of customizable and flexible positioning seated transportable (DTAP) worked out improves the seated positioning with an impact on SD symptoms. This will be verify by the analysis of swallowing videofluoroscopy outcomes.

USEFULNESS OF THE IDDSI FLOW TEST AS A MEASURE OF LIQUID CONSISTENCY

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Purpose: The simplicity of the flow test proposed by the International Dysphagia Diet Standardization Initiative (IDDSI) for the categorization of thickened liquids is appealing. The current research sought to compare the results of the novel IDDSI flow test to the results of the established line spread test (LST) for the caterogization of hand thickened infant formulas into therapeutic categories.
Methods: Nine commonly prescribed ready to feed infant formulas from two major U.S. distributors were thickened with three commercially available thickening agents to nectar (mildly thick) and honey (moderately thick) consistencies following the manufacturer's instructions for thickening. Each formula at nectar (mildly thick) and honey (moderately thick) consistencies was assessed with the LST and IDDSI flow test following the published instructions. Results of the two measure were compared to determine what if any relationship exists between the two measures.
Results: Utilizing the bivariate Pearson correlation technique there was a significant negative realtionship between LST and IDDSI flow test measures when measuring nectar (mildly thick) $r = -0.737$ ($p < 0.01$) and honey (moderately thick) $r = -0.427$ ($p < 0.01$) consistencies.
Conclusion: The LST is an established reliable tool for categorizing liquids into therapeutic categories; however it requires large volumes of test liquids and equipment that is not readily available in many settings. The IDDSI flow test and the LST results have a strong correlation when measuring nectar (midlly thick) liquids and a moderate correlation when measuring honey (moderately thick) liquids. The authors suggest clinicians adopt the IDDSI flow test into their clinical practice as a way of verifying liquid consistency when thickening infant formula.

*IMPROVEMENT OF OROPHARYNGEAL DYSPHAGIA WITH COLD AND GAZ LIQUID: AN ANIMAL STUDY

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Background: One aspect of rehabilitation in swallowing disorders is to change liquid properties. The objective of our study was to test how liquid properties could improve oropharyngeal dysphagia and swallowing and ventilation coordination in an animal model.
Materials and Methods: Forty-two healthy male rats were distributed in 6 groups including a control group. Rats were deprived of water for 24 h and then each group was administered different liquid properties: tap water sugar water sparkling water salt water cold water and acidic water. Rats were studied without and with oropharyngeal dysphagia achieved by unilateral section of the hypoglossal nerve. Swallowing and ventilation were analyzed by barometric plethysmograph.
Results: In the control group of healthy rats without oropharyngeal dysphagia swallowing occurred during expiratory time for all liquid properties. Most deglutitions were during expiratory time for all liquid properties ($88 \pm 12\%$) and were not modified. Regarding ventilation inspiratory time expiratory time respiratory rate during swallowing and tidal volume did not provide significant results in the different groups. There was an increase inVT/TI during swallowing with sparkling water and cold water ($p < 0.05$). In the operated groups rats ingested lesser amounts of salt water (4.5 ± 1.6 ml; $p < 0.05$) and acidic water (4.7 ± 0.9 ml; $p < 0.05$) compared to tap water. Compared to the control group of healthy rats operated rats had significantly fewer swallows with tap water ($p < 0.05$) and significantly more swallows with sparkling water ($p < 0.001$) sugar water ($p < 0.001$) and cold water ($P < 0.001$) during expiratory time. As in the control group of healthy rats inspiratory and expiratory time respiratory rate and tidal volume during swallowing did not provide significant results. Nevertheless the mean inspiratory volume (VT/TI) increased with sparkling water ($p < 0.05$).
Conclusion: liquids properties could improve oropharyngeal dysphagia.

Session 09 Poster session 2.8: Dysphagia in stroke and brain damage II

POST STROKE DYSPHAGIA: ASSOCIATION BETWEEN RATING SCALES OF FUNCTIONALITY AND SEVERITY

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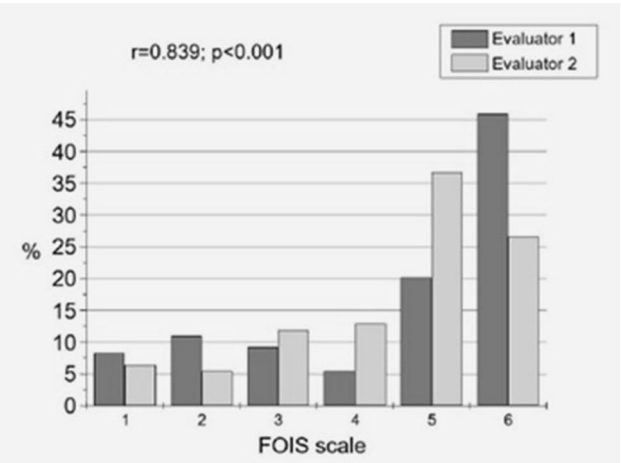
Introduction: Oropharyngeal dysphagia is a clinically detectable symptom in about 50% of patients in acute post stroke. The classify scales of oropharyngeal dysphagia impairment degree are instruments used within the diagnosis process of this symptom in clinical and objective assessments of swallowing disorders to assist in the identification of risk classification of dysfunction or as an instrument for defining conduct and/or as a parameter to control the effectiveness of rehabilitation. Considering the prevalence and incidence of swallowing disorders and Comorbidities post stroke this study search to investigate the association between the results of functionality scales and dysphagia severity determined from videofluoroscopy exams in post-stroke patients.



Caption: FOIS scale - evaluator 1 vs evaluator 2; r = Spearman's correlation coefficient; P = p-value; FOIS: Functional Oral Intake Scale

Graph 1. Correlations among scores FOIS scale and between evaluators

Material and Methods: This is a retrospective study of 109 video fluoroscopy of swallowing exams' analysis of post-stroke patients (56 male and 53 female). All of them were evaluated by severity scale and swallowing functionality in a blinded way. Approved by Ethical Committee in Research under the number 927.637.

Results: Through the independent analysis of the deglutition dynamics two evaluators established the levels of deglutition functionality by using the FOIS scale classification which is formed by seven levels of classification and there was significant difference among all the scores of the scales of both evaluators ($p < 0001$; $r = 0839$) (Fig. 1). It was observed a high number of discrete dysphagia. In one third of dysphagic patients was noticed the presence of tracheal aspiration. There was a significant association between the scores of DOSS and FOIS scales in post-stroke patients that is the highest score in DOSS scale will be the highest score found in FOIS scale.

Conclusions: There is an association between DOSS and FOIS scales and can be used as evaluative benchmarks and in the management of clinical speech therapy intervention. The association between the ranges of functionality and severity in addition to being used in a manner complementary to instruments of assessment can also be aggregated as the supporting of the progression or regression of dysphagia.

*CORTICOBULBAR TRACT AND DYSPHAGIA AFTER MIDDLE CEREBRAL ARTERY INFARCTION: DIFFUSION TENSOR TRACTOGRAPHY STUDY

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Introduction: The aim of our diffusion tensor tractography study was to determine whether the corticobulbar (CBT) is structurally affected by middle cerebral artery (MCA) infarction.

Material and Methods: Seventeen dysphagia patients after unilateral MCA infarction were enrolled. Videofluoroscopic swallowing study (VFSS) findings performed within two months of stroke were reviewed and severity of dysphagia was classified according to the dysphagia outcome and severity scale (DOSS). Probabilistic tractography was performed using FSL's ProbtrackX program. Fiber tracking parameters were as follows; number of samples 5000; curvature threshold 0.1 (cosine 84°); step length 0.5 mm. The two regions of interest (ROIs) were placed over cortex and brainstem to reconstruct the CBT. The seed ROI was located on the lip and tongue representing area corresponding to Homunculus from axial slices. The way ROI was located where the corticobulbar/corticospinal tract lies at mid-pontine level. Tract volume was calculated by multiplying the voxel volume by the number of traced voxels during fiber tracking with robust minimum intensity 3. Affected vs. unaffected CBT volume were compared to explore the role of CBT on poststroke dysphagia.

Results: Demographic characteristics were as follows; mean age 65.6 ± 12.5 years; time to VFSS 22.7 ± 15.5 days time to DTI acqusition 32.9 ± 17.1 days mean DOSS 4.2 ± 1.8. The volume of affected CBT was smaller than those of unaffected one (affected vs.unaffected 2774 ± 3839 vs 8029 ± 6090 mm3 $p = 0.005$).

Conclusions: The CBT was accosicated with poststroke dysphagia in patient with MCA infarction.

CORRELATION BETWEEN LOCATION OF CEREBRAL INFARCTION AND FEATURES OF VIDEOFLUOROSCOPIC SWALLOWING STUDY

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Introduction: Dysphagia affects up to half of stroke patients and increases the risk of pneumonia and mortalities. The patterns of dysphagia verified by videofluoroscopic swallowing study (VFSS) may differ according to the location of cerebral infarction. The purpose of this study was to investigate whether the pattern of swallowing difficulty verified in VFSS was associated with the location of the infarction in stroke patients.

Material and Methods: Ninety-two patients with dysphagia (admitted from January 2015 to August 2016) who had first onset cerebral infarction as diagnosed with magnetic resonance imaging were included in this study. All subjects were evaluated by VFSS within 6 months after stroke. Location of the stroke was classified

into three groups: unilateral brainstem (n = 29) left hemisphere (cortex + white matter) (n = 37) and right hemisphere (cortex + white matter) (n = 26). The characteristics of VFSS were analyzed retrospectively by one blinded researcher. Seven indicators in VFSS were analyzed: (1) oral transit time (OTT); (2) triggering of pharyngeal swallowing (TPS); (3) presence of residue in the vallecular and pyriform sinus; (4) penetration; (5) aspiration; (6)cough reaction; (7) upper esophageal sphincter (UES) opening. The characteristics of dysphagia in different infarction sites through the three groups were compared using two classifications Chi square test.
Results: There was no significant differences between the three groups in OTT ($\chi 2 = 0.062$ P = 0.970) TPS ($\chi^2 = 1.985$ P = 0.371) and cough reaction ($\chi^2 = 2.270$ P = 0.230). The unilateral brainstem group showed more residue in the vallecular and pyriform sinus than left hemisphere group ($\chi^2 = 6.934$; P = 0.008). Penetration and aspiration were more frequently found in unilateral brainstem group ($\chi^2 = 9.742$; P = 0.002). The unilateral brainstem group was more likely to has the UES opening insufficiently than left hemisphere group ($\chi^2 = 23.316$; $P < 0.001$) and right hemisphere group ($\chi 2 = 20.875$; $P < 0.001$).
Conclusions: The different VFSS manifestations between unilateral brain stem and unilateral cerebral hemisphere dysphagia mainly exist in the pharyngeal stage characterized by the residue in the vallecular and pyriform sinus penetration aspiration and the degree of UES opening.

VIDEOFLUOROSCOPIC EVALUATION OF SWALLOWING IN INDIVIDUALS WITHOUT DIETARY RESTRICTION THREE MONTHS AFTER A STROKE

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Ribeirão Preto Medical School, Brazil

Introduction: One of the most common neurological causes of swallowing difficulties (dysphagia) is ischemic cerebrovascular disease (stroke). After stroke dysphagia has the tendency to decrease in intensity; however it is possible that an alteration on swallowing persist for a long time even in patients with recovery of the swallowing function. The hypothesis of this investigation was that even without a restriction in oral ingestion of liquid paste and solid foods patients could still have some swallowing alteration. The objective was to evaluate the swallowing of a group of individuals who had a stroke three months before and had no dietary restriction.
Material and Method: Videofluoroscopic evaluation of swallowing was performed on 33 patients with previous stroke (mean age: 61.5 years) who were able to ingest liquid paste and solid foods three months after infarction and 19 healthy individuals (mean age: 59.9 years). They swallowed in duplicate and in random sequence 5 mL and 10 mL of liquid and paste boluses and a solid bolus. Measured was the duration of oral preparation oral transit pharyngeal transit transit through the upper esophageal sphincter laryngeal elevation hyoid bone movement and oral-pharyngeal transit.
Results: There were no differences between the groups except for the oral preparatory duration for 5 mL liquid bolus with a longer oral preparation in patients [1148(846)ms mean(SD)] than in healthy volunteers [789(469)ms p = 0.02] and an almost significant result for solid bolus [patients: 20068(10150)ms volunteers: 15274(6192)ms p = 0.06].
Conclusion: Patients without food restriction three months after stroke have no important swallowing differences compared with volunteers except the possibility of longer oral preparation duration.

ROLE OF THE VIDEOFLUOROSCOPY IN THE MANAGEMENT OF STROKE PATIENTS WITH DYSPHAGIA

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Introduction: This study aimed to evaluate the role of the videofluoroscopy (VFS) in the management of stroke patients with dysphagia and especially in the selection of the type of feeding (oral artificial or mixed).
Material and Methods: Videofluoroscopic swallowing study was performed with personal protocol. Studies started with nectar viscosity and boluses were increasing from 2 to 6 mL. Once patients completed the series without aspiration at VFS they performed series of increasing difficulty (pudding and liquid viscosity). If the patient presented aspiration the series was interrupted. We prospectively assembled an inception cohort of 80 patients with dysphagia post first stroke. Patients were divided according to the side and type of lesion and type of feeding (oral nasogastric tube -NT- and percutaneous endoscopic gastrostomy -PEG-).
Results: VFS identified aspiration in 41% of patients. Aspirations were observed in 34% of patients with oral diet in 67% with PEG and in 43% with NT. Aspiration pneumonia occurred in 15% of patients who returned to a free diet according to negative bedside tests. 79% of patients completed the liquid series without VFS aspiration with 73% tested higher volumes. Independent predictors of aspiration were age > 70 years male sex dysarthria chest infection penetration and pharyngeal residue.
Conclusions: Clinical swallow screen could not detect silent aspiration estimated in 32% of patients. VFS is useful in determining which swallowing therapy to perform and what type of diet to prescribe. VFS is indicated when suspecting presence of inhalation before beginning oral feeding or in order to continue with rout enteral feeding.

ELECTROACUPUNCTURE COMBINED WITH PHARYNGEAL ACUPOINTS QUICK NEEDLE INSERTION TREATMENGT FOR DYSPHAGIA CAUSED BY STROKE: A CASE REPORT

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Introduction: This report introduces the clinical efficacy of electroacupuncture combined with pharyngeal acupoint quick needle insertion in the treatment of a patient with dysphagia after stroke.
Methods: A 70 years old male was admitted to the hospital on March 20th 2017. Chief complaint: Drinking cough dysphagia and dysarthria for 1 month. Diagnosis: cerebral infarction bulboparalysis. The patient's swallowing function was V grade assessed by Kando drinking water test. VFSS (meglumine diatrizoate 5 ml) showed a decrease in hyoid bone movement a mount of contrast agent remained in the piriform recess. Treatment: Cluster acupuncture on scalp-point for 2 h electroacupuncture treatment for 30 min on the napex

acupoints quick needle insertion on the pharyngeal acupoints patient was treated once a day 6 times per week lasting for 6 weeks.

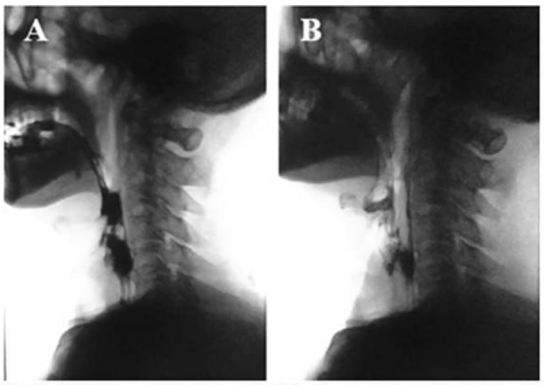

Fig1 The VFSS results before and after the treatment (A: Before, B: After)

Results: After treatment the patient's swallowing function improved significantly drink and eat normally. The patient's swallowing function was I grade. VFSS showed an increase in hyoid bone movement cricopharyngeal disorder improved significantly most of the contrast agent can smoothly enter into the esophagus only a small amount left in the piriform recess patient's symptom of dysphagia were healed clinically.

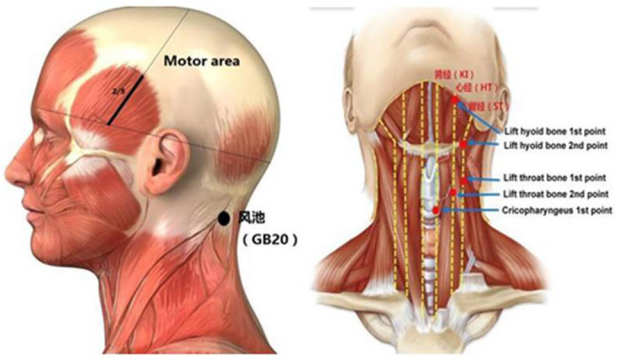

Fig2 Acupuncture points

Conclusions: Electroacupuncture combined with pharyngeal acupoint quick needle insertion treatment can improve the mobility of hyoid throat and the recovery of the cricopharyngeus achalasia therefore promote the recovery of swallowing function in patients with dysphagia after stroke.

INFLUENCE OF DYSPHAGIA IN THE REHABILITATION PROCESS OF STROKE PATIENTS

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Introduction: Stroke is considered an important health concern given the burden of the disease in our society and currently in developed countries is the third leading death causes. One of a consequence of this health problem is the dysphagia. This symptom can develop complications such as: malnutrition dehydration and respiratory infections. Diagnosis and detection of this symptom can be performed by several screening methods and instrumental techniques. The aim of this study is to verify if there are differences in the rehabilitation process of stroke patients with/without dysphagia.

Material/Methods: Conducted as a descriptive study that includes all stroke inpatients within a Brain Injury Rehabilitation Unit (BIRU) between April 2012 and June of 2015.

Results: The final sample consisted of 146 patients with a mean age of 57.36 ± 12.93 years in the case of patients with dysphagia and 55.06 ± 11.73 years in the group of patients who did not have it. Concerning the presence of dysphagia we observe that 40 patients was diagnosed with dysphagia at admission process. After carry on the volume-viscosity swallow test (V-VST) 22 new cases were diagnosed with dysphagia determining a rate of under-diagnosis of 65%. The final prevalence of dysphagia was observed in 66(45.2%) patients. Of the patients with dysphagia it can be observed that 53(56.4%) have a total dependence 11 a severe dependence and 2 a moderate dependence showing a statistically significant relation between the presence of dysphagia and the degree of functional dependence. Regarding the length of stay (LOS) a difference of over 30 days can be observed between of patients with dysphagia and without dysphagia.

Conclusion: Dysphagia in stroke patients can influence the rehabilitation process of them. There is a statistically significant relation between the cognitive status degree of dependence and dysphagia. Furthermore LOS in the BIRU of patients with dysphagia is higher than patients without it.

A STUDY OF SWALLOWING WITH STROKE PATIENTS USING 3D DYNAMIC COMPUTED TOMOGRAPHY: TONGUE AND SOFT PALATE KINEMATICS

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Introduction: The tongue and soft palate movements were examined by VF in some previous studies but VF study is 2 dimensions visualized. MRI and US study is limited by depiction method and resolution. Three dimensions dynamic 320-row area detector computed tomography (320-ADCT) imaging overcomes the limitations of another's in assessing. We can see the tongue groove in the oral stage of swallowing with healthy subjects using 320-ADCT. Although dysfunction of the tongue and soft palate with stroke patients is a well-known its kinematics is not fully understood. This study aimed to analyze the kinematics of tongue and soft palate movements in swallowing with stroke patients.

Methods: 12 stroke patients (supratentorial lesion 5 infratentorial lesion 7 age 62 ± 12 years.) participated in this study. We performed 320-ADCT scanning and created images in order to evaluate of morphologic and kinematic analysis of swallowing in 45-degree reclining position. 3D images were created at an interval of 0.10 s (10 frames/s). The qualitative parameter measured were: (a) coordination (b) laterality and (C)forms. The quantitative parameter measured

were: (1) timing of critical events (2) tongue groove size and (3) tongue-palate seal position.
Results: Comparing supratentorial lesion group infratentorial lesion group showed laterality of the tongue and soft palate movements. Both groups delayed the initiation of swallowing reflex after tongue-palate seal off. The depth of the tongue groove of infratentorial group was not significantly shorter than that of supratenroial group. (P = 0.08)
Discussion: Three-dimensional analysis enabled the visualization of tongue and soft palate movements during swallowing with stroke patients. We thought that bilaterally innervation of cranial nerves may effect the laterality of infratentorial lesion compared to supratentorial lesion. Further study kinetic analysis is necessary to more cases analysis.

Session 09 Poster session 2.9: Physiology and neurophysiology II

*AGING CHANGES BRAIN NETWORKS DURING SWALLOWING: GENERAL LINEAR MODEL AND INDEPENDENT COMPONENT ANALYSIS

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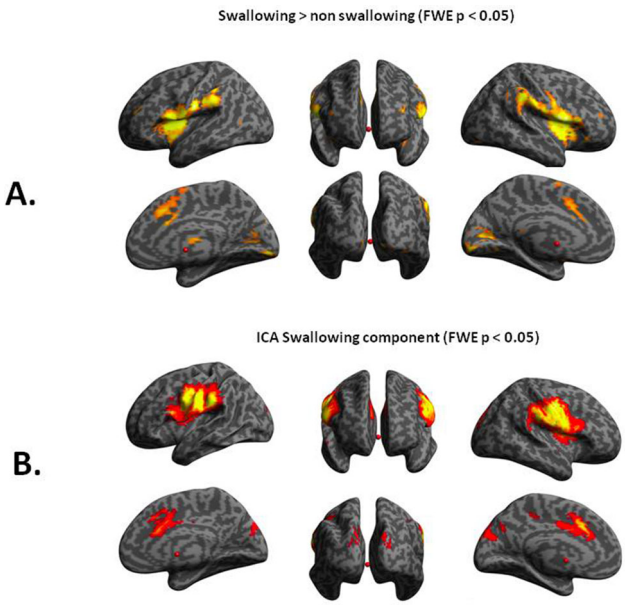
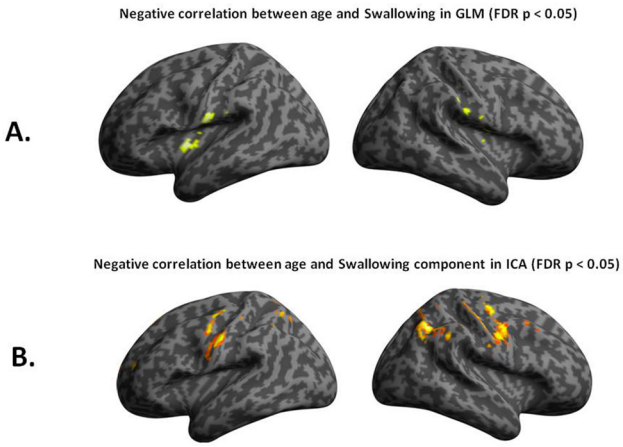
Introduction: Understanding the functional networks of swallowing in the course of aging is essential when diagnosing and treating older adults with swallowing difficulties. We aimed to separate the neural activated regions related with swallowing and discriminate the neural networks related with normal aging.



Material and Methods: Forty-six healthy individuals (45.7 ± 18.37 years range 19 ~ 73 years) were examined with fMRI during voluntary saliva swallowing. fMRIs were obtained with echo planar imaging sequence. General linear model (GLM) and spatial independent component analysis (ICA) were performed using SPM and GIFT toolbox separately. Group ICA for each of the 46 subjects decomposed individual fMRI data into 26 components using the Infomax algorithm. Then 26 components of 46 subjects were correlated with age and task paradigm.



Results: In GLM analyses the significant BOLD activations were shown in bilateral inferior pericentral gyri supramarginal gyri anterior insular cortices pre-SMA and visual cortices (Figure 1). Twelve independent components (ICs) were positively correlated with swallowing task. Correlation analyses between ICs of all subjects and age revealed negative correlations in the areas of both precentral gyri anterior cingulated cortex (IC 12) putamen (IC 15) and cerebellum (IC 18) (FDR $p < 0.05$). Correlation analyses with age showed decreased BOLD signal in inferior peri-central gyri and anterior insular cortices in GLM and ICA analyses (FDR $p < 0.05$) (Figure 2).
Conclusions: The BOLD signals during swallowing were dominantly decreased in inferior peri-central gyri and anterior insular cortices according to aging process. These brain areas can be primarily considered for target area of non-invasive stimulation such as rTMS to facilitate swallowing function in elderly people.
Acknowledgement: This work was supported by the National Research Foundation of Korea (NRF) funded by the Korea government (No. 2016R1A2B4009206).

VISCOSITY IN THE DIET OF PATIENTS DIAGNOSED WITH OROPHARYNGEAL DYSPHAGIA

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Introduction: This research is part of a PhD thesis on food safety in patients suffering from dysphagia. Data have been collected from 402 hospitalized patients referred to speech therapy by the doctor responsible of the hospital ward.

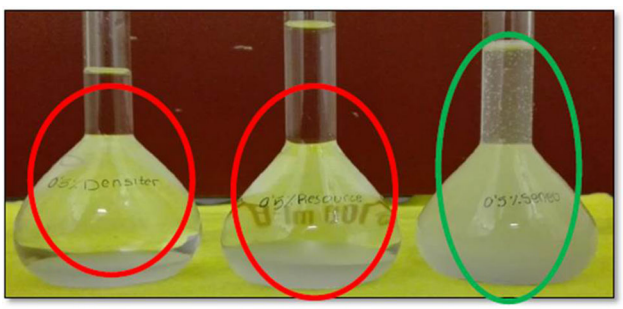
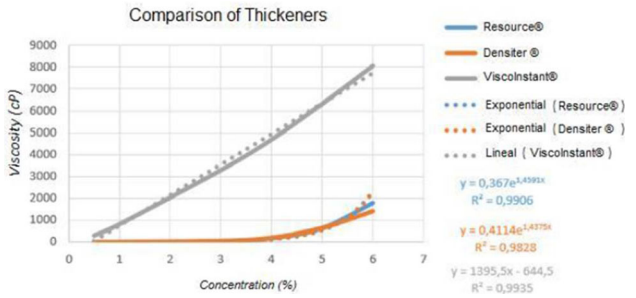


Figure 1: Samples at 0.5% of the Resource®, Densiter® and ViscoInstant®

Materials and Methods: The behavior of three thickeners two of them based on starch Resource® and Densiter® were determined. The third ViscoInstant® consisting of a mixture of maltodextrin xanthan gum and guar gum was facilitated by Smoothfood Spain. The used samples showed a volume of 650 ml and were prepared in triplicate expressing the concentration of thickener in % as (0.5, 1, 2, 3, 4, 5, 6%). At the moment of preparing the dissolution the thickener was slowly poured at the vortex of the solvent in order to avoid the formation of lumps while it was shaken at 25 °C until obtaining an apparently homogeneous suspension. In this way we tried to simulate the conditions that the health professionals work. The viscosity of the 0.5 and 1% concentrations of the Resource® and Densiter® thickeners was determined with a Cannon–Fenske 520 viscometer while all other determinations were performed with a Brookfield RTV 31196 rotational viscometer. In the case of the Cannon–Fenske viscometer it was imposed as a restrictive criterion that the difference between two consecutive measurements of the same sample did not exceed one second. Otherwise the measure was repeated.

Table 1: Viscosity values of the three thickeners (*Resource® Densite ®* ViscoInstant®) and the corresponding equations adjusted by least squares.



Results: Confirm that the so-called second-range thickeners mainly composed of gums (xanthan guar…) are safer from a health point of view than the first range consisting mainly of starch modified or not. Significant differences have been observed in relation to the resting time of the sample and the amount of thickener to be applied in order to obtain the deserved viscosity: liquid nectar honey or pudding.

Table 2. Comparison of consistencies of the different thickeners (*Densite ®, Resource®,* ViscoInstant®) at different concentrations

	Densiter ®		Resource®		ViscoInstant®	
Consistency	0h	24h	0h	24h	0h	24h
Liquid	0,5%-3%	0,5%-3%	0,5%-3%	0,5%-3%	-	-
Nectar	4%	4%	4%	3%	0,5%	0,5%
Honey	5%-6%	5%	5%	5%	1%	1%
Pudding	6%	6%	6%	6%	3%-6%	3%-6%

Conclusions: Given the results obtained in laboratory it is recommended the use of second-range thickeners.

NEUROPLASTICITY ACROSS THE LIFESPAN: IMPLICATIONS FOR DYSPHAGIA MANAGEMENT

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Neuroplasticity has a significant impact on the brain's ability to acquire new information adapt to a rapidly changing environment and recover from injury. Investigation into the role of neuroplasticity in swallow function has begun to emerge in the current literature. This presentation will discuss how neuroplasticity affects learning across the lifespan and how to take advantage of the brain's plastic nature in clinical practice when working with dysphagia. Understanding the effect of neural changes in relation to the function of the swallowing mechanism will allow clinicians to take advance of the brain's plastic nature to develop efficient rehabilitative strategies for swallowing disorders and assist in predicting recovery following brain injury (Martin 2009; Rajappa & Malandraki 2016). This presentation will discuss current research evidence that outline the biological process of neuroplasticity with a focus on how to implement these neuroprotective concepts into treatment of feeding/swallowing disorders across the lifespan. Studies exploring the most effective timing for intervention principles of neuroplasticity as well as those investigating impact of intensity and frequency of intervention will be discussed to assist with implementation of evidence-based assessment and treatment approaches.

A STUDY ON MASSETER SUPRAHYOID AND INFRAHYOID MUSCLE ACTIVITIES DURING SWALLOWING OF VARIOUS FOODS

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Introduction: Mastication and swallowing movements are achieved with complexly coordinated muscle movements of various organs. However there have been few studies describing activities of the muscles involved in swallowing before and after the occurrence of swallowing pressure by tongue movement. The aim of this study is to investigate activities of the muscles related to mastication and swallowing related muscles in healthy adults.
Materials and Method: Participants in this study were 15 healthy adults without stomatognathic and swallowing problems. They were asked to chew and swallow three types of test foods: 6 g of steamed rice 3 g of jelly and 5 cc of water. Electromyographic activities (EMG) were recorded on the masseter suprahyoid and infrahyoid muscles using surface electrodes.
Results: Foods requiring more mastication had more preceding muscle activity in the suprahyoid muscles than in the infrahyoid muscles following masseter activity. The activity of the suprahyoid muscles and infrahyoid muscles synchronized in water and three patterns were observed: subsequent masseter activity; synchronized activities of the three muscles; and synchronized activities of the suprahyoid muscles and infrahyoid muscles following the masseter activities.
Conclusion: These results suggest that tongue movements at the end of mastication could be involved in the judgment and recognition of whether the amount and physical properties of foods are swallowable or not.

EXPLORING THE ROLE OF INTRA-OPERATIVE LARYNGEAL MONITORING (IOLM) IN PREDICTING THE DEVELOPMENT OF POST-OPERATIVE DYSPHAGIA FOLLOWING ANTERIOR-CERVICAL SPINAL SURGERY (ACS)

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Introduction: Damage to the recurrent laryngeal nerve (RLN) is a common neurological complication following elective ACS with associated dysphagia. The association between IOLM & post-operative dysphagia is not currently known. It is postulated that employing IOLM may identify intra-operative changes to RLN conduction leading to dysphagia. A retrospective review of all monitored patients between 2013 and 2016 was carried out to determine if there was an association between IOLM events and post-operative dysphagia.

	Dysphagia	No dysphagia	Total
Free-run EMG activity	13	8	21
No free-run EMG activity	8	29	37
Total	21	37	**58**

Material/Methods: During anterior cervical surgery as part of routine neurophysiology service a surface electrode is placed on the endotracheal tube and introduced into the larynx during intubation. Spontaneous EMG activity (free run) is recorded via this electrode & considered a significant event. Post-operative referrals were made to the speech and language therapy team (SLT) for suspected dysphagia. Patients were assessed at bedside using FEES where indicated. The FOIS (Functional Oral Intake Scale) rating scale was used to categorise dysphagia severity and association with signal output from IOLM.
Results: A total of 58 elective ACS patients had IOLM during this time period. Of the 21 referrals to SLT 14 were male. Ages ranged from 18 to 86 years. Dysphagia was diagnosed in 21 patients with 13 demonstrating free-run EMG activity of which 69% scored levels 1–3 (FOIS). A Fishers Exact test shows a two-tailed P value = 0.0040 which suggests a highly significant association between RLN EMG activity and dysphagia.
Conclusion: Our study indicates that IOLM has the potential to determine post-ACS dysphagia in elective patients. It can provide real-time information and potentially minimise RLN injury and development of dysphagia through surgical adjustments & prompt early referral to SLT. A prospective longitudinal study is planned to look at surgical modifications that may prevent dysphagia and to determine recovery.

ANALYSIS OF RELATIONSHIP BETWEEN ORAL CHANGES AND ALTERNATIONS IN MASTICATION/SWALLOWING PATTERNS OF RATS USING 3D VIDEOFLUOROSCOPIC TECHNIQUE

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Introduction: It is considered that tooth loss and its sensory deprivation affect oral behavior during oral stage swallowing. However it remains unclear if and how dental implants can restore these oral functions. Therefore we used a rat model of tooth loss and dental implant and analyzed a 3D kinematic recording of the mandibles and the tongue to evaluate the pattern of mastication and swallowing cycles and tongue movement during unconstrained feeding.
Material and Methods: Sprague–Dawley rats were chronically implanted with 0.5 mm tantalum beads into the skull mandibles and tongue to analyze 3D kinematics during unconstrained feeding of radiopaque BaSO4 infused kibbles using a high-speed biplanar videofluoroscopy (XROMM). Kinematic was recorded at three stages: Baseline after tooth extraction and after dental implant replacement.
Results: Oral environmental changes resulted in differences in behaviors. Power spectrum analysis showed shift in peak frequencies of tongue displacement and tongue shape kinematics and they were statistically different (t test $p < 0.001$) and tongue shape dynamics was much faster than individual mandible and tongue markers. At baseline the durations of chew gape cycles and those of swallowing were statistically different (t-test p = 9.7759e-4). We compared the baseline and 3 days after the extraction and there was no statistical difference in chew cycle durations there was a significant increase in swallowing cycles duration on day 3 compared to baseline (t-test p = 2.8741e-4). Although the durations of chew cycles did not change gape phase transition patterns changed from the baseline to day 3.
Conclusions: We have shown that oral environmental changes resulted in the pattern of chewing and swallowing cycles and tongue movement during natural feeding. We are in the process of characterizing daily progressions of observed changes and when those changes are plateaued.

INFLUENCE OF THE INCREASE IN FOOD VOLUME PER MOUTHFUL ON CHEWING AND SWALLOWING ACTIVITIES

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Introduction: Although there have been studies focusing on the activities in infra- and supra hyoid muscles during swallowing the time course and orders of onsets in those muscles still remain unclear. This study aimed to elucidate the effect of increase in the volume of food per mouthful on masticatory and swallowing activities according to the difference in the food.
Material and Method: Nine healthy participants (5 men and 4 women average age 31 years old) participated in this study. Bread and steamed rice were selected as test foods. Weights of each test food were measured before and after each participant had his/her first bite and then difference in the weights was calculated and defined as the individual volume of food per mouthful (single mouthful). The single mouthful multiplied by 2 to define the double amount of single mouthful (double mouthful). Each participant was asked to chew and then swallow the single and double mouthfuls of the test foods. The muscle activities in the masseter muscles supra- and infrahyoid muscles were recorded from the onset of mastication until swallowing as well as the number of chewing cycles and swallowing movements.
Results: The number of both chewing cycles and swallowing movements for the double mouthful were significantly higher than the single mouthful in both test foods. The time difference between the onset of the infrahyiod muscle activity and that of the suprahyoid

muscle activity significantly increased for the double mouthful for rice compared with the single mouthful whereas a significant change was not observed for bread.
Conclusion: The increase in the amount of food per mouthful caused the increase in the number of chewing and swallowing for both of bread and rice and furthermore induced the delay of the onset of infrahyoid muscle activity during swallowing of rice. These findings suggest that the amount of bread per mouthful should be determined with caution for patients with swallowing disorder.

MODULATION OF INITIATION OF SWALLOWING EVOKED BY CONTINUOUS LARYNGEAL STIMULATION IN ANESTHETIZED RATS

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[1]Division of Dysphagia Rehabilitation Niigata University Graduate School of Medical and Dental, Japan

Introduction: Patients with long-term use of tracheostomy tube or those suffering from chronic gastroesophageal reflux disease have difficulty in swallowing. We speculate that those symptoms may possibly be caused by impaired pharyngolaryngeal sensation following the long-term mechanical or chemical stimulation to upper airways. The aim of this study was to investigate the effect of continuous laryngeal stimulation on initiation of swallowing in anesthetized rats.
Materials and Methods: Experiments were carried out on sixteen Sprague–Dawley male rats anesthetized with urethane (1.3 g/kg). To identify a swallow electromyographic activity was recorded from the left side of suprahyoid and thyrohyoid muscles. In this study we examined time-dependent changes in swallowing initiation during continuous mechanical or chemical stimulation applied to the laryngeal mucosa. As a mechanical conditioning stimulation airflow (40 ml/sec) was applied from extrathoracic trachea to larynx. As a chemical conditioning stimulation capsaicin (10–5 M) or hydrochloric acid (0.1 N) was continuously applied to the larynx at a rate of 0.5 μl/sec. The number of swallows in each 10 min was counted over 60 min. In addition before and after conditioning stimulation the von Frey filament and capsaicin (10–5 M 5 μl) were applied to the larynx if the swallowing was evoked.
Results: The number of swallows during airflow capsaicin and hydrochloric acid conditioning stimulation was gradually reduced in a time-dependent manner. After conditioning stimulation the swallowing threshold increased in both models.
Conclusion: These results suggest that continuous mechanical or chemical laryngeal stimulation may cause impairment of swallowing initiation.

Session 09 Poster session 2.10: Professional roles in dysphagia management

THE PARALLEL SWALLOW DISORDER CLINIC: A COLLABORATIVE APPROACH BETWEEN ENT AND SPEECH LANGUAGE THERAPY (SLT) TO IMPROVE PATIENT EXPERIENCE AND OUTCOMES

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Introduction: The "one stop" Swallow Disorder Clinic offers a quality holistic patient centred approach to the MDT management of swallowing disorders with shared leadership in a cost effective and evidence based framework.
Materials and Methodology: Retrospective analysis of referrals to ENT at Conquest Hospital was conducted for an 8 month period. These patients were not referred to SLT. 57 patients were identified and their pathway mapped. Total length of pathway was 24 weeks with limited outcomes identified. A one stop parallel clinic was developed redesigning the pathway with SLTs leading the process alongside ENT.
Results: Waiting times reduced from 24 weeks to 5 weeks. Handoffs reduced from 5 to 1 improving flow and streamlining processes. Referrals for barium swallow reduced from 100% to 0% improving patient safety reducing unnecessary radiation. Video feedback improved patient understanding and management of their condition. High levels of patient satisfaction were reported with 88% of patients finding their appointment very helpful and VAS scores improving 6.4 points for ability to cope pre clinic and managing dysphagia post clinic.
Conclusion: This "One stop" approach maximises clinical resources and provides patients with single pathway demonstrating how a collaborative approach between ENT improves the patient pathway outcomes and experience. This model won a national advancing healthcare award for prudently advancing practice in April 2017 and has been shortlisted as a finalist in Zenith Global Awards.

DYSPHAGIA MANAGEMENT IN DUTCH INTENSIVE CARE UNITS: A NATIONWIDE SURVEY

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Introduction: Dysphagia is a common problem in the intensive care unit (ICU). However no national guidelines on dysphagia prevention screening and management exist for ICU patients. We performed a national survey to learn what strategies are being used in Dutch ICUs.

Table 1: screening modalities			
	Always	Sometimes	Never
Water swallow test	88%	9%	3%
Methylene blue aspiration test	12%	27%	61%
Cervical auscultation	4%	12%	84%
VFSS	0%	25%	75%
FEES	1%	60%	39%

Methods: A survey was developed based on current literature and experts' opinions. It comprised questions regarding demographics awareness of dysphagia and current practise. It was sent to all 90 non-paediatric ICUs in The Netherlands.

Table 2: aspiration prevention and swallow training			
	Always	Sometimes	Never
Postural adjustments during meals	82%	16%	1%
Dietary texture modifications	60%	39%	1%
Specialized eating accessories	39%	49%	12%
Cuff deflation during meals	15%	57%	28%
Gastric tube feeding	33%	58%	9%
Oral anticholinergics	1%	42%	57%
Transdermal anticholinergics	0%	55%	45%
Bedside swallowing exercised	51%	45%	4%
Neuromuscular electrical stimulation	0%	6%	94%
sEMG biofeedback	0%	10%	90%

Results: 67 ICUs (74%) replied to our survey. A median relevance score of 4 (IQR 4–5) out of 5 was given to the topic of dysphagia. In 22% of ICUs patients were always screened for dysphagia after extubation in 45% of ICUs screening was always performed after tracheotomy. The water swallow test was always part of the work-up in 88% of ICUs. Fiberoptic endoscopic evaluation of swallowing (FEES) was the gold standard in 60% of ICUs versus videofluoroscopic swallowing study (VFSS) in 25%. In 49% of ICUs no standardized active rehabilitation protocol for dysphagia existed. In the remaining 51% swallowing exercises supervised by the speech language pathologist were part of standard rehabilitation occasionally supplemented by electrical stimulation or sEMG biofeedback training in 6 and 10% respectively.
Conclusions: despite dysphagia being considered relevant most Dutch ICUs do not regularly screen for dysphagia after extubation or tracheotomy and almost half do not have a treatment or rehabilitation protocol. The diagnostic tests and therapies used vary between hospitals. A screening and treatment algorithm based on an evidence-based guideline could provide more standardized approach to this problem.

THE BELIEFS AND PRACTICES OF SPEECH AND LANGUAGE THERAPISTS REGARDING QUALITY OF LIFE ISSUES IN DYSPHAGIA MANAGEMENT – AN INTERNATIONAL SURVEY

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Introduction: Considering the extensive impact that living with dysphagia may have on health and well-being the aim of the current study is to explore the knowledge experience and practices of Speech and Language Therapists internationally when considering quality of life issues in dysphagia management.
Materials and Methods: An anonymous cross-sectional non-experimental survey design was used in this study. A 30 question online survey was disseminated through international gatekeepers using Survey Monkey. Participants were recruited using snowball sampling and consisted of Speech and Language Therapists working globally with adults with acquired dysphagia.
Results: 223 Speech and Language Therapists responded to the survey. There was strong agreement (> 80%) across the participants with regards the definition of quality of life and the significant impact that dysphagia can have on health and well-being. However less than 30% were satisfied with the amount of clinical time they spend managing quality of life issues in their dysphagia caseload. A number of barriers to managing and supporting quality of life issues were highlighted including a lack of population specific assessment tools a lack of understanding and awareness amongst multidisciplinary team colleagues and limited time and resources. Less than 10% of participants felt that quality of life in dysphagia was covered sufficiently during their professional training degree with only 37% reporting that they feel confident practising in this clinical area.
Conclusions: Speech and Language Therapists internationally believe that the management of quality of life is an important feature when working with persons with acquired dysphagia. However it is felt that a lack of clinical resources time and specific training limit the effectiveness of intervention in this clinical area.

SELECTION OF FOOD CONSISTENCY AND TEMPERATURE FOR DYSPHAGIC PATIENTS

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Introduction: The care and guidance of dysphagic patients includes the selection of foods to be used in therapy and recommended for daily diet. For such conduct the Speech-Language Pathologist must consider the characteristics of foods and their influence on the physiology of swallowing with emphasis on consistency and temperature.
Methods: The data was collected through the application of an online questionnaire with speech therapists from all over Brazil regardless of the area of action investigating temperature and consistency used by professionals during the food supply for dysphagic patients. In the matter concerning the temperature the options involved warm room temperature cold and also an option of which the temperature does not interfere in the security of the offer. In matters of consistency the options included thin liquid thickened liquid and pasty puree.
Results: 1056 questionnaires were answered. In the issue that reports the temperature can be observed that 42.07% report that the ideal temperature would be the room temperature followed by 25.93% cold 21.38% warm and 10.62% report that the temperature does not interfere with safety of food supply. Regarding consistency it was observed that 71.29% reported that the safest consistency would be pasty puree followed by 25.74% thickened liquid and 2.96% thin liquid.
Conclusion: In relation to the food consistency considered safe there was great predominance in the pasty consistency while the thin liquid is considered less safe. For the relation of the temperature of the food offered the highlighted option was "at room temperature". It is necessary to conduct research in order to detail the influence of consistency and temperature on the physiology of swallowing.

PUREED DIET FOR DYSPHAGIA: PATIENT PERSPECTIVE

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Introduction: Diet modification is the one module for dysphagia management. In Thailand nutritionist divided dysphagia diet into 5 steps; (1) thick puree-no liquid (2) thick and thin puree and thick liquid (3) mechanical soft-thick liquid (4) mechanical soft diet (5) regular diet. For the first step most hospital use yogurt thick congee

and mashed banana. As there is less options in dysphagia diet the patient loss of appetite due to eating the same food repeatedly. Therefore new recipe of pureed diet was developed in Srinagarind hospital as patient requested.

Item	Congee	Pork steak (pureed diet)
Energy (kcal)	170.93	399.9
Carbohydrate (g)	14.12	6.75
Fat (g)	6.49	10.44
Protein (g)	14.01	69.65
Protein-Animal (g)	12.94	67.5
Protein-Vegetable (g)	1.07	2.15
Calcium (mg)	21.5	50.01
Iron (mg)	2.04	4.4
Iron-Animal (mg)	1.85	3.6
Iron-Vegetable (mg)	0.19	0.8
Vitamin A (RE)	184	62.58
Thiamin (mg)	0.49	4.1
Riboflavin (mg)	0.41	1.15
Vitamin C (mg)	0	74
Niacin (mg)	1.84	14.55

Material and Methods: Two types of pureed food; thick congee and pork steak which processed as dysphagia pureed were served in separation meal. Satisfaction of the participant which included taste appearance and easy to swallow was evaluated afterward.
Results: The pork steak was rated in higher score than congee in all aspects. Nutrition facts per serving for each diet as follow table. < TABLE 01>
Conclusions: Although the participants preferred to eat pork steak carbohydrate level did not reach reference daily intake. To improve nutrition the health professional should concern not only the appropriate diet level but also the taste varieties and nutrition of food.

THE SPEECH AND LANGUAGE THERAPIST'S ROLE IN THE MANAGEMENT OF DYSPHAGIA AND MEALTIME DIFFICULTIES IN DEMENTIA: A PROPOSED DELPHI CONSENSUS STUDY

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Dementia causes gradual changes and decline in swallowing as well as mealtime skills. The growing prevalence of people with dementia is increasing pressure on speech and language therapy services to deliver effective and person-centred dysphagia care in the context of scarce resources and a limited evidence base. The importance of supporting people with dementia at mealtimes is increasingly being recognised as a complex multidimensional interdisciplinary issue. While dysphagia management is a priority issue due to the associated negative sequelae clinical consensus of the most appropriate management strategies is lacking. This leads to variation in service management across settings. Delphi survey techniques are increasingly being used in healthcare research to establish clinical consensus based on expert opinion and an iterative process that facilitates discussion. This research proposes using a Delphi methodology to establish guidelines for best practice for speech and language therapists managing dementia-related mealtime difficulties and dysphagia. Based on the findings of three qualitive studies with key stakeholders—dementia carers speech and language therapists and multidisciplinary team members—a set of consensus statements will be generated for dissemination to a panel of speech and language therapy and dementia experts for their comment and rating. The methodology will involve a three-round process with between round feedback to the panel. It is expected that this process will generate guidelines for assessment and management of dementia-related mealtime difficulties and dysphagia as well as proposals for the training of carers. Adequate access to speech and language therapy services is essential for the quality of life of people with dementia. An established consensus of practice will benefit the profession to advocate for services. These guidelines may also serve as a guide to direct future research into supporting people with dementia.

Session 13 Poster session 3.1: Screening and clinical assessment III

*RESPONSIVENESS OF THE EAT-10 IN DYSPHAGIC HNC-PATIENTS AFTER (C)RT

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Introduction: The EAT-10 is a widely used dysphagia questionnaire designed to measure patient-perceived functional health status (FHS). This study used Classical Test Theory (CTT) to evaluate the psychometric properties of the EAT-10 at different time points in a single cohort of 105 head-and-neck cancer (HNC) patients treated with (chemo) radiotherapy.
Methods: All patients completed the EAT-10 four times: (I) in the first two weeks of RT (II) in the final week of RT (III) two weeks post-RT and (IV) at discharge from SLP services. Data was compared to their oral intake status as determined by the FOIS (Functional Oral Intake Scale).
Results: At all data-points the EAT-10 had a strong negative correlation with the FOIS (− 0.805 − 0.797 − 0.809 and − 0.687). Fisher's-Z transformation found no statistically significant correlation coefficient differences between data-points I II and III however there was a significant difference in correlation between these three data-points and data-point IV ($p = 0.027$; $p = 0.039$ and $p = 0.022$ resp.). Factor analysis revealed the presence of one underlying construct at all four data-points. Reliability of the questionnaire was determined using Cronbach's α and was found to be 0.964 0.947 0.950 and 0.955. Analysis suggested that reliability would improve if Question 9 was removed from the questionnaire at data-point I resulting in a Cronbach's α of 0.966. At data-points II and III removal of Questions 1 and Question 9 would result in an increase of Cronbach's α (0.954 and 0.960). At data point IV removal of Question 1 would result in an increased Cronbach's α (0.962).
Conclusion: The use of CTT in the same sample of patients suggests the existence of different redundant items on the EAT-10 at different time-points and questions the responsiveness of the EAT-10 to clinical changes. Therefore it is recommended not to use the EAT-10 as a sole outcome measurement tool to assess FHS in HNC-patients with dysphagia.

Session 13 Poster session 3.1: Screening and clinical assessment III

THE MALNUTRITION UNIVERSAL SCREENING TOOL (MUST) IDENTIFIES NUTRITIONAL AND CLINICAL OUTCOME IN STROKE PATIENTS

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Introduction: Malnutrition is commonly seen in patients after a stroke. In addition malnutrition is associated with poor clinical outcome in these people (1 2) with a prevalence that varies widely from 6.1 to 62% (3). This study aimed to establish the true prevalence of malnutrition is among patients after stroke and whether the malnutrition universal screening tool (MUST) can be used as an independent predictor of clinical outcome in stroke victims.
Method: This is a retrospective observational cohort study using patients' records who have been admitted to stroke unit at a large teaching hospital in the North West of England and who have had MUST as part of routine care from January 2013 to March 2016. The cohort data utilised information obtained from the Sentinel Stroke National Audit Programme (SSNAP).
Results: Of 1101 patients 51% were women the mean age of 73.6 years and 88.7% had an ischemic stroke. Of these while the majority of patients (78.5%) had no risk of malnutrition 17.3% had high risk and 4.1% had medium risk. Additionally the association between risk of malnutrition and clinical outcomes was both significant and proportional (i.e. the greater the risk of malnutrition the higher the possibility of poorer outcomes). For those who had greater risk of malnutrition (high vs. medium) their hospital stay was longer ($P \leq 0.023$ vs. $P \leq 0.033$). In the high risk group mortality was higher both within the hospital admission ($P < 0.001$) and at 6 months follow-up ($P < 0.001$) and infections more prevalent ($P < 0.001$).
Conclusion: Malnutrition is prevalent in the stroke population. Furthermore the application of the MUST as an independent predictor of clinical outcomes can be used in health care settings in acute stroke. Early identification of risk of malnutrition in stroke and provision of early nutritional interventions are likely to become an important priority for health services with potential improved clinical outcomes and resources saving.

AGREEMENT AND TEST–RETEST RELIABILITY OF THE FRENCH VERSION OF THE SYDNEY SWALLOW QUESTIONNAIRE IN YOUNG HEALTHY ADULTS

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Introduction: The Sydney Swallow Questionnaire (SSQ) is a validated questionnaire of the symptomatic severity of oropharyngeal dysphagia. It is a self-report inventory and is well accepted completed in a short time and not time consuming for the clinician in the everyday use. This study is a stage in the process of the validation of the French version of the SSQ. The purposes of this study were to evaluate the content validity agreement and the test–retest reliability in healthy subjects.
Material and Methods: The SSQ contains 17 items completed with a horizontal visual analogue scale except one question with a maximum total score of 1700. After ethical approval (2016/18MAI/215) and registration of the trial (NCT02845362) one hundred subjects were asked to fill out these questionnaires to determine content validity. Two weeks later the SSQ was repeated to evaluate the test–retest reliability. The inclusion criteria were as follows: 18 years or older and native French speaker. Exclusion criteria were diagnostic of a neuromuscular disease or another situation-altering swallowing.
Results: Ninety-nine consecutive subjects met the inclusion criteria (male/female:49/50 age:21.7 ± 2.6 years) and completed the SSQ French version (one subject with diagnosed dysphagia was excluded). Forty-six filled out the questionnaire twice. The mean SSQ total score was 77.4 ± 68.9. The content validity was good with questions-total scores correlations ranging from 0.289 to 0.703. They were all highly significant (p-value < 0.01). The test–retest reliability was evaluated on 46 healthy subjects. The ICC for SSQ total scores within 2 weeks was 0.89 (95% IC: 0.75–0.94; p-value < 0.001). The Bland and Altman method revealed a low bias between the measurement days for the SSQ total score (bias = 23; limits of agreement: − 68; + 114). The calculated cut-off score was 215.1.
Conclusions: In conclusion the French version of the SSQ is valid and reliable.

DOES STRUCTURED TRAINING IMPROVE THE RELIABILITY AND VALIDITY OF CERVICAL AUSCULTATION?

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Introduction: Cervical auscultation (CA) is an adjunct to the Clinical Swallow Examination. Previous studies have suggested that CA has poor rater-reliability however many of these studies demonstrated methodological flaws with recruited raters having variable or no training prior to study inclusion. This study investigated the impact of a structured CA course on rater reliability and validity.
Method: Forty speech pathologists with 0.5–20 years (mean = 5.67 years) dysphagia experience and no formal CA training enrolled in a university accredited course consisting of a 2 day theoretical and practical CA workshop. Nine swallow sounds (both dysphagic and non-dysphagic swallows as determined by fibreoptic endoscopic evaluation of swallowing FEES) were rated 1–2 months prior to the workshop and rated again (re-randomised order) within one month following the workshop. Swallow sounds were rated using two binary yes/no questions (1) dysphagia (2) safe and by a Likert dysphagia severity rating scale. Intra-rater agreement was calculated with percent agreement Cohen's and Weighted kappa (for categorical/ordinal data). Inter-rater agreement for the severity rating was calculated with Interclass correlation coefficient (ICC) for multiple raters with ordinal data. Sensitivity specificity and area under the Receiver Operating Characteristic (aROC) curve were calculated.
Result: Intra-rater reliability pre-course across the three questions ranged from 51 to 66% exact agreement (kappa = 0.23–0.33) and improved to 84–100% (kappa = 0.96–1.00) post course for Dysphagia Safe and Severity scales. Inter-rater reliability for dysphagia severity (ICC) improved from 0.30 to 0.60 pre to post course. Accuracy (aROC) as compared with FEES improved 84–89% pre to post course.
Conclusion: Results indicate that reliability and validity of cervical auscultation similar to instrumental dysphagia assessments improve with structured training.

*RISK FACTORS FOR DYSPHAGIA IN PATIENTS ADMITTED TO AN ICU

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Introduction: Patients who remain for a long period of time in the intensive care unit exhibit specific features that can promote the change of swallowing and the occurrence of aspirate pneumonia being orotracheal intubation and mechanical ventilation known as risk factors. Those that use invasive ventilatory support and OTI require alternative way of feeding for maintenance of nutrition and hydration. Objective: Associating the presence of dysphagia and the risk factors of MV and OTI with the patients admitted to an ICU.

Variables			Dysphagia		
		Total	Presence	Absence	p-valor
Age, in years, m ± sd		60.3 ± 16.6	61.4 ± 16.1	57.7 ± 17.4	0.258#
Gender, n(%)					0.689
	Female	52	34 (65.4)	18 (34.6)	
	Male	58	40 (69.0)	18 (31.0)	
Intubation, n(%)					>0.999*
	No	14	10 (71.4)	4 (28.6)	
	Yes	96	64 (66.7)	32 (33.3)	
Tracheostomy, n(%)					0.058#
	No	86	64 (62.8)	32 (37.2)	
	Yes	24	20 (83.3)	4 (16.7)	
Time of mechanical ventilation, in days, md (25%-75%)		7.0 (4-13.0)	9.0(4-14.5)	5.0(2-9.3)	0.024##
Feeding, n(%)					0.819
	Oral enteral tube	9	5 (55.6)	4 (44.4)	
	Oral feeding	13	8 (61.5)	5 (38.5)	
	Nasal enteral tube	72	50 (69.4)	22 (30.6)	
	Others	16	11 (68.7)	5 (31.3)	

Methods: Retrospective descriptive Study conducted by analysis of speech therapies protocols of the patients treated in an ICU between July 2012 to April 2014. This research was approved by research ethics committees of participating institutions.
Results: The sample was attended by 110 patients most forwarded with clinical pulmonary and/or neurological change with an average age of 60.3 years. It was observed that the majority of patients required OTI (87.3%) mechanical ventilation time exceeding four days on average in patients with dysphagia ($p = 0.024$) and every day a patient spent in mechanical ventilation increased by 10% the chance to introduce change of swallowing. There was significant Association ($p < 0.001$) among patients who made use of the OTI with the alternative way of feeding by nasal enteral tube (Table 1).
Conclusion: Increased time MV found in patients of this study it was found that each day increases the chance of presenting dysphagia revealing the impact of MV in swallowing. The earlier detection of dysphagia and the intervention minors the risk of worsening of the clinical condition of the patient and the greater the chances of a positive prognosis.

PORTUGUESE TRANSLATION AND CULTURAL ADAPTATION OF GUSS (THE GUGGING SWALLOWING SCREEN) SCALE

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Introduction: Dysphagia is present in 42%-67% of patients within the first three days post stroke being the incidence of aspiration in the first 5 days between 19.5%- 42%. Clinical non-instrumental evaluation plays an important role in the assessment of the dysphagic patient. GUSS seems to be an easy bedside dysphagia screen to use in acute-stroke patients. Our aim was to translate and culturally adapt the GUSS to the European Portuguese language.
Methods: Original version was translated by 3 Physical and Rehabilitation Medicine specialists (PRM) and 1 Speech and Language Therapist (SLT) bilingual and European Portuguese native speakers. A first Portuguese version was produced. This version was reviewed by these 4 translators and 1 more leading to the adaptation of some words considered inappropriate to the Portuguese reality resulting in a "first translation of consensus". A back translation was made individually by 2 bilingual professional translators English native speakers blind to the original scale. The 2 backtranslations were compared to the original English version resulting in a "second translation consensus". A group of health professionals (4 PRM/2 SLT) with experience in dysphagia analyzed this version and classified all its items in terms of clarity according to a 4-points Likert scale (Phase I). Some modifications were suggested. The new version was reanalyzed by the same group (Phase II). Data resulting from both evaluations were statistically analyzed-Content validity index (CVI) at the item level (I-CVI) and at the scale level (S-CVI) averaging calculation (S-CVA/Ave) and the universal agreement calculation method (S-CVI/UA) was calculated.
Results: All CVI values improved in Phase II (Phase I:I-CVI = 0.67–1; SCVA/Ve = 0.85;S-CVI = 0.33;Phase II:I-CVI = 1;SCVA/Ave = 1;S-CVI/UA = 0.96).
Conclusions: GUSS—European Portuguese version presented very good values of content validity. Further studies are needed to study its psychometric characteristics.

*THE ITALIAN VERSION OF FOIS (FOIS-IT): A STUDY OF CROSS CULTURAL TRANSLATION AND VALIDATION

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Introduction: Outcome measures and scales translated according to convention into other languages are important for international clinical research in dysphagia. Typically assessments and scales are directly translated from one language to another without a back

translation process or with inappropriate translation techniques. This process does not guarantee a valid translated measure which has content equivalent to the original version of the instrument. The Functional Oral Intake Scale (FOIS) is used widely in dysphagia research and clinical practice in English speaking countries. Nevertheless it is not available in Italian. The aim of this study was to translate and validate the FOIS into Italian allowing the FOIS to be available to speech-language pathologists (SLPs) and clinicians working with individuals with dysphagia in Italy.
Material and Methods: The FOIS was translated following five stages of cross-cultural adaptations described by Beaton et al. (2000). This involved (1) translation from English to Italian (2) synthesis and solution of discrepancies between translators (3) back-translation from Italian to English (4) expert revisions and (5) pre-testing. To validate the translated scale ten SLPs were recruited from three different facilities across Italy. A questionnaire containing similar information to the FOIS and the Italian versions of the FOIS (FOIS-It) were completed by SLPs on 227 people with dysphagia.
Results: Internal consistency was excellent ($\alpha = 0.99$). Inter-rater reliability calculated with two blinded SLPs completing scales on 30 patients was excellent (ICC = 0.99).
Conclusions: In conclusion the Italian version of FOIS was translated following international guidelines and validated by Italian SLPs working with individuals with dysphagia. The FOIS-It is a reliable tool to report swallowing outcomes in different health care settings in Italy.

Session 13 Poster session 3.2: Instrumental assessment and dysphagia diagnosis III

*EVALUATION OF OROPHARYNGEAL DYSPHAGIA IN POST-RADIATION PATIENTS WITH NASOPHARYNGEAL CARCINOMA USING HIGH RESOLUTION MANOMETRY

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Background: Oropharyngeal dysphagia is a common complication of radiation in patients with nasopharyngeal carcinoma(NPC) and it can degenerate over time due to post-radiation fibrosis. There's still a research gap for evaluation of oropharyngeal dysphagia among this population. The aim of this study is to explore the characteristics of oropharyngeal dysphagia among post-radiation patients with nasopharyngeal carcinoma.
Methods: 30 healthy subjects and 60 patients were recruited. Patients were divided into 2 groups(oral-feeding group and tube-feeding group) of 30 subjects. Each subjects underwent high resolution manometry and finished 3 swallows of 5 cc nectar thick liquid. Acquired parameters included UES resting pressure(URP) UES nadir pressure(UNP) UES relaxation duration(URD) velopharyngeal/hypopharyngeal peak pressure(VPP/HPP) velopharyngeal/hypopharyngeal contractile velocity(VCV/HCV) velopharygeal/hypopharyngeal pressure duration(VPD/HPD) and all results were the average value from 3 swallows.
Results: No significant differences were found in URP URD and VPD among oral-feeding NPC group and healthy group. No significant differences were found in VCV/HCV among oral-feeding NPC group and tube-feeding NPC group. Except for these significant differences were found in all the other pairwise comparison which showed an increase in UNP and decrease in URP VPP/HPP from healthy group oral-feeding group to tube-feeding group.
Conclusions: The results of this study showed that oropharyngeal dysphagia in post-radiation patients with nasopharyngeal carcinoma manifests as the gradual decrease of strength and endurance of muscles in soft palate pharynx and UES area. At the mild stage muscle endurance can compensatory the decrease of muscle strength. However underlying mechanisms targeted precaution or treatment required to be further investigated.

A STUDY OF ORAL HEALTH COMPLICATIONS AND MALNUTRITION BY DYSPHAGIC PATIENTS WHO DIED IN HOSPITAL

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Introduction: Our hospital in an acute care facility with 1014 beds. Dysphagia rehabilitation is discussed on ward rounds conducted by multidisciplinary team including a physiatrist a dentist a dental hygienist a nurse and a dietitian. Our recent studies suggested that patients who were judged to be "most severe" even once in the oral health condition had difficulty in improving the swallowing function completing the dysphagia rehabilitations and died in hospital. This study aimed to determine the oral health complications and nutrition factors predicting death in dysphagic patients.
Material and Methods: Patients with dysphagia under the care of the multidisciplinary team between April 2016 and March 2017 were retrospectively investigated by reviewing their medical records. The clinical characteristics of the patients who died in hospital were analyzed.
Results: A total of 38 patients died in hospital. The most common inflammatory diseases were respiratory (n = 13) and cardiovascular disease(n = 10). The oral health condition levels were "most severe" for the 9 patients and "severe" for the 17 patients. The most common findings of the oral health complications were xerostomia thick saliva and attached or retention of sputum. The mean serum albumin levels at the start of intervention were 2.3 ± 0.5 g/dl despite intervention only 8 patients improved the serum albumin levels.
Conclusions: The result of the present study showed that most mortalities were attributable to deterioration of general condition including oral health complications and nutritional status rather than to fatal diseases such as malignancy and severe stroke. For improvement of nutritional status aggressive oral health care intervention is important particularly xerostomia and thick saliva. Therefore it was suggested that the development of oral health care and nutrition intervention systems to enable early intervention is essential for our multidisciplinary teams.

PEDIATRIC DYSPHAGIA: SCREENING INSTRUMENT PROPOSAL

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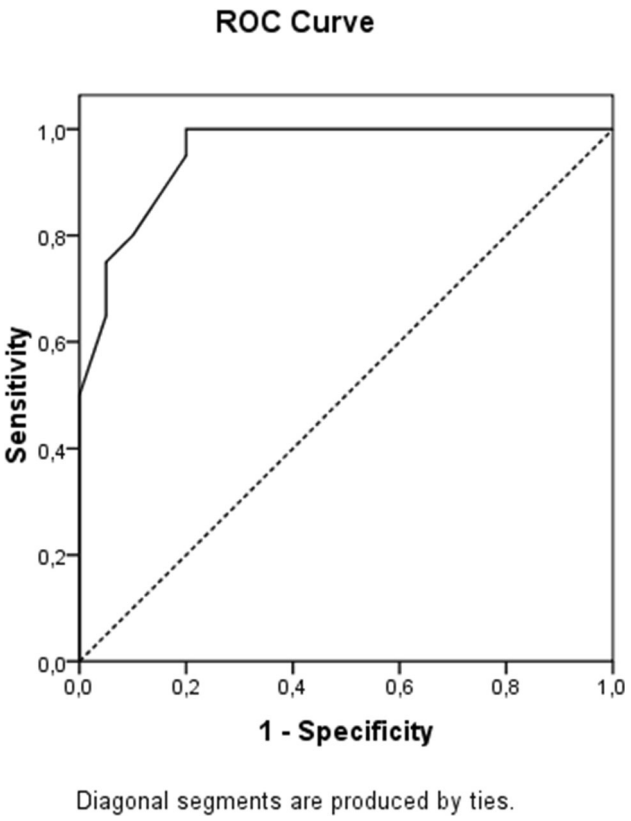
Introduction: The feeding and swallowing disorders in childhood have increased and occur in conjunction with multiple and complex

medical conditions health and development. Early identification of pediatric dysphagia helps prevent and minimize sequelae such as aspiration.
Object: Aiming at the early identification of children at risk for dysphagia we developed a screening instrument to be used in hospitals.



Materials and Methods: Research approved by the Ethical Committee of a South Brazilian Health Institution under the number 218.872. The screening instrument for risk of Pediatric Dysphagia—SIRPD consists of 23 questions to be applied to the parents/guardians of hospitalized children. This was sent to 3 judges for analysis and it was conducted a pilot study. To check the validity of the criteria the SIRPD was applied and a clinical evaluation of swallowing was performed with children through the Pediatric Dysphagia Evaluation Protocol—PDEP. Two groups were formed with dysphagia and functional swallowing and checked the association between the SIRPD and the result of the PDEP through the Chi square Pearson test or Fisher exact. The cutting point to the presence of risk for dysphagia was set by ROC curve. The reliability of the SIRPD was checked by the coefficient α of Cronbach's alpha.
Results: The sample consisted of 40 children with median age of 3.7 months. Statistically significant association was found in eight items of the instrument. The internal consistency of the SIRPD was 0.828. The cutting point to the risk of dysphagia was five points (100% sensitivity and specificity 80%) (Fig. 1).
Conclusion: Due to satisfactory results we should follow the validation process of the SIRPD. The procedures of screening instruments in swallowing have been studied to provide accuracy in identification of subjects with dysphagia or aspiration. In Pediatrics the data available in the literature are quite restricted making this a valuable study.

CERVICAL AUSCULTATION OF PRETERM DURING BREASTFEEDING

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Introduction: Breastfeeding is the most natural and safe way to feed preterm. Cervical auscultation is a noninvasive method consists in hearing the sounds of swallowing especially the pharyngeal phase and its interaction with breathing through an amplification instrument. When there is an inadequacy or incoordination of some of the functions involved in swallowing is verified speech-language therapy can provide safe and effective feeding to this population.
Object: The aim of the study was to characterize the parameters of cervical auscultation of preterm during breastfeeding.

Variables	n(%)
Behavior	
Calm	25 (92,6)
Agitated	2 (7,4)
	Md±Sd
Frequency peak (Hz)	578,7 ± 115,2
Intensity (dB)	39,3 ± 14,1
Number of swallowing	4,0 ± 1,2
Swallowing time (s)	1,5 ± 0,8

Materials and Methods: A cross-sectional observational study consisted of data collection of the preterm cervical auscultation during breastfeeding with a Littmann electronic stethoscope model 3200. The device was positioned in the cervical region of the preterm for 20 s. Noise was analyzed using DeglutiSom software. Were included preterm with gestational age—Capurro method—between 25 and 37 weeks and excluded preterm with craniofacial malformations severe asphyxia mother with HIV or other factors that make breastfeeding impossible.
Results: Twenty-seven preterm were included being 15 males. Mean gestational age were 33.3 ± 2.2. For 62.96% the prematurity was the only reason for hospitalization. The sound analysis indicated low frequency and intensity; the most was in a calm behavior during the breastfeeding (Table 1).
Conclusions: Through the characterization of cervical auscultation it can be possible to establish parameters of normality and incoordination between suction respiration and deglutition in preterm.

HOW STRONG IS STRONG ENOUGH TO CLEAR ASPIRATION?

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Introduction: Reflexive coughing (RC) is the process by which foreign material is expelled when airway invasion occurs. The strength of RC required for this process is unknown. This study objectively measures RC in response to airway invasion and determines RC strength required to expel aspirate from the airway.
Materials and Methods: Data were collected on RC and prompted voluntary coughing (VC) in response to aspiration and penetration during clinical video-fluoroscopic swallowing studies (VFSS). Cough strength was recorded in decibels with a lapel microphone placed

anterior to the tragus of the ear. Cough effectiveness defined as ejection of material from the laryngeal vestibule was determined from VFSS.
Results: Of 25 coughs in response to aspiration 15 RC and 10 VC were analysed. Of 19 coughs in response to penetration 11 RC and 8 VC were analysed. No coughs (100%) were effective in clearing aspiration. There was no significant difference in the decibel level of RC and VC to aspiration ($p = 0.10$). 74% of coughs were effective in clearing penetration and 26% were ineffective. There was no significant difference in the decibel level of RC and VC to penetration ($p = 0.41$) or between effective and ineffective coughing to penetration ($p = 0.37$).
Conclusions: RC and VC were ineffective at expelling aspirate below the level of the vocal folds. RC and VC may eject penetration but decibel levels were not sensitive for discriminating between effective or ineffective coughing. These findings question our current assumptions of the role of RC in expelling subglottic aspirate. Acoustic intensity of coughing was not a sensitive screening tool for identifying effective or ineffective clearance of aspirate.

ELECTROMYOGRAPHIC EVALUATION OF SALIVA SWALLOWING AND EFFORTFUL SALIVA SWALLOWING AFTER OROTRACHEAL INTUBATION

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Introduction: Swallowing is a complex autonomic function that may be compromised by orotracheal intubation/OTI wich may contribute to the onset and worsening of dysphagia. The objective of this study was to analyze the parameters of the electrical activity during saliva swallowing and effortful saliva swallowing after OTI in patients with and without associated neurological disease.
Materials and Methods: This study was conducted at Hospital Pompeia with the joint participation of Hospital de Clinicas de Porto Alegre. In the Experimental Group/EG were evaluated 30 subjects underwent OTI (17 with a history of associated neurological disease/EG1 and 13 with no such history/EG2). 29 subjects were selected without clinics changes for the control group/CG. The swallowing function had assessed by surface electromyography/EMG. The EMG signal was normalized and processed using the Matlab® software.
Results: EG1 and EG2 showed statistically different medians for EMG activity as compared to the CG. The median electrical activity was lower in the CG and the duration of electrical activity was longer in the EG. During the effortful saliva swallowing test EG1 showed reduced duration of the electrical activity when compared to the saliva swallowing. Statistical analysis revealed no differences between EG1 and EG2.
Conclusion: These findings allowed to infer that the use of OTI impairs the normal swallowing process. Effortful saliva swallowing reduced the duration of the EMG signal in the EG1 group improvement the swallowing.

AUTOMATIC MEASUREMENTS OF NECK FLEXION USING SMARTPHONE-BASED SWALLOWING MONITOR

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Introduction and Purpose: Postural technique is widely used for preventing aspiration in dysphagia treatment; however measuring the posture angles are not easy especially at the home health care settings. Although the inclination can be set using the chair the neck flexion is different from the chair inclination due to neck supports etc. used. We have been developing a smartphone-based neck worn swallowing monitor the Swallowscope for evaluating the swallowing ability (Fig. 1)[1]. The purpose of this study is to introduce the system of detecting neck flexion and to compare the neck flexion dynamics before during and after swallowing between the older persons and young adults.

figure 1

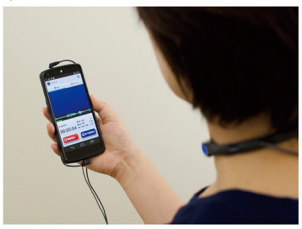
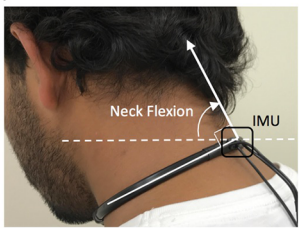


figure 2



Detection of Neck Flexion: We developed an Inertial Measurement Unit (IMU) based posture measuring system on the back of the neckband of the Swallowscope (Fig. 2).

figure 3

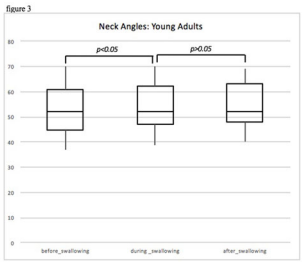


figure 4

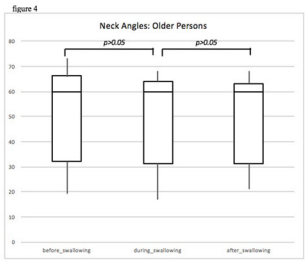


figure 5

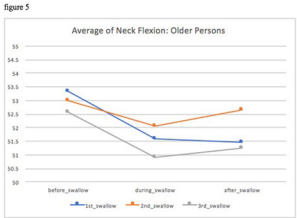
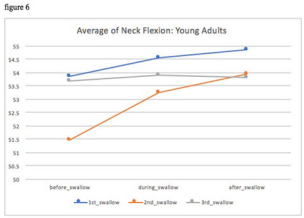


figure 6



Method: Seven older persons staying at a nursing home (84.3 ± 12.4 years old; 2 males) and 15 young adults (25.4 ± 2.9 years old; 12 males) were included in the study and none of the subjects has reported difficulties in swallowing. All the participants wore the Swallowscope and drank 10 ml of water three times using spoon.
Results: Older persons have shown a larger variation of neck flexion angle before during and after swallowing compared to young adults (Figs. 3, 4). When comparing the average swallowing angles of each swallow we could see that the older persons lowered their neck when swallowing and raise them after swallowing (Fig. 5). On the contrary the young adults are more likely to keep the neck raised (Fig. 6). The average neck flexion between these two groups is statically not same (T-test: $p > 0.05$).
Conclusion: Automatic IMU-based angle estimation can provide deep insights of dynamics of neck flexion. The device will contribute to the posture adjustment for the dysphagia patients and safe mealtime assistance.

RELATIONS BETWEEN NASOPHARYNGEAL REFLUX AND ASPIRATION

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Introduction: Nasopharyngeal reflux (NPR) is an abnormal upward flow of ingested content from pharynx to nasopharynx or nasal cavity. With a presumption that the each sequential order of NPR based on the penetration or the aspiration events would be the key to understand the mechanical pathophysiology in patients with dysphagia we made analysis.

Table 1. Basic demographic characteristics of each group.

Characteristics	Total	Group A	Group B	*P* value
Patient No.	28	14	14	
Age (yr)	50.8 (2-91)	49.6 (2-76)	52.0 (22-91)	0.76
Sex				0.02*
Male	12 (42.9)	9 (64.3)	3 (21.4)	
Female	16 (57.1)	5 (35.7)	11 (78.6)	
Pneumonia				0.46
No Pneumonia		10	13	
Aspiration Pneumonia		4	0	
Other Pneumonia		0	1	
Diagnosis				
Brain lesion				
Brain Tumor		2	4	
Cerebral infarction		2	1	
Intracranial hemorrhage		2	0	
Hypoxic brain injury		0	1	
Parkinson's disease		1	0	
Cervical cord injury		1	3	
Motor neuron disease				
Amyotrophic lateral sclerosis		3	2	
Other		2	1	
Myopathy		0	1	
Peripheral neuropathy				
Guillain-Barre syndrome		1	1	

Values are presented as mean (range) or number (%).

*; P value <0.05

Group A; Nasopharyngeal reflux before penetration or aspiration, Group B; Nasopharyngeal reflux after penetration or aspiration.

Material and Methods: By videofluoroscopic swallow study 28 patients with NPR were screened out between January 2013 and October 2015. Patients are divided into two groups; group A (NPR before penetration or aspiration) and group B (NPR after penetration or aspiration). For graded analysis we made a simple grading system of cricopharyngeal dysfunction (CPD); grade 1 (no CPD) grade 2 (material passes the upper esophageal sphincter (UES)) grade 3 (material cannot pass the UES). We also adjusted a new leveling system for NPR; level 1 (NPR at or below 1/2 height of nasopharynx) level 2 (NPR above 1/2 height of nasopharynx but not through nasal cavity) and level 3 (NPR into nasal cavity). The 8 point penetration aspiration scale was used. T test and Chi square test were used.

Table 2. Comparison the data of videofluoroscopic swallow study between group A and B.

Videofluoroscopic Swallow Study		Total (n=28)	Group A (n=14)	Group B (n=14)	*P* value
Tongue movement					
Complete		14 (50.0)	6 (42.9)	8 (57.1)	0.45
Incomplete		14 (50.0)	8 (57.1)	6 (42.9)	
Posterior spontaneous falling					
(-)		13 (46.4)	5 (35.7)	8 (57.1)	0.26
(+)		15 (53.6)	9 (64.3)	6 (42.9)	
Cricopharyngeal dysfunction					
Grade 1		10 (35.7)	5 (35.7)	5 (35.7)	0.59
Grade 2		17 (60.7)	8 (57.1)	9 (64.3)	
Grade 3		1 (3.6)	1 (7.1)	0 (0.0)	
Oropharyngeal reflux					
(-)		13 (46.4)	5 (35.7)	8 (57.1)	0.26
(+)		15 (53.6)	9 (64.3)	6 (42.9)	
Nasopharyngeal reflux level					
Level 1		19 (67.9)	6 (42.9)	13 (92.9)	0.02*
Level 2		6 (21.4)	5 (35.7)	1 (7.1)	
Level 3		3 (10.7)	3 (21.4)	0 (0.0)	
8 point penetration aspiration scale					
Material enters above vocal cord	1	0 (0.0)	0 (0.0)	0 (0.0)	0.03*
	2	5 (35.7)	2 (14.3)	3 (21.4)	
	3	9 (64.2)	8 (57.1)	1 (7.1)	
	4	3 (21.4)	0 (0.0)	3 (21.4)	
	5	0 (0.0)	0 (0.0)	0 (0.0)	
Material enters at or below vocal cord	6	0 (0.0)	0 (0.0)	0 (0.0)	
	7	3 (21.4)	2 (14.3)	1 (7.1)	
	8	8 (57.2)	2 (14.3)	6 (42.9)	

Values are presented as mean (range) or number (%).

*; P value <0.05

Grade 1; no cricopharyngeal dysfunction (CPD), Grade 2; material passes the UES despite the CPD, Grade 3; material cannot pass the UES due to CPD, Level 1; Nasopharyngeal reflux (NPR) at or below 1/2 height of nasopharynx, Level 2; NPR above 1/2 height of nasopharynx, but not through nasal cavity, Level 3; NPR into nasal cavity.

Results: Basic demographic characteristics had no difference between groups but group B had more female patients (P = 0.02) (Table 1). Tongue movement (P = 0.45) posterior spontaneous falling (P = 0.26) oropharyngeal reflux (P = 0.26) and each grade of the CPD (P = 0.59) had no significant differences. However the level of nasopharyngeal reflux was significantly higher in group A (P = 0.02). Further 8 point penetration aspiration scale also showed significant difference between two groups (P = 0.03) (Table 2).

Conclusions: By analysis of the patients with NPR females are tend to have NPR event after the penetration/aspiration event rather than before. The NPR level was higher when occurs before than after the penetration/aspiration event. The materials have a tendency to enter at or below vocal cord when the penetration/aspiration event precedes the NPR.

Session 13 Poster session 3.3: Dysphagia after HNC treatment II

*PERSISTENCE OF DYSPHAGIA XEROSTOMIA AND TASTE ALTERATION: IMPACT ON QUALITY OF LIFE FOLLOWING HEAD AND NECK CANCER TREATMENTS

B. P. M. Messing[1], E. C. W. Ward[2], C. L. L. Lazarus[3], M. K. Kim[4], J. S. Silinonte[4], D. G. Gold[4], K. H. Harrer[4], K. U. Ulmer[4], K. R. Ryniak[4], S. M. Merritt[4], X. Z. Zhou[5]

[1]GBMC, Milton J. Dance, Jr. Head & Neck Center, University of Queensland, USA; [2]University of Queensland, Centre for Functioning and Health Research, Australia; [3]Mount Sinai Beth, Israel, THANC Functional Outcomes Research Center, USA; [4]GBMC, Milton J. Dance, Jr. Head and Neck Center, USA; [5]Johns Hopkins, USA

Introduction: HNC treatment results in numerous toxicities affecting function and potentially quality of life. This study examined the presence and pattern of resolution of treatment toxicities influencing quality of life outcomes up to 24 months post-HNC treatment.
Materials and Methods: Forty-eight participants who had received curative non-surgical treatment comprised of combined chemotherapy and hyperfractionated radiation therapy were followed prospectively. The EORTC QLQ-C30 and EORTC QLQ-H&N35 were administered to all participants (baseline and at 3 6 12 24 months post treatment). The QLQ-C30 includes five functional scales three symptom scales a global health status/quality of life (QoL) scale and six single items. The QLQ-H&N35 assesses pain swallowing senses (taste and smell) speech social eating social contact and sexuality.
Results: Global health/QoL and toxicities from each timepoint were compared to baseline using generalized estimating equations (GEE). Global health/QoL was significantly improved at 12 and 24 months. Across the symptom/items measured by the QLQ-C30 and QLQ-HN35 participants reported difficulties at baseline and 3 months with improvements at 12 and 24 months post-treatment. There were some factors that were problematic (remained or worsened) and were predominately related to swallowing taste and saliva issues. Patients with persistent swallowing related issues at 24 months did not demonstrate significantly reduced global health/QoL.
Conclusions: Overall patients' perceptions of the impact of cancer-related treatment toxicities improved over time to 24 months with positive changes in global quality of life. However despite resolution of many treatment-related toxicities over half of the group had persistent issues swallowing solids taste dry mouth and sticky saliva. This research highlighted the importance of following patients long-term post-treatment to monitor functional swallowing issues was highlighted by t

DEGLUTITION DISORDERS AS A CONSEQUENCE OF CANCER THERAPIES: A SYSTEMATIC REVIEW AND META-ANALYSIS

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[1]University of Brasilia, Brazil; [2]Federal University of Santa Catarina, Brazil

Objective: The study aims to estimate the frequency of deglutition disorders in patients pre and post-treatment for head and neck cancer.
Methods: Search strategies were developed for the following databases: PubMed LILACS Scopus Web of Science LIVIVO and SpeechBITE. Additionally a search of the grey literature was performed through Google Scholar Open Grey and ProQuest. Only studies that were prospective cohorts that performed evaluation of deglutition before and after cancer treatment were included in this systematic review. The studies had to use diagnostic exams for deglutition disorders as videofluoroscopy swallowing exam Fiber-optic endoscopic evaluation of swallowing modified barium swallow or Videofluorographic swallow study. The Critical Appraisal Checklist for Studies Reporting Prevalence Data from the Joanna Briggs Institute was used to assess the risk of bias of the included studies. A proportion of fixed or random effects meta-analysis using the MedCalc Statistical Software version 14.8.1 (MedCalc Software Ostend Belgium) were conducted.
Results: Sixteen studies met the eligibility criteria and were included. In all of the studies an assessment of the deglutition was performed previous and up to 12 months after receiving treatment for the cancer. Aspiration previous to the cancer treatment had a frequency of 11.17% (standard deviation (SD) 8.62 to 14.17%; n = 517) between 1 to 6 months after treatment this increased to 26.70% (SD 18.84 to 35.38%; n = 478) and up to 12 months after there was a decrease to 17.99% (SD 12.37 to 24.83%; n = 153). Penetration tongue impairment reduced larynx elevation and others were also more frequent in the 1 to 6 months' period after the treatment for the head and neck cancer.
Conclusion: The frequency of deglutition disorders and its complications as aspiration in patients with head and neck cancer appears to be higher in the immediate to 6 months post-treatment period.

VOICE AND SWALLOWING AFTER TOTAL LARYNGECTOMY

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[1]University Hospital, Lund University, Sweden

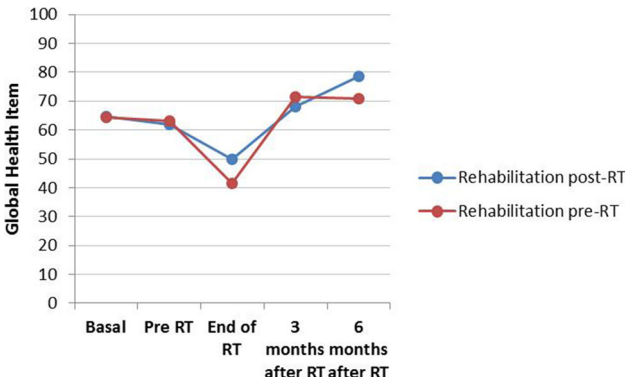
Introduction: Voice and swallowing problems are often seen in patients with advanced larynx cancer after total laryngectomy (TL) and chemo/radiotherapy. The aim of this study was to determine the occurrence of voice and swallowing problems in patients who have been laryngectomized and investigate if these symptoms were related to age time after TL radiotherapy and TNM-classification. In addition we studied how often the patients changed their voice prostheses and the need of therapeutic interventions after TL.
Methods: 45 patients were included in the study and completed the Swedish version of the Sydney Swallow Questionnaire and the Voice Handicap Index-Throat.
Results: Swallowing problems were reported by 89% of the patients and moderate to severe voice handicap was reported by 66%. Most of the subjects who had dysphagia also presented voice problems ($rs = 0.67$ $p < 0.01$). Additional therapeutic interventions to manage problems with voice and/or swallowing after TL were required in 62% of the patients.
Conclusions: Swallowing and voice problems after TL are common. Thus the preoperative information and assessment of these functions as well as the treatment and the postoperative rehabilitation should be evaluated and optimised to provide better functional results after treatment of advanced larynx cancer.

*IMPACT OF PROPHYLACTIC SWALLOWING REHABILITATION IN PATIENTS UNDERGOING HEAD AND NECK CANCER RADIOTHERAPY: A RANDOMIZED CLINICAL TRIAL. REDYOR TRIAL—PRELIMINARY RESULTS

N. Bofill[1], A. Guillén-Solà[2], J. Martínez-Orfila[2], S. Nieto[2], C. Barrera[2], O. Pera[2], P. Foro[2]

[1]Hospital de Tortosa Verge de la Cinat, Spain; [2]Parc de Salut Mar, Spain

Introduction: Current diagnostic and radiotherapeutic protocols try to preserve the essential organs in swallowing for patients with head and neck cancer though dysphagia and poor quality of life are likely to appear.



Materials and Methods: Prospective single-blind randomized controlled trial is carried out in Head and Neck Cancer patients. Two arms of rehabilitation treatment: before and after the beginning of radiotherapy intervention. Patients are evaluated: at diagnosis previously to RT at the end of radiotherapy and 3–6 months after RT. Main outcomes are functional outcomes: maximum inspiratory pressure maximum expiratory pressure tongue strength mouth opening; and besides the Penetration-Aspiration Scale (PAS-Videofluoroscopic study) and Global heath item of European Organization for Research and Treatment of Cancer test.

Results: A preliminary analysis is performed to determine if there is difference between groups at each follow-up. At previous to RT it is observed significant differences between groups in mouth opening (49.33 ± 8.9 in the post-RT group and 51.85 ± 6.17 in the pre-RT group) and in maximum expiratory pressure (66.21 ± 16.60 in the post-RT group and 82.38 ± 23.57 in the pre-RT group). At end of RT it is slightly observed significant differences between groups in strength tongue (41.77 ± 7.80 in the post-RT group and 50.38 ± 11.26 in the pre-RT group). No other significant differences are observed between groups.

Conclusions: Patients starting rehabilitation before radiotherapy get better results in some functional items until end of radiotherapy. In the follow-up after the end of radiotherapy a trend towards improvement in maximum inspiratory pressure maximum expiratory pressure strength tongue and PAS in the post-RT group are observed. In Global health item there is a similar behavior in both groups. Further studies are needed to evaluate the impact of prophylactic swallowing rehabilitation in the follow-up of HNC.

EAT-10 SCORES AND FIBEROPTIC ENDOSCOPIC EVALUATION OF SWALLOWING FINDINGS IN HEAD AND NECK CANCER PATIENTS

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Introduction: The Eating Assessment Tool (EAT)-10 has been studied in head and neck cancer (HNC) patients by Arrese et al. [1] AT-10 scores were significantly higher in HNC patients with unsafe swallowing in videofluoroscopy. The present cross-sectional cohort study investigates EAT-10 scores and swallowing function using fiberoptic endoscopic evaluation of swallowing (FEES).

Material and Methods: Thirty eight dysphagic HNC patients completed the EAT-10 and a standardized FEES examination with 10 cc thin and 10 cc thick liquid boluses. Two blinded clinicians performed penetration-aspiration ratings. Exclusion criteria: presenting with a concurrent neurological disease; scoring below 23 on a Mini Mental State Examination; being older than 85 years; having undergone a total laryngectomy; and being illiterate or blind. None of the patients were in a palliative state of disease. Descriptive statistics independent samples t-test and Mann–Whitney U tests were performed.

Results: Observer agreement was sufficient (Kappa ≥ 0.7). Sixty-one % (N = 17) and forty-eight % (N = 14) of the patients showed aspiration for respectively thin and thick liquid. None of the patients had an EAT-10 score < 3. No significant group differences (aspiration vs. no aspiration) in EAT-10 scores were found ($p = 0.47$). Frequency distributions of tumor stage and site treatment modality age and FOIS score did not influence this EAT-10 outcome between groups. There was significantly more aspiration in patients who underwent radiotherapy.

Conclusions: Although all HNC patients reported clinically relevant symptoms of dysphagia in the present study the EAT-10 questionnaire cannot be used as an indicator for the severity of dysphagia.

BIOIMPEDANCE VECTOR ANALYSIS IN DYSPHAGIC PATIENTS WITH HEAD AND NECK CANCER: PRELIMINARY RESULTS

M. Milewska[1], B. Jamróz[2], J. Chmielewska[2], Z. Przekop[1], S. Moczydłowska[1], T. Czernicki[3], K. Niemczyk[2], E. Osuch-Wójcikiewicz[2]

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Introduction: Bioimpedance vector analysis (BIVA) allows to obtain information about tissue hydration and body cell mass independently of regression equations. Still little data exist about the raw bioelectrical impedance parameters in patients with head and neck cancer and swallowing disorders.

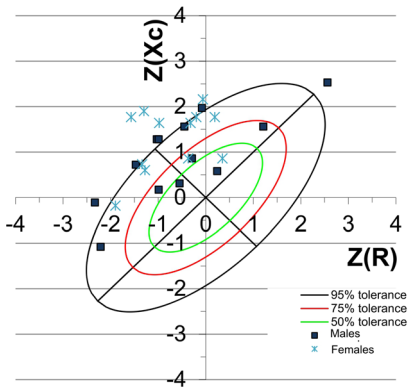

Fig. 1 Individual vectors for dysphagic patients with head and neck cancer in the 50%,75% and 90% tolerance ellipses for the reference population.

Materials and Method: The sample comprised 26 patients (13 males and 13 females) aged 20 to 80 years hospitalized in Otolaryngology Ward. Exclusion criteria were: not-Caucasian ethnicity chemio-or radiotherapy spread of cancer chronic liver and kidney diseases epilepsy limb amputations metallic prosthesis pacemaker or implantable defibrillators. Raw impedance data were obtained at multi-frequency bioimpedance analyzer (BioScan 920-2 (Maltron Int. UK). The 2 vector components (resistance (R) and reactance Xc) were standardized by height and transformed into bivariate Z-scores using data of sex-specific reference population proposed by Piccoli et al. [1]. All measurements were performed at admission of patients with suspicion of cancer recurrence or dysphagia complications. Statistical analysis was performed with Statistica 10PL. The protocol of the study was approved by the Medical University Ethics Committee.
Results: The distribution of individual impedance vectors in males and females showed that 61.5% and 76.9% (respectively) cases were located above 75 pc. Majority of the individual vectors were located to the left of the major axis and above upward on the RXc graph (out of the 75% ellipse) of the reference population what can indicated body cell mass within the range values but dehydration (Figure 1). There was a tendency toward a location mainly on the upper left side of the tolerance ellipses (Male Z (R) -0.49 ± 1.3; Z(Xc) 0.89 ± 0.95) and Female Z(R) -0.82 ± 0.78; Z(Xc) 1.23 ± 0.7 $p < 0.05$). The differences between phase angle (cellular biomarker) was not significant.
Conclusion: Dysphagic patients presented hydration disturbances and rather good nutritional status.

FEASIBILITY AND POTENTIAL VALUE OF LIPOFILLING IN PATIENTS WITH POST-TREATMENT OROPHARYNGEAL DYSFUNCTION

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[1]The Netherlands Cancer Institute, Department of Head and Neck Oncology and Surgery, Netherlands; [2]Academic Medical Center, Department of Plastic Reconstructive and Hand Surgery, Netherlands

Introduction: Head and neck cancer (HNC) patients may develop oropharyngeal dysfunction as result of volume loss or muscle atrophy of the tongue or pharyngeal musculature following treatment with surgery and/or chemoradiotherapy. If intensive swallowing therapy offers no further improvement and the functional problems persist transplantation of autologous adipose tissue (lipofilling) might restore functional outcomes by compensating the existing tissue defects or tissue loss.
Material and Methods: In this prospective pilot/feasibility study the application of lipofilling was studied in seven HNC patients with chronic dysphagia. The lipofilling procedure was carried out under general anesthesia in several sessions using the Coleman technique. Both short- and long-term effectiveness on swallowing outcomes (including videofluoroscopy (VFS) Functional Oral Intake Scale and SWAL-QOL questionnaires) were evaluated. MRI was used to evaluate the post-treatment injected fat.
Results: Five patients completed the intended three lipofilling sessions while two completed two injections. One patient dropped out of the study after two injections because of progressive dysphagia requiring total laryngectomy. Four of the six remaining patients showed improved PAS scores on post-treatment VFS assessments with two patients no longer showing aspiration for a specific consistency. Two patients were no longer feeding tube dependent. Patient-reported swallowing and oral intake improved in four out of six patients.
Conclusions: Based on the results the lipofilling technique seems safe and—in selected cases—of potential value for improving swallowing function in this small therapy-refractory head and neck cancer patient cohort.

Session 13 Poster session 3.4: Dysphagia in children III

*THE EFFECT OF AIRWAY ASPIRATION ON QUALITY OF LIFE OF THE CAREGIVERS OF CHILDREN WITH CEREBRAL PALSY

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Introduction: Swallowing disorders can affect general well-being and development of children with cerebral palsy (CP) as well as well-being of caregivers. The aim of this study was to investigate the effect of airway aspiration on quality of life of the caregivers of children with CP.
Materials and Methods: Ninety-seven who were referred for swallowing evaluation and their parents were included. The children were divided into two groups including study group with airway aspiration and control group without airway aspiration. Motor function level was determined with Gross Motor Functional Level (GMFCS). The presence of open mouth open bite tongue-thrust high-palate as oral motor assessment was noted. Caregivers completed the Feeding/Swallowing Impact Survey (FS-IS) which has 3 subscales including daily activities worry and feeding difficulties.
Results: The study group included 62 children with a mean age height and weight of 2.8 ± 2.3 years 83.7 ± 16.5 cm 11.3 ± 5.3 kg. The control group included 35 children with a mean age height and weight of 4.1 ± 4.1 years 91.9 ± 23.23 cm 14.2 ± 8.1 kg. No difference was found between groups in terms of age height weight GMFCS levels and oral motor assessment ($p > 0.05$). All three subscales of the FS-IS as well as the total score significantly higher in study group ($p < 0.001$).
Conclusion: Our study shows that caring children with airway aspiration cause additional burden on caregivers. Swallowing team should be family-centered. Due to life quality and concerns of the caregivers may affect their involvement in dysphagia management these factors should be considered during organizing treatment goals and procedures.

FIBEROPTIC ENDOSCOPIC EVALUATION OF SWALLOWING IN CHILDREN WITH DYSPHAGIA: RELATION BETWEEN ENDOSCOPIG FINDINGS FEEDING OUTCOMES AND VIDEOFLUROSCOPIC SWALLOW STUDY RESULTS

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Introduction: Fiberoptic endoscopic evaluation of swallowing (FEES) is a tool developed to assess swallowing in patients with dysphagia as an adjunct to videofluroscopic swallow study (VFSS). It enables evaluation of pharynx and larynx without radiation. Our aim is to describe our experience with FEES in children and the relationship between its findings feeding outcomes and VFSS results.
Methods: Retrospective review of patients who underwent FEES since 2015. The procedure is carried out by a gastroenterologist a nurse and a swallowing therapist who presents coloured food of different textures. FEES is only stopped if impairment of swallowing safety is detected or patient fails to cooperate. Feeding status was documented in the last visit. Dysphagia characterization agreement between FEES and VFSS was assessed by weighted kappa index. Logistic regression was used to compare clinical diagnoses and FEES findings to the final feeding status.
Results: Fifty-seven patients under 18 years old underwent FEES after clinical swallowing evaluation. In 7 patients FEES was stopped because of apparent significant aspiration. No complications were detected afterwards. Larynx cleft was suspected in 13 patients but confirmed in only 6 cases. The kappa index for results in VFSS and FEES regarding swallowing security and efficacy was 0.83 and 0.53 respectively showing a good agreement. Two out of five patients with normal VFSS were found to have security impairment in FEES. Aspiration or penetration with liquids (odds ratio –OR– 5.4) and honey-thick food (OR 11.6) significantly increased the risk of nothing by mouth status. The absence of base neurological disorders and vocal cord dysfunction raised the likelihood of achieving total oral feeding status.
Conclusions: FEES findings can predict middle term feeding status in children better than clinical diagnoses. FEES provide complementary information to VFSS and can be performed safely at patient's bedside.

DECREASE OF DROOLING BY ORAL MOTOR THERAPY CONCOMITANT TO KINESIO TAPING ON ORBICULARIS ORIS MUSCLES

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Introduction: Drooling is considered normal during the development of oral neuromuscular control and is expected to improve spontaneously until about two years of age. Persistent drooling is very common in children with neurological disorders. Previous investigation associated drooling and the efficiency of lip seal in children with cerebral palsy. The aim of this study was to evaluate the effects of treatment for drooling by oral motor therapy concomitant to application of Kinesio Taping (KT) on orbicularis muscles which are responsible for closing the mouth.
Material and Methods: 15 children (mean age of 10y7mo SD 4y4mo) with neurological disorders and drooling complaints were submitted to oral motor therapy and applications of KT on orbicularis muscles twice a week for 30 days. Drooling and oral motor skills were assessed by 13 parameters: drooling impact on the child's and his caregiver's lives; severity of drooling; frequency of drooling; drooling estimated by number of used bibs; salivary scape; mouth gap; and seven markers of oral motor skills.
Results: The application of KT and its stay for only 1–2 min diminished mouth gap ($p < 0.001$). Various markers of drooling decreased after 15 days of treatment ($p < 0.05$) and remained lower than baseline ($p < 0.05$) until the end of intervention. Oral motor skills increased after 15 days of treatment ($p < 0.05$) and remained high for the next 15 days.
Conclusion: Persistent drooling in children with neurological disorders decreased rapidly with oral motor therapy concomitant to KT on the orbicularis muscles.

ROLE OF NMES IN DYSPHAGIA MANAGEMENT FOR CHILDREN WITH HYPERTONIA AND DYSTONIA : A CASE STUDY

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Background: The role of NMES in Dysphagia Management in adult patients is well documented. However there are not many publications on the therapeutic outcomes with Neuromuscular Electrical Stimulation (NMES) in infants and children with swallowing and feeding issues.
Purpose: This paper a case study reports the therapeutic outcomes of a holistic approach to the management of swallowing and feeding difficulties in a child with Hypertonia and Dystonia.
Methods: The patient in this study had an initial clinical assessment by the Speech-Language Therapist followed by an objective assessment of swallowing with Video-fluoroscopy. The child underwent treatment programs involving oral-motor therapy and electrical stimulation (NMES) to strengthen and improve the swallowing mechanism. Electrical Stimulation was done periodically over several blocks of intensive sessions as the child was living in a geographically different location from that of the service provider. The Stimulation lasted 60 min each session with sensory inputs provided using sour bolus (lemon flavoring) pureed baby foods and cold spoon stimulation on the tongue. Oral sensory motor exercises to prepare the neuromuscular system and also to facilitate skill building for feeding were instituted during the sessions and also for regular follow up by the care givers outside the therapy sessions.
Conclusion: The patient demonstrated changes in swallowing as reflected by a series of outcome measures: both clinical and objective. This study highlights the importance and clinical advantage of using a modality such as NMES as an integral part of dysphagia therapy in the paediatric population.

COMPARISON BETWEEN CLINICAL AND VIDEOFLUOROSCOPIC SWALLOWING EVALUATION OF PEDIATRIC PATIENTS ATTENDING A SWALLOWING OUTPATIENT CLINIC IN A TERTIARY HOSPITAL

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Introduction: Dysphagia can cause significant morbidity and mortality. The diagnosis of swallowing disorders can be assessed by clinical swallowing evaluation (CSE) and Videofluoroscopic Swallowing Study (VFSS) is the gold standard exam. The aim of this study is to describe and compare findings of CSE and VFSS in patients referred to an outpatient swallowing clinic in a tertiary hospital.
Methods: This is a descriptive cross-sectional and retrospective study based on analysis of medical records and VFSS records. The research included all patients treated at the children's swallowing outpatient clinic over a period of 24 months. The age ranged from aged 1 month to 18 years-old. Patients whose medical records were incomplete were excluded.
Results: Our sample consisted of 53 patients. In our review there was a total of 89 patients attending the outpatient clinic in the period of the study but only 59 underwent a VFSS. 6 were excluded from this study because of incomplete data. The mean age was 3.95 ± 4.2 years. We found a positive correlation between normal cervical auscultation (CSE) and absence of tracheal aspiration (VFSS) ($p = 0.046$). Sucking and chewing functions that demonstrated abnormalities in the CSE correlated positively with tracheal aspiration in the VFSS ($p = 0.016$). There was an association between coughing and/or gagging episodes during swallowing (CSE) with penetration (VFSS) ($p = 0.006$).
Conclusion: Findings of the CSE and VFSS were correlated in most variables analysed in this research. The results showed the great importance of CSE being performed by experts and the proper recommendation of VFSS to complete diagnosis and treatment in pediatric dysphagia population aiming to prevent and reduce clinical complications and hospital costs.

ACTUAL CONDITION OF NUTRITION INTAKE IN VERY-LOW-BIRTHWEIGHT INFANT

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It is widely known that feeding function and nutritional problems occur with high frequency in very-low-birthweight infants. The aim of this study is to reveal the actual status of feeding function and nutritional problem therefore a follow-up research was carried out for very-low-birthweight infants. The objectives were 37 very-low-birthweight infants (15 boys and 22 girls) who were fed via nasal feeding tube at least temporarily. Mean age at initial evaluation was 14.2 months (SD: 5.6 months). The researched items about feeding function and nutrition status were chief complaint of caregivers stage of gross motor function age at weaning from tube feeding period of tube feeding contents of meals and process of feeding function. Prior to the study implementation the research content were reviewed and approved by the ethical committee of our faculty. The principal problems on feeding status were 'method of weaning from breast or bottle' 'vomiting' and 'failure to gain weight'. Mean period of tube feeding were 10.2 months (SD: 5.5 months). Nine infants were fed by feeding tube exclusively 14 infants were fed by breast or bottle and 14 infants were given weaning food. On the issue of feeding function 11 infants were classified into 'preweaning stage' 15 infants were classified into 'unmatured swallowing function stage' 5 infants were classified into 'disorder of lip-closing function' and remaining 6 were classified into 'disorder of mashing function'. After 1 year feeding functions were improved in almost all the objectives and 6 infants were shifted from exclusive tube feeding to oral feeding. From these results it is suggested that various problems were shown in very-low-birthweight infants. Additionally method of nutrition intake can be changed by appropriate support.

ELASTIC THERAPEUTIC TAPING IN THE TREATMENT OF DROOLING IN CHILDREN WITH NEUROLOGICAL DISORDERS – CASE SERIES

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Introduction: Drooling can be defined as a non-intentional loss of saliva from the oral cavity. Around 10 to 38% of children with cerebral palsy present some level of salivary escape. Objective: To assess the effect of elastic therapeutic taping for the control of salivary escape in children with neurologicaldisorders.
Material and Methods: It were selected individuals with neurological disorders that presented complaints of drooling with age between 3 to 18 years old. All individuals were submitted to the application of elastic taping in the region of the superior and inferior orbicularis muscle once a week over a period of two months. The tape we used was kept in position until it falls alone or until the next application. The instruments to evaluate the impact frequency and severity of salivary escape and oral motor skills were: Salivary Escape Impact Scale (EIES) Salivary Severity and Frequency Scale Oral Motor Scale (OMS) bib weight before and after the application of OMS and the number of bibs used per day.
Results: Four out of the five children evaluated had a decrease in the EIES score three had a modification in frequency and four in the severity of the salivary escape. There were changes in the OMS score in three children. For the children that used bibs there were a decrease in the weight and in the total number of bibs used per day.
Conclusion: The data is promising but still preliminary and in need of a bigger sample. It is important to have further studies with prospective data and control groups.

Session 13 Poster session 3.5: Dysphagia in children IV

*EFFECT OF COMMERCIALLY AVAILABLE THICKENING AGENTS ON READY TO FEED INFANT FORMULAS

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Purpose: Infants depend on formula or breast milk to meet all of their nutrition and hydration needs. Thickening the formula or expressed breast milk is a common treatment option for infants with dysphagia. This project sought to determine the effects of three different commercially available thickening agents on the resulting thickness of ready to feed infant formulas commonly used in special care and neonatal intensive care nurseries in the USA.
Methods: Nine different ready to feed infant formulas commonly used in neonatal settings were mixed to nectar and honey consistencies with three different thickening agents following manufacturer's instructions. Each of the thickening agents featured a different active thickening agent (oat flour cellulose gum and carob bean gum). Thickened formulas were assessed for thickness with the line-spread test (LST) an established reliable tool for the categorization of formulas into therapeutic categories. Each thickness sample for each formula was run on the LST 10 times to provide a mean for comparison.
Results: LST values were statistically significantly different between the three thickening agents when formula was mixed to the nectar (Welch's $F(2\ 167.042) = 203.41$ $p < 0.0005$) and honey (Welch's F

(2 174.056) = 158.100 $p < 0.0005$) consistencies. Games-Howell post hoc analysis revealed that there were statistically significant differences in thickness between all three thickening agents for both therapeutic categories.
Conclusions: The choice of thickening agent impacts the resulting thickness of ready to feed infant formulas. The thickening agent that utilized carob bean gum as the main thickening agent consistently produced thickened formula that fell outside the target therapeutic range and was significantly thinner than the target consistency. Clinicians must consider the type of thickening agent when making recommendations for thickened formula to manage dysphagia in infant populations.

THE RELATIONSHIP BETWEEN SUCKING PATTERN AND PENETRATION-ASPIRATION SEVERITY IN INFANTS

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Introduction: The study aimed to investigate the relationship between sucking pattern and penetration-aspiration severity in infants.
Material and Methods: This study included 47 infants. The age height and weight were recorded. The prematurity status was noted as ''premature'' or ''mature''. The sucking pattern of children was scored between 1 and 5 according to the Neonatal Oral-Motor Assessment Scale (NOMAS). The level 1 means ''Normal sucking pattern'' and level 5 means '' Dysfunctional = Definitely abnormal sucking pattern''. The videofluoroscopic swallowing evaluation was performed and the penetrastion-aspiration severity was determined with the Penetration-Aspiration Scale (PAS).
Results: The mean age of the children was 40.14 ± 2.01 postmenstrual age (PMA) of which 61.7% were premature. The mean height was 53.60 ± 5.96 cm the mean weight was 3.98 ± 1.21 kg. The median NOMAS score was 2 (min = 1 max = 5) and the median PAS score was 1 (min = 1 max = 8). A strong correlation was found between NOMAS and PAS ($p < 0.001$ r = 0.82).
Conclusions: In conclusion the sucking pattern is associated with the penetration-aspiration severity in infants. When the sucking pattern becomes disorganized and dysfunctional the penetration-aspiration severity increases in neonatal period.

COORDINATION OF SUCKING, SWALLOWING AND BREATHING DURING NUTRITIVE SUCKING IN HEALTHY INFANTS

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Introduction: Nutritive sucking in infants consists of reflexive well-coordinated sucking swallowing and breathing. Feeding problems are often reported in premature born infants and may lead to aspiration apneas desaturation and failure to thrive[1]. Information on the coordination of nutritive sucking in healthy term-born infants is needed to gain more insight in abnormal coordination. Adults show a brief non-respiratory inhalation after swallowing (SNIF)[2]. This SNIF was observed at the moment of opening of the laryngeal vestibule and release of the tongue base and soft palate from the pharyngeal wall. The presence of SNIF was explained as the inward airflow to release the vacuum at the offset of pharyngeal muscle contraction and may provide information of pharyngeal pressure changes. The SNIF was not observed during our clinical swallowing assessment in premature infants. The aim of this study was to gain more insight into the coordination of sucking swallowing and breathing during nutritive sucking in healthy infants and to assess whether the SNIF exists in normal neonatal swallowing.

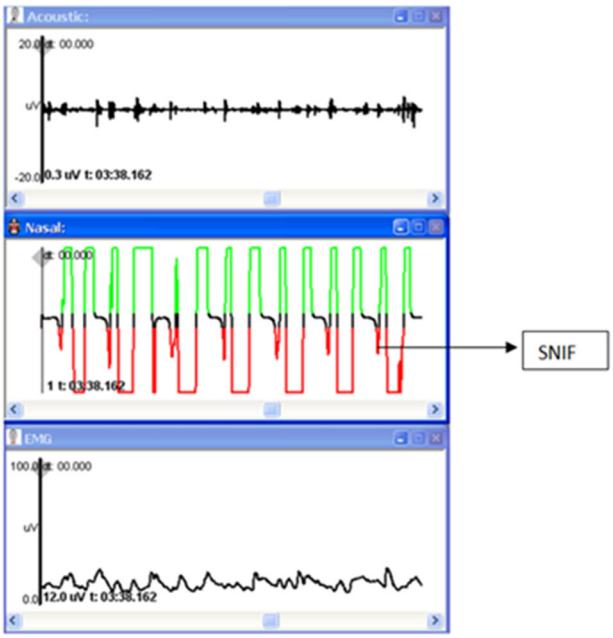

Figure 1: Acoustic, sEMG and nasal airflow measurement during nutritive sucking. Nasal airflow shows 'SNIF' after swallowing

Methods: Ten term-born healthy infants of 2 months age were included. Measurements were performed on coordination of swallowing during bottle feeding. Data was collected of activity of the submental muscles using surface electromyography in combination with a measurement of direction of nasal airflow and acoustic measurements of swallowing using the digital swallowing workstation (KayPentax USA).
Results: Preliminary results show well-coordinated sucking swallowing and breathing with a suck-swallow ratio of 1:1 2:1 or 3:1 varying within one feeding moment. The SNIF was present after every swallow (Figure 1).
Conclusion: Normal neonatal swallowing shows a varying coordination of sucking swallowing and breathing. In addition the pharyngeal pressure changes during swallowing was adult-like which was shown by the presence of the SNIF.

BASIC RESEARCH OF PEDIATRIC DYSPHAGIA-IDENTIFICATION OF FACTORS ASSOCIATED WITH TONGUE PRESSURE DURING CHILDHOOD

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Introduction: Tongue pressure caused by contact between the tongue and palate during eating and pronunciation is an effective index to evaluate the muscle strength of the tongue. Tongue pressure is widely used for evaluation of dysphagia in the elderly; however few reports have evaluated the diagnostic usefulness of tongue pressure measurement in children. The aim of this study was to evaluate changes in tongue pressure and identify associated factors for diagnosis of dysphagia in childhood.
Material and Methods: A questionnaire was completed by the parents of 27 children for whom it was difficult to measure tongue pressure and 209 children who were able to comply. Measurements were taken of grip strength body composition occlusal force tongue thickness and tongue pressure using a balloon-based JMS tongue pressure measurement device.
Results: Tongue pressure was 11.8 ± 7.7 16.7 ± 7.5 22.1 ± 9.5 and 25.4 ± 8.2 kPa for 3 year olds 4 year olds 5 year olds and 6 year olds respectively showing a moderate correlation with age. Tongue pressure was moderately correlated with height weight grip strength and skeletal muscle mass. There was almost no correlation between occlusal force and tongue thickness. It was suggested that children with functional problems such as unclear pronunciation and improper chewing and swallowing based on the questionnaire possibly had low tongue pressure.
Conclusions: Maximum tongue pressure increased from the age of 3 to 6 years. In addition tongue pressure and grip strength were found to be correlated suggesting that both parameters can be measured at about the cross-striated muscles force. Therefore children with functional problems such as unclear pronunciation and eating possibly had a lower tongue pressure indicating a relationship between tongue pressure and problems with pronunciation and eating during childhood. Hence tongue pressure measurement may be useful for diagnosis of dysphagia in childhood.

IMPACT OF GESTATIONAL AGE AND COMMON MORBIDITY ON ORAL FEEDING SUCCESS IN PRETERM INFANTS

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Purpose: This retrospective study sought to determine the impact of gestational age at birth and common newborn mordibidities on the age at which preterm infants cared for in a level II–III nursery in the USA were able to support nutritional intake by mouth.
Methods: Data was collected retrospectively from chart review for all neonates born < 37 weeks gestational age over a 12-month period (Jan 2013–Dec 2013) admitted to the Neonatal Intensive Care Unit at two small birthing hospitals within the same healthcare system. The Morbidity Assessment Index for Newborns (MAIN) was completed from the chart review and information pertinent to the achievement of oral feeding milestones was also collected. Reviews were conducted by two researchers who achieved a high level of reliability before independently collecting data from medical charts.
Results: There was a statistically significant interaction between degree of morbidity and degree of prematuirty on the gestational age at which preterm infants achieved full oral feeding $F(6\ 210) = 7.282$ $p = 0.020$ partial eta squared = 0.069. Analysis of simple main effects for degree of morbidity and prematuirty was performed and revealed statistically significant difference in mean age at attainment of oral feeding competency for infants with severe moderate and minimal degrees of morbidity and for those born extremely preterm and very preterm.
Conclusion: In this sample of majority (74%) moderately preterm (born between 32 and 33 weeks gestation) and late preterm (born between 34 and 36 weeks gestation) infants achievement of full oral feeding was significantly impacted by the degree of prematurity and morbidity. This research confirms the finding from previous research.

ANALYZING MASTICATORY MOVEMENTS IN CHILDREN WITH CEREBRAL PALSY BY USING CLINICAL OBSERVATION ULTRASOUND AND KINEMATICS

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Introduction: Children with cerebral palsy (CP) need more time to eat solid foods and choke more frequently on solids compared to typically developing children. The aim of this study was to explore the feasibility of three measurement methods to gain insight in masticatory movements: the clinical Mastication Observation and Evaluation (MOE) instrument ultrasound and kinematic measurements.
Materials and Methods: Five bites of a biscuit of 8 children with CP spastic type (mean age 9 years; 8 months; GMFCS I-V) were compared to those of 14 typically developing control children (mean age 9 years; 1 month). Data were collected with the MOE instrument ultrasound and 3D kinematics; differences were tested with a t-test at group level.
Results: Total MOE score per bite ranged from 17 to 31 (median 24) in the CP group and from 28 to 32 (median 31) in the control group. Higher MOE scores indicate better performances. The bites in the CP group showed a significant longer total time (15.9 versus 7.1 s) higher number of chewing cycles (14.0 versus 8.9 cycles) a larger chewing cycle duration (0.84 versus 0.64 s) and a larger anterior excursion of the mandible (10.3 versus 6.6 mm) compared to the control group. Tongue movements showed a smaller horizontal (0.67 versus 0.92 mm) and smaller vertical displacement (0.48 versus 0.59 mm) in the CP group compared to the controls.
Conclusion: Assessments of bites with ultrasound kinematics and observation are feasible in children with CP. The MOE captures differences in mastication between individual children with CP. Objective measurements were complementary to the observational data.

Session 13 Poster session 3.6: Treatment III

*EFFECTS OF USING A SWALLOWING ASSISTIVE GEL TO DELIVER CAPSULES IN HEALTHY INDIVIDUALS: A PRELIMINARY STUDY

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Objective: Oral administration of medication can be challenging in multiple aspects including the taste palatability and size. Generally water is the agent to help deliver the medication from oral cavity to stomach. Difficulty in swallow oral medication may lead to efficacy and safety issue or even poor patient compliance. This study aims the effect of a novel swallowing assistive gel in delivering capsules.
Materials and Methods: 20 healthy subjects (8 Male 12 Female) were included in this study to finish capsule swallow tests using water and swallowing assistive gel respectively during Videofluoroscopic Swallow Study. Capsules (00#) were filled with barium sulfate and barium sulfate is also added into delivery agent to reach a concentration of 25%w/v. A subjective questionnaire with 4 items including the palatability taste stuck feeling and adverse reactions and objective quantitative parameters of VFSS were compared.
Results: Significant superiority was found in improving palatability taste and stuck feeling of capsule swallow using swallowing assistive gel with no adverse reaction including vomit and choke occurred in both agent. Stage transition duration (STD) UES opening duration (UOD) pharyngeal transition time (PTT) hyoid bone displacement (AHD) and extent of UES opening (EUO) were significantly greater for water whereas oral transition time (OTT) was significantly longer for swallow assistive gel. Pharyngeal Swallow time lag between delivery agent and capsule exists in water and was negative for swallowing assistive gel.
Conclusions: The preliminary results indicate that swallow assistive gel may become a novel method to help alleviate the discomfort patients undergo and less strength to swallow for oral medication.

*KINEMATIC ANALYSIS OF TONGUE-HOLD SWALLOW IN HEALTHY SUBJECTS USING 3D DYNAMIC COMPUTED TOMOGRAPHY

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Introduction: Tongue-hold swallow is designed as an exercise to improve contact between the tongue base and the posterior pharyngeal wall during swallow. Although it is a well-known swallowing exercise its physiological mechanism is not fully understood. This study aimed to analyze the kinematics of tongue-hold swallow in three dimensions using dynamic 320-row area detector computed tomography (320-ADCT).
Methods: Eight healthy adults (22–29 years) underwent 320-ADCT during saliva swallow (SS) and tongue-hold swallow (THS) in 45 degree reclining position. 3D images were created at an interval of 0.10 s (10 frames/s). The parameters measured were: (1) timing of critical events (2) pharyngeal volume (3) hyoid and larynx displacement and (4) cross sectional area of UES.
Results: Smaller pharyngeal volume with shorter anteroposterior and lateral diameter of velopharynx and oropharynx was shown before onset of hyoid anterosuperior movement (swallow onset) in 6 out of 8 subjects. In THS the hyoid was positioned significantly higher at start at swallow onset and at maximum position (p = 0.04 0.01 0.02) than in SS. Distance of superior laryngeal elevation was significantly larger (p = 0.01) and was positioned significantly higher at maximum position (p = 0.02). UES maximum cross-sectional area was significantly larger in THS (p = 0.01).
Discussion: Three-dimensional analysis enabled the visualization of pharyngeal cavity during THS for the first time. Smaller volume of pharynx with shorter dimeter before swallow onset suggested that THS induced larger pharyngeal contraction from the preparatory stage of swallow. Additionally this study implied that THS affected not only pharyngeal contraction but also affected the hyolaryngeal motion and UES opening. Further study combining kinetic analysis is necessary to determine the effect of Tongue-hold swallow as swallowing exercise.

*EFFECTS OF RESPIRATORY MUSCLE EXERCISE ON LARYNGEAL EXCURSION IN HEALTHY INDIVIDUALS

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Purpose: To analyze the effects of respiratory muscle exercise using flow-oriented incentive spirometry (FIS) on position measurements of laryngeal elevation by angle during swallowing in healthy individuals.
Methods: This prospective longitudinal study involved 29 subjects (8 men 21 women) aged between 21 and 30 years (mean 21.06 years). The FIS respiratory exercise was performed using the RESPIRON® for seven consecutive days (three sets of ten repetions for each inspiration and expiration. Participants underwent spirometry tests manometry and videofluoroscopy before and after the respiratory training. Videofluoroscopic analysis was performed by blinded raters following a specific protocol to measure hyoid rest and peak positions using Kinovea software.
Results: Hyoid bone position at rest and maximum elevation were significantly higher following respiratory muscle exercise (3441o e 2996o) compared to pre-training positions (3779o e 3234o). Considering that this study included normal subjects the change in hyoid position was attributed to the activation of hyolaryngeal complex during the exercises leading to regional muscle hypertrophy.
Conclusions: Respiratory muscle training with FIS can influence the position of the hyoid bone. Further the software Kinovea to measure laryngeal angle is an effective tool for biomechanical analysis of swallowing.

LOCALIZATION AND EXPRESSION OF TRPM8 AND ASIC3 IN THE MUCOSA OF THE HUMAN OROPHARYNX AND LARYNX

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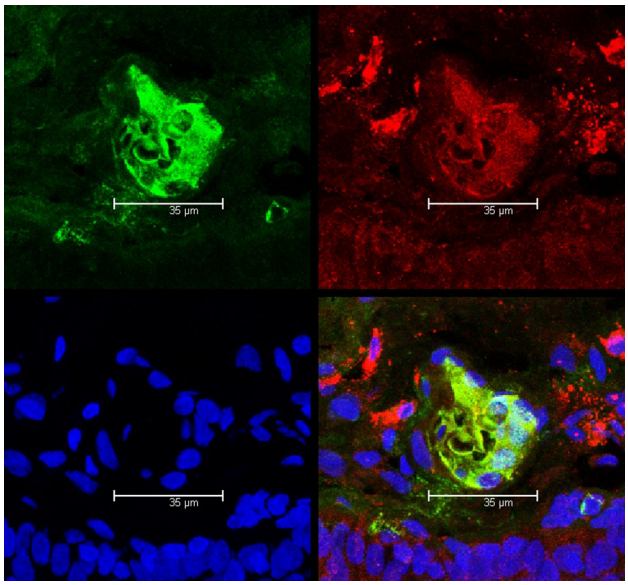
Introduction: We have found that TRPM8 agonists and acidic solutions improve swallow response in patients with oropharyngeal dysphagia in earlier studies but little is known about the expression of TRPM8 and ASIC3 in the human oropharynx. The aim of this study was to assess the expression and localization of TRPM8 and ASIC3 in human samples of the oropharynx to set the basis for new pharmacological treatments for OD.
Materials and Methods: Pathology-free samples from oropharyngeal regions innervated by cranial nerves V IX and X were obtained during major ENT surgery and processed either to obtain mRNA (20 patients) or to be used in immunohistochemical assays (6 patients). The expression analysis was performed by RT-qPCR using ACTBh as reference gene. H&E dye was used to study the histology of the samples the immunohistochemical assay used NSE-A to detect neuron fibres or fluorescent probes to co-locate TRPM8 or ASIC3 with NSE.



Results: ASIC3 was expressed in the three studied regions with similar expression levels and was localized on nociceptive fibres innervating the mucosa below the basal lamina of all studied regions. TRPM8 expression was not found in the studied regions but was localized on the nociceptive fibres innervating the mucosa below the basal lamina of all studied regions.
Conclusions: TRPM8 and ASIC3 are found in the human oropharynx on submucosal sensory nerves. Our study sets the bases to use oropharyngeal TRPM8 and ASIC3 receptors as promising therapeutic targets to develop active treatments for OD patients.

A SYSTEMATIC REVIEW AND META-ANALYSIS OF THE EFFECTIVENESS OF BIOFEEDBACK IN DYSPHAGIA THERAPY

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Introduction: Biofeedback involves the use of electronic monitoring of a bodily function such as swallowing to train voluntary control of it. The aim of this systematic review (PROSPERO 2016:CRD42016052942) was to assess the effectiveness of therapy involving biofeedback in improving swallowing in adults with dysphagia.
Methods: We included full text English language studies. Searches and analyses conducted independently by two reviewers included MEDLINE EMBASE trial registries conference proceedings and grey literature up to Dec 2016. Randomized controlled trials RCTs were assessed for risk of bias using Cochrane tools. Non RCTs were included and assessed for quality using criteria derived from several tools.

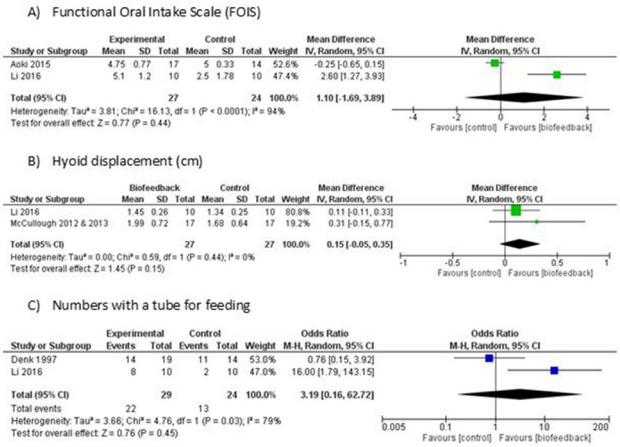

Figure 1: Results from Meta-analysis (Review Manager 5) showing changes in A) function, B) physiology and C) clinical outcome in patients receiving swallowing therapy with biofeedback compared to usual care.

Results: We included 22 studies (N = 412) in the qualitative analysis. Three main types of biofeedback were used; accelerometry surface electromyography and tongue manometry. Exercises included saliva swallows manoeuvres and tongue strength exercises. Dose varied between 6 and 72 sessions of 20–60 min. Patients had acute and chronic dysphagia from a range of conditions. Fourteen studies reported significant gains in patients with stable chronic dysphagia but did not have a control group so were excluded. Four studies (N = 101); in stroke (n = 58) head and neck cancer (n = 33) and mixed aetiology (n = 10) were suitably controlled and were included in meta-analysis. There was no significant difference between biofeedback and control on swallow function (FOIS Fig 1A) on swallow physiology—hyoid displacement (Fig 1B) or on reducing dependency on tube feeding (Fig 1C). Overall risk of bias was high and heterogeneity was present between trials for swallow function and number tube fed (I2 = 70–94%). A variety of outcome measures were used and several were not validated. Subgroup analysis was not possible due to a paucity of studies.
Conclusions: Biofeedback as a means to augment dysphagia therapy requires further research incorporating robust study design.

SENSORY PERCEPCION OF LIQUIDS ADAPTED FOR DYSFAGIA AS AFFECTED BY GUM INCLUSION IN THE THICKENING FORMULA

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Introduction: International dysphagia guides establish certain categories for consistencies needed depending on the characteristic swallowing disorder of each patient in order to assure a safe swallowing. The classification based on three different viscosity ranges (nectar honey and pudding) is widely used. These categories are also the base for diagnosis tools such as volume-viscosity test. Commercial thickening agents usually include preparation specifications which should help to achieve the range of viscosity needed. Nevertheless literature shows that in some cases the expected consistency differs from the viscosity actually got. The aim of this work was to study sensory perception of water thickened using commercial thickening agents constituted by either modified starch or gums.
Materials and Methods: A panel was constituted with 23 members who received training in sensory assessment. A simple protocol for evaluation of consistency perception of thickened liquids was adopted. It included quantitative evaluation of certain parameters affecting swallowing: humidity adhesiveness viscosity grainy texture swallowing difficulty residue and times swallowed. Usual commercial formulas were evaluated for nectar honey and pudding consistencies: three starch based products and one gum based thickener.
Results: The gum thickener developed lower consistencies than the starch based agents and failed to achieve the expected consistencies when prepared as indicated by the manufacturer. At the higher concentrations perceived consistency corresponded to the previous viscosity categories (e.g. nectar is perceived when honey is expected). These results show the same tendency as previous texture and rheology studies.
Conclusions: Sensory perception of adapted liquid matrixes is clearly affected by the inclusion of gums in the thickening formula. The sensory protocol proposed could be an easy and useful tool to assure proper texture adaptation of liquid food for dysphagia patients.

MODIFIED TEXTURES FOR ADULTS (ABOVE 17 YEARS) WITH OROPHARYNGEAL DYSPHAGIA: AN UPDATED CLINICAL GUIDELINE OF THE EVIDENS IN RELATION TO THREE CRITICAL AND SEVEN IMPORTANT OUTCOMES

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Introduction: A well-established management strategy for Oropharyngeal dysphagia (OD) is the modification of the texture of food and liquids. This strategy is primarily based on best practice and not on a systematic review. The aim of this paper was to report the result of an up-date of an original national guideline focussing on whether thickened liquids (review question 1) and modified foods (review question 2) are beneficial for adults above 17 years with OD in relation to aspiration pneumonia and death & hydration nutritional status mealtime performance patient preferences adherence and quality of life.
Material and Methods: The first step was to update the systematic literature search. Then as a second step the quality of the body of evidence for each review question was assessed using the GRADE system. Finally as a third step clinical recommendations were developed on the basis of the evidence assessment of the risk benefit ratio and perceived patient preferences.
Results: The body of evidence consisted of two RCTs for review question 1 both using nectar thickened liquids or honey-thickened liquids. No evidence was found for two important outcomes mealtime performance and health-related quality of life. With regard to risk of pneumonia death aspiration dehydration weight loss and intervention adherence no significant differences were found. The outcome addressing the patient perspective found a non-significant increased dissatisfaction with nectar thickened liquids (RR 1.11; 95% CI 0.95–1.30) and a significant increased dissatisfaction with honey thickened liquids compared to thin liquids/chin down (RR 1.18; 95% CI 1.01–1.37). No evidence was identified for review question 2.
Conclusion: Based on the quality of the identified evidence and a balance between desirable and undesirable consequences the recommendations were not in favour of using texture modified liquids and a good practice point was made in favour of offering texture modified foods.

VISCOSITY OF LIQUID FOOD IN THE CHILEAN MARKET: FIRST APPROACH TO THE STANDARDIZATION IN THE FEEDING OF PEOPLE WITH DYSPHAGIA

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Introduction: In the treatment of people with dysphagia it is recognized that dietary changes are efficient to reduce associated complications (especially the viscosity change of liquids) which must be selectively indicated for each case. Moreover it has been shown that: (1) the effectiveness of thickeners of food is scarce to long time periods (2) the selection of viscosity is highly dependent on the treating specialists and (3) there are few data to use safely foods that already offers the Chilean market. In this context the aim of this study is describe the rheological performance of various liquids foods available in the domestic market; characterized by viscosity level in order to make this information available to those who give advice/treatment to people with dysphagia.
Material and Methods: 80 different liquid foods were selected all frequently used and with high availability in the chilean market The tests were distributed by brand flavor and presence of sugar and fat. The rheological tests were determined on a digital rotational viscometer (Brookfield DV2-T). Temperature was monitored. Subsequent analysis allows obtaining the absolute viscosities.
Results: Of the total liquid food evaluated 16% were thin liquid 25% slightly thick liquid; 27% mildly thick liquid and 32% moderately thick liquid. Differences related with flavor brand and sugar and fat presence were found.
Conclusions: The objectification of the viscosity of the food available in the Chilean market gives to the specialists in swallowing disorders the information necessary for prescribing those foods more appropriate to each condition. The creation of this first table of rheological performance is a contribution to this purpose. It is hoped that this study in addition to others conducted in parallel allow an improvement in the quality of life in the people with dysphagia by facilitating the use of products easily accessible.

Session 13 Poster session 3.7: Dysphagia in stroke and brain damage III

SWALLOWING FUNCTION IN PATIENTS WITH UNILATERAL VOCAL CORD PARALYSIS

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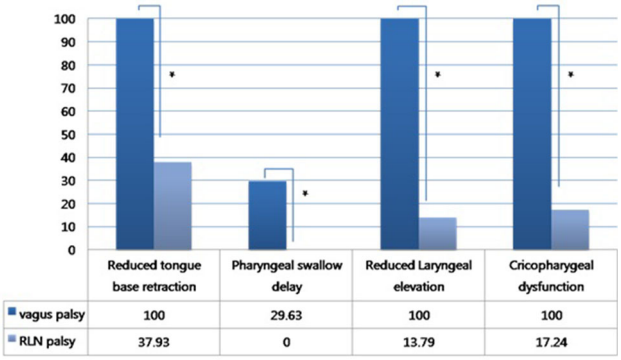
Introduction: Patients with vocal cord paralysis may experience swallowing problems because the deficiency in glottal closure can increases the risk of penetration and aspiration during swallow. Unilateral vocal cord paralysis (UVCP) occurs from injury of the vagus or recurrent laryngeal nerve suggesting that swallowing function of UVCP can vary depending on sites of the lesions. The purpose of this study was to determine different swallowing characteristics following location of UVCP using videofluoroscopic swallowing study (VFSS).



Material and Methods: The medical records for 56 patients with UVCP who underwent VFSS were reviewed retrospectively. Twenty-nine patients were diagnosed with recurrent laryngeal nerve (RLN) palsy and 27 had lesion in vagus nerve. We obtained some data such as the penetration-aspiration scale (PAS) bolus residues the timing of aspiration and the findings of the pharyngeal function during swallow.

	Vagus palsy (n=27)	RLN palsy (n=29)
Age (yrs)	61.15 (range, 24-87)	63.34 (range, 33-84)
Gender (M:F)	21:6	14:15
Time from onset (month)	21.94 (range, 0.2-120)	2.45 (range, 0.2-12)
Mean PAS*	6.15 (SD,2.64)	3.07 (SD,2.88)
Aspiration (n)*	20	7
Before	2	0
During	1	5
After	15	2
Mixed (before & after)	2	0
Residue (n)*	27	11
Valleculae	1	6
Pyriform sinuses	2	0
Both	24	5

Results: The patients with vagus lesions had significantly higher rates than RLN group in the mean PAS aspiration and residues ($P < 0.001$ by Independent t-test; Table 1) (Table 1. Characteristics PAS and presence of aspiration and residues of the two groups). The aspiration in the group with vague nerve injury was mostly found after swallow while that of RLN group was showed during swallow. The patients with vagus lesions exhibited the residues on both valleculae and pyriform sinuses in contrast to those of the RLN group found mostly in valleculae (Table 1). In pharyngeal stage all findings were significantly different between the two groups ($P < 0.001$ by Independent t-test) and the group with vagus lesions showed abnormalities in the findings (Fig. 1). (Fig. 1. Comparison of the pharyngeal phrase between the groups).

Conclusions: The results suggest that the site of UVCP makes a different impact on swallowing. It is important to establish different treatment strategies considering the origins of vocal cords lesion.

SWALLOWING KINEMATICS IN POST-STROKE DYSPHAGIA PATIENTS WITH PENETRATION-ASPIRATION

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Introduction: The goal of this study was to describe the spatiotemporal characteristics of post-stroke aspirators in detail at the level of the swallow rather than the patient.

Material and Methods: 38 stroke patients showing penetration or aspiration during 2-ml liquid barium swallow (58 swallows) were included. Kinematic spatiotemporal variables were obtained by two-dimensional motion analysis or calculated by using the result of the motion analysis. To investigate the hyolaryngeal incoordination of stoke patients we analyzed the sequence of hyolaryngeal structural movements.

Results: Among the 58 swallows analyzed 13 swallows (22.4%) showed the aspiration events before swallowing. The aspiration events during swallowing were observed in 45 swallows (77.6%). The aspiration after swallowing was not detected. Five subjects showed both before and during swallow aspiration at different times. The aspiration timings of 6 wallows (10.3%) by regular reading of videofluroscopic study were not in agreement with those by kinematic analysis. Among 45 swallows showing aspiration during swallow 26 (57.8%) swallows exhibited abnormal sequence of hyolaryngeal structural movements compared with healthy subjects. Delayed horizontal hyoid movement after the onset of epiglottic tilt was observed in these swallows of abnormal sequence. Among the 7 patients who showed improved swallowing function measured by ASHA NOMS scale 3 patients (42.9%) showed change from abnormal to normal sequence of hyolaryngeal movements. The maximal horizontal distance of hyoid was significantly increased in follow-up evaluations in patients showing improvement of swallowing ($P = 0.018$).

Conclusions: The timing of aspiration can be classified as before during or after the swallow by kinematic method at the level of each swallow. The horizontal excursion of hyoid is the most important factor associated with aspiration timing and improvement of swallowing function in stroke patients.

STROKE PATIENT KNOWLEDGE REGARDING SWALLOWING DISORDER

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Introduction: Dysphagia is the common problem in stroke survivors which can cause morbidity and mortality. Early detection and appropriate health care program improve quality of life of patient and decrease complication such as aspiration pneumonia and malnutrition. Self-awareness and knowledge of patient is an important factor in

success of care process. Objective of this study was to determine the knowledge of stroke patient regarding swallowing disorder and management.
Material and Methods: Descriptive study was conducted in Srinagarind hospital. Thirty stroke patients with dysphagia were interviewed using 20 items questionnaire; general knowledge 7 items pneumonia prevention 8 items and rehabilitation and management 5 items. Each item had a scale running from "yes" (= 1) "no" (= 0) "don't know" (= 0). The total score was calculated and divided level of knowledge into 3 groups; poor (1–7) fair (8–14) and good (15–20).
Results: Total of 30 stroke patients were enrolled in the study. Most of them were male (70%) with mean age 72 ± 2 years. Of these only 30% had good knowledge about swallowing disorder. Most of participants (63%) had fair knowledge. Few patients knew about silent aspiration and the important of oral care in pneumonia prevention.
Conclusions: Most of stroke patients had fair knowledge regarding swallowing disorder. As a result though health care professionals educated their patients regarding swallowing disorder patients could not perceive all information. Education innovation should be considered to improve the knowledge among patients.

PREVALENCE AND ASSOCIATION OF ORAL CANDIDIASIS WITH DYSPHAGIA IN INDIVIDUALS WITH ACQUIRED BRAIN INJURY

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Purpose: To describe the prevalence of oral candidiasis (OC) in individuals with severe acquired brain injury (ABI) and to explore the association between OC and improvement in dysphagia.
Method: Individuals with ABI admitted to highly specialized rehabilitation were recruited in the span of one year. Data on OC were collected by clinical observations and verified by cultivation or microscopy in every 3 weeks during first 10 weeks of admission in a rehabilitation setting. Data on improvement in dysphagia were collected through review of medical records and defined by two measures (1) First positive change in food consistency (2) At least initiation of soft food consistency. Individuals with OC were compared with individuals without OC using multivariable cox proportional hazards regression.
Results: The overall prevalence of OC was 32.5 and 29.7% in all individuals and in individuals not treated with antifungal agents respectively. The point prevalence of OC was 24.8% after one week of admission and reduced to 10.1% after ten weeks of hospitalization. The association between OC and improvement in dysphagia showed adjusted hazard ratios of 0.64–0.77 though not statistically significant.
Conclusion: Prevalence of OC was high at the admission (week 1) but reduced during the rehabilitation stay of 10 weeks. The negative associations between OC and improvement in dysphagia suggest that OC may delay the rehabilitation of dysphagia.

PATIENT EXPERIENCES OF LIVING WITH PERSISTING POST STROKE DYSPHAGIA AND OF DYSPHAGIA MANAGEMENT: A QUALITATIVE STUDY

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Introduction: Dysphagia occurs in up to 78% of stroke patients and greatly impacts their daily life however little is known about patients' experience of living with dysphagia and received dysphagia management. The aim of this study was to investigate patients' experiences of living with dysphagia after stroke and their experiences of dysphagia management.
Material and Methods: Personal interviews were conducted with five participants 54 to 95 years of age and in two to 10 years post stroke in Västra Götaland Region Sweden. Inclusion criterion was persisting moderate to severe dysphagia Functional Oral Intake Scale ≤ 5. Exclusion criteria were severe aphasia Reinvang Oral Communication 3–4 or dementia diagnosis. The interviews were semi-structured and had an inductive approach and data was analyzed with qualitative content analysis.
Results: The participants' experiences of living with dysphagia was captured in the theme "Dysphagia impacts life situations negatively and requires long term support from skilled health care professionals". This consisted of the categories "Learning to manage dysphagia and its complications" "Professional support with dysphagia varies" and "Finding small moments of joy despite large restrictions in life situations".
Conclusion: The findings indicated that patients with dysphagia experienced a lack of support from health care professionals. They felt left on their own and required to adapt strategies on their own without support or guidance. Better health care support to ensure an optimal quality of life is needed. Actions to achieve this may include developing national guidelines for adequate dysphagia follow-up and establishing multidisciplinary dysphagia teams in both hospitals and long-term care facilities.

A SURVEY OF DRUG ADMINISTRATION VIA NASOGASTRIC TUBE IN STROKE PATIENTS

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Introduction: The stroke survivors receive several medicines to prevent recurrent of stroke and control underlying disease. Unfortunately some stroke patients have swallowing problem and use the feeding tube. The health professionals and patients should prepare each drug properly to meet the medical needs and avoid complications. Therefore this study aimed to ascertain the problem in drug administration via nasogastric tube among patient and care givers.
Material and Methods: A survey was conducted among 32 stroke patients who were discharged from rehabilitation ward Srinagarind hospital Khon Kaen Thailand using structured questionnaire.
Results: Most participants were male (65%) with mean age 65 ± 12 years. Ninety seven percent of the participants used the appropriate drug formulation and gave drug safely. Only 75% could crush the medicine appropriately thus 65% used the suitable mortar and pestle. Neither tube occlusion nor adverse event was reported.
Conclusions: Inappropriate crushing medicine may lead to drug interaction and adverse effect. This study reported a one-fourth of the patients could not administer medicine properly. Therefore health professionals should aware about drug administration via feeding tube.

STUDY ON THE CORRELATION BETWEEN SWALLOWING FUNCTION AND RESPIRATORY FUNCTION IN STROKE PATIENTS

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Objective: To explore the correlation between respiratory and swallowing function in dysphagia patients with acute and subacute stroke.
Methods: 30 hospitalized stroke patients in acute and subacute enrolled from January 2017 to April 2017. 15 patients with dysphagia divided in observation group15 patients without dysphagia in control group.Inspiratory vital capacity (IVC) peak expiratory flow rate (PEF) and minute maximum ventilation (MVV) were assessed by stray function and static respiration test. Swallowing function was assessed by Kubota drinking water test.
Results: The results showed that the difference in the actual values of the IVC PEF and MVV between the observation group and the control group significantly ($p < 0.05$).
Conclusions: Stroke patients with swallowing problems might accompany with respiratory dysfunction which inevitably lead to swallowing—breathing coordination disorder to some extent and also might lead to aspiration.
Keywords: Stroke; Swallowing function; Respiratory function

CASE REPORT: VOCAL CORD MYOCLONUS IN DYSPHASIA PATIENTS WITH DYSPNEA

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Introduction: Dyspnea due to bilateral vocal cord myoclonus is a rare manifestation of generalized palato-pharyngo-laryngeal myoclonus in chronic stroke patients. Palato-pharyngo-laryngeal myoclonus may present in some stroke patients related to hypertrophic olivary degeneration. Olivary hypertrophy may occur several months after the initial insult to the dentato-olivary pathway. Myoclonus may follow shortly afterward but persist despite subsequent olivary neuronal loss and atrophy.
Case: Here we present two cases of patients with post-stroke dysphagia who also manifested with intermittent dyspnea. During the FEES (Fiberoptic Endoscopic Evaluation of Swallowing) evaluation generalized myoclonus involving the palate pharyngeal laryngeal spaces were observed. In addition continuous rhythmical contraction of bilateral vocal folds was observed.
Conclusions: These two cases highlight that in dyspnea in chronic stroke patients may be related to myoclonus of the vocal folds. Diagnosis can be easily made with the use of the FEES.

Session 13 Poster session 3.8: Physiology and neurophysiology III

*EFFECT OF VOLITIONAL CHEWING ON MASTICATORY BEHAVIORS

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Introduction: Chewing can be performed without conscious volition because the so-called chewing central pattern generator in the brain stem controls basic motor pattern of chewing movements. However most dysphagic patients have to pay attention to their chewing and swallowing behaviors to prevent aspiration. In the present study we examined how volitional chewing affected the whole masticatory process including swallowing.

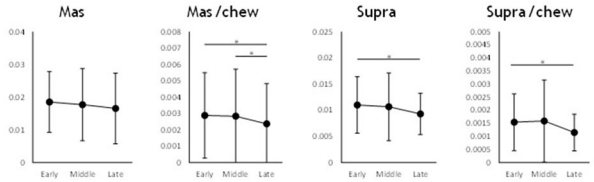

Fig. 1 Changes in EMG activity during natural chewing.
Both masseter and suprahyoid activity gradually decreased during chewing. This was also the case under T and N conditions. Mas, masseter activity; Mas/chew, masseter activity per chewing cycle; Supra, suprahyoid activity; Supra/chew, suprahyoid activity per chewing cycle. *P <0.05.

Material and Methods: Fifteen healthy participants were asked to eat 8 g of steamed rice in their natural manner. Electromyographic (EMG) activity of right and left masseter and suprahyoid muscles and videoendoscopic images were recorded. This trial was repeated three times and mean chewing times (T) and number of chews (N) until the first swallow were recorded for each individual. In the volitional test they were asked to chew the same food under T or N condition followed by swallow. Variables of EMG and VE data were compared among the conditions.

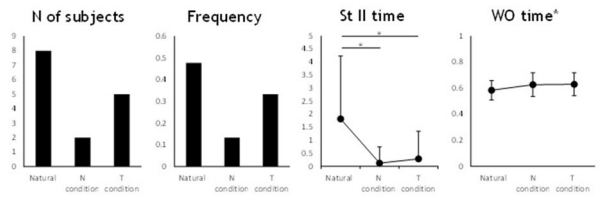

Fig. 2. Bolus propulsion into the pharynx during chewing (St II) and its effect on swallowing. The number of subjects who exhibited St II and occurrence frequency of St II were much larger during natural chewing than under N and T conditions. St II time was also longer during natural chewing and under N and T conditions. Whiteout (WO) time representing the time duration of pharyngeal swallow was different among the conditions. *P <0.05.

Results: Masseter and suprahyoid activity gradually decreased during chewing in any conditions. Volitional chewing changed the bolus propulsion from the oral cavity to the pharynx during chewing; bolus transport was rarely observed under T and N conditions. Swallowing activity was significantly smaller during natural mastication than under T and N conditions.
Conclusion: Volitional chewing may affect not only chewing but also swallowing behaviors.

*INSPIRATION BEFOR OR AFTER SWALLOW – PREDISPOSITION TO ASPIRATION AND EXACERBATION?

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Swallowing normally occurs during expiration and the breathing after swallowing is resumed with expiration. However other types of breathing-swallowing (B-S) coordination are also observed i.e. swallowing occurred immediately following inspiration (I-SW pattern) and breathing resumed with inspiration (SW-I pattern). It has been shown that Parkinson disease patients with decreased swallowing safety have a higher frequency of SW-I pattern. Further we have recently found that COPD patients with a higher frequency of I-SW and/or SW-I patterns have higher frequency of exacerbation. In the present study we investigated the frequency distribution of I-SW and SW-I patterns to know how many healthy subjects have such a trait and extracted temporal swallowing characteristics in subjects with higher frequency of I-SW or SW-I patterns. We recruited 267 elderly volunteers and measured the timing of swallow in the respiratory cycle swallowing latency (interval between the onset of respiratory pause and the onset of swallow) pause duration (duration of respiratory pause for swallowing) and the B-S coordination pattern. Twenty (7.5%) subjects had a high (> 40%) I-SW rate and 25 (9.4%) subjects had a high SW-I rate in water swallows. Subjects with a high I-SW rate tended to have a longer swallowing latency and pause duration and a longer interval to the next inspiration suggesting that I-SW pattern could be an adaptive behavior to compensate for the longer swallowing latency. On the other hand subjects with a high SW-I rate tended to swallow at a late timing in the respiratory cycle and have a shorter interval to the next inspiration which could be a risk of aspiration. In conclusion there are elderly subjects with high I-SW or high SW-I rate. Further studies are necessary to elucidate whether the tendency to have high I-SW or high SW-I rate predisposes to aspiration and/or exacerbation and whether an early intervention corrects the predisposition.

THE INFLUENCE OF LIQUID THICKNESS ON TIMING MEASURES OF SWALLOWING IN HEALTHY ADULTS

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Introduction: The goal of this study was to measure relationships between bolus flow and swallowing kinematics across a continuum of liquid consistency in healthy adults aged â ‰¤ 60. We hypothesized that parameters related to bolus flow would be significantly longer with thicker consistencies but that differences would not be seen between starch- and gum-thickened liquids matched for gravity flow despite known differences in shear viscosity.
Material and Methods: 34 participants (19 male) mean age 36 (range 21–60) swallowed 27 boluses (20%w/v barium) under videofluoroscopy acquired at 30 images/second. This included 3 boluses of thin and 6 boluses each of slightly- mildly- moderately- and extremely-thick barium thickened to meet the International Dysphagia Diet Standardisation Initiative (IDDSI) flow guidelines. Half of the stimuli were thickened using starch and half with xanthan-gum. The order of thickener presentation was block randomized. Blinded rating of the videofluoroscopy was performed for each bolus according to the ASPEKT procedure (Analysis of Swallowing Physiology: Events Kinematics and Timing).
Results: Mixed model repeated measures ANOVAs revealed significantly longer timing measures ($p < 0.05$) with thicker liquids for the timing of hyoid burst onset UES opening and swallow rest relative to bolus arrival at the mandibular ramus. Laryngeal vestibule closure reaction time did not differ by flow level but longer closure durations were seen with thin liquids. Consistency by thickener interactions were seen for UES opening duration with shorter durations of opening for gum-thickened mild and moderately-thick liquids.
Conclusions: The hypothesis of longer bolus-flow timing measures with thicker consistencies was confirmed. When starch- and gum-thickened liquids were matched for gravity flow no differences were observed in the majority of timing measures. However gum-thickened liquids appear to travel faster through the UES.

AN INVESTIGATION OF THE INFLUENCE OF SEVERAL FOOT CONTACT CONDITIONS ON SWALLOWING FUNCTION IN HEALTHY VOLUNTEERS

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Introduction: Clinically the stable foot contact during the diet is one of the keys to maintain safe swallows for dysphagic patients. However the influence of several foot contact conditions during the diet on swallowing function remains unclear. The aim of this study was to investigate the effects of several foot contact conditions on the muscle activities concerning swallowing function during deglutition of the different bolus materials. The muscle activities of the suprahyoid muscle (SHM) and the sternocleidomastoid muscle (SCM) during command swallows of different bolus materials were measured using surface electromyography (sEMG).

	Saliva	5ml Water	10ml Water	5ml yogurt	
BN90°					
Duration(s)	1.64 (SD=0.48)	1.62 (SD=0.37)	1.69 (SD=0.37)	2.04 (SD=0.66)	n.s.
Peak (μv)	48.57 (SD=18.52)	54.64 (SD=16.85)	54.46 (SD=13.36)	58.65 (SD=15.13)	n.s.
Integrated muscle activities (sμv)	25.77 (SD=15.05)	27.60 (SD=13.86)	27.47 (SD=10.56)	35.82 (SD=19.46)	n.s.
BN135°					
Duration(s)	1.63 (SD=0.54)	1.61 (SD=0.27)	1.73 (SD=0.33)	2.23 (SD=0.70)	p=0.01
Peak (μv)	42.73 (SD=12.40)	51.22 (SD=12.99)	53.71 (SD=16.64)	61.37 (SD=17.66)	p=0.03
Integrated muscle activities (sμv)	22.20 (SD=8.71)	25.13 (SD=6.63)	28.34 (SD=10.47)	38.11 (SD=16.41)	p=0.02
Off					
Duration(s)	1.70 (SD=0.43)	1.64 (SD=0.34)	1.64 (SD=0.30)	2.08 (SD=0.72)	n.s.
Peak (μv)	44.92 (SD=14.12)	52.31 (SD=15.42)	56.30 (SD=14.62)	63.05 (SD=19.90)	p=0.04
Integrated muscle activities (sμv)	25.06 (SD=13.74)	26.03 (SD=10.34)	28.00 (SD=8.37)	38.07 (SD=20.06)	n.s.
					significant values between materials using Kruskal-Wallis test
			Table1; Results of SHM		

Material and Methods: Thirteen healthy adult subjects (8 men; age range 23–36 years mean age 28.1 and 5 women; age range 25–32 years mean age 28.0) enrolled in this study as participants. Three different foot contact conditions were investigated; foot contact during bending knees 90 degrees (BN 90°) foot contact during bending knees 135 degrees (BN135°) and foot off (Off). Expect for the foot contact conditions participants maintained the same postural condition. Participants swallowed four bolus materials (1) saliva (2) 5 ml water (3) 10 ml water (4) 5 ml yogurt in each foot contact condition. The muscle activities during swallowing were detected through the bipolar surface electrodes of the sEMG located on the left SHM and both sides of the SCMs. The sEMG measurements included swallowing duration peak amplitude and integrated muscle activities of both the SHM and SCM.

	Saliva	5ml Water	10ml Water	5ml yogurt	
BN90°					
Peak (μv)	12.50 (SD=3.53)	12.35 (SD=2.99)	12.66 (SD=3.21)	13.76 (SD=3.66)	n.s.
integrated muscle activities (sμv)	3.18 (SD=2.10)	3.29 (SD=1.79)	3.48 (SD=2.32)	4.69 (SD=3.84)	n.s.
BN135°					
Peak (μv)	12.65 (SD=2.78)	12.72 (SD=2.99)	12.60 (SD=3.17)	14.16 (SD=2.87)	n.s.
integrated muscle activities (sμv)	3.26 (SD=1.78)	3.39 (SD=1.74)	3.71 (SD=1.84)	4.95 (SD=3.16)	n.s.
Off					
Peak (μv)	12.30 (SD=3.10)	12.58 (SD=3.23)	12.87 (SD=3.07)	13.97 (SD=3.45)	n.s.
integrated muscle activities (sμv)	3.31 (SD=1.54)	3.06 (SD=1.56)	3.02 (SD=1.39)	4.58 (SD=2.85)	n.s.
					significant values between materials using Kruskal-Wallis test
			Table2; Results of SCM		

Results: Results of SHM and SCM are shown (Tables 1, 2). Swallowing duration peak amplitude and integrated muscle activities of SHM during a 5 ml yogurt swallow in BN135° significantly greater than those of other bolus materials swallows in BN135°. There was no significant difference found in the other measurements investigated in this study.

Conclusions: Results of this study suggested that foot contact during BN135° might influence on the swallowing function.

FACTORS RELATED TO SWALLOWING ORAL PHASE

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Introduction: Efficacy of swallowing oral phase is often impaired in dysphagic patients and may impact on pharyngeal stage meal consumption nutritional status and quality of life. However factors related to oral phase of swallowing have been little studied.

Matherial and Methods: Thirty-nine adult patients with dysphagia of different etiology were enrolled. FEES and the Test of Mastication and Swallowing Solids (TOMASS) were performed. The Penetration-Aspiration scale the Yale Pharyngeal Residue Severity Rating Scale and the Dysphagia Outcome and Severity Scale (DOSS) were used to assess the FEES. Tongue strength was assessed using the Iowa Oral Performance Instrument. Patients completed the Eating Assessment Tool-10. The time the patients needed to consume a meal the Functional Oral Intake Scale score and the body mass index (BMI) were recorded. Correlations between the TOMASS and other variables were studied using Spearman's correlation coefficient. TOMASS scores were compared between patients with complete denture and those with partial edentulism through Mann–Whitney test.

Results: The number of discrete bites correlated only with the BMI (r = -0.38; p = 0.01). Statistically significant correlations were found between the number of masticatory cycles and tongue strength (r = -0.47; $p < 0.01$) pharyngeal residue (r = 0.42; $p < 0.01$) DOSS (r = -0.38; p = 0.01). The total time of the TOMASS correlated with tongue strength (r = -0.45; $p < 0.01$) pharyngeal residue (r = 0.48; $p < 0.01$) time needed to consume a meal (r = 0.41; p = 0.01) and DOSS (r = -0.36; p = 0.02). A significant difference was found between patients with complete denture and patients with partial edentulism for the number of masticatory cycles (p = 0.02) and total time (p = 0.03).
Conclusions: Swallowing oral phase seems to correlate with tongue strength denture pharyngeal residue overall dysphagia severity duration of meals and BMI. Further studies involving a larger sample size are necessary to confirm present data.

THE EFFECT OF DIFFERENT STIMULATION PARAMETERS ON LARYNGEAL MOVEMENT IN HEALTHY VOLUNTEERS WHEN APPLYING NMES TO SUBMENTAL MUSCLES

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Much of the research on NMES in speech pathology has utilized stimulation parameters based on the Vitalstim system. However these parameters lack a clear rationale insofar some studies have opted for frequencies and pulse durations lower than the 80 Hz and 300 μs in a bid to reduce risks of laryngospasm and laryngeal depression; and decrease metabolic demands. A stimulation frequency of 80 Hz is misaligned with findings in physiotherapy; where frequencies of 12–16 Hz and 18–25 Hz have been recommended for optimal muscle contractions. No attempts have been published yet to define the optimal stimulation parameters for the use of NMES in dysphagia. Measurement of movement of the larynx in millimeters (as assessed with video analysis) when the floor of mouth muscles are stimulated with 9 different settings (ranging from 80 Hz 300 μsec to 30 Hz 150 μsec). Secondary outcomes included: swallow apnea max. tolerable intensity and participant comfort. Thirteen healthy volunteers were included. Laryngeal elevation in rest varied when muscles were stimulated. Both laryngeal elevation and laryngeal depression were seen during stimalation. A stimulation with 30 Hz 150 μsec was found to be the most tolerable whereas 80 Hz stimulation were perceived as most painful. Our data suggests that in the treatment of dysphagia with NMES a 30 Hz 150 μsec stimulation is preferable over other stimulation parameters. However large individual differences seem to exist. Our data also supports recent findings that NMES of the neck muscles might lead to fixation of the larynx during swallowing and not to facilitation in some participants.

CHARACTERISTICS OF SEMG SIGNALS OF SUBMENTAL MUSCLES DURING DEGLUTITION IN HEALTHY VOLUNTEERS

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The aim of this study is to determine whether sEMG is a reliable tool for measuring pharyngeal delay by exploring the influence of different bolus characteristics (i.e. volume viscosity and temperature) known to influence pharyngeal transit times on temporal measures within a captured sEMG signal in normal healthy volunteers. Thirty-nine healthy participants (mean age 30.3 years; range 20–68; four male) swallowed boluses differing in: volume (5 ml and 10 ml); temperature (room and ice water temperature) and viscosity (water and yoghurt). The swallows were performed under two conditions a normal and an effortful swallow. sEMG electrodes were attached to the submental muscles for swallowing tasks. Data was collected using the sEMG module on the Kay Pentax Swallowing Station. Participants demonstrating double swallows in all trials were excluded. The average pharyngeal delay times and sEMG activity for each observation were calculated. Data was then analysed using the Friedman Test. Correlation analysis was done to determine whether there was a relationship between age weight height and BMI and pharyngeal delay. Results showed that changes in bolus characteristics did not result in significant changes in temporal measures within the captured sEMG signal of the submental muscle activity. No correlation between temporal measures and height weight BMI and age were found. In conclusion changes in bolus characteristics known to affect pharyngeal response times in swallowing were not reflected in significant changes in temporal measures within an sEMG signal.

*EFFECTS OF TEXTURE MODIFIED DIETS ON BRAIN ACTIVITY

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Introduction: Texture modified diets (TMDs) are often used for the elderly with swallowing disorders or dental problems. With generally decreasing cognitive function activation of the brain by frequent and regular eating is effective in maintaining or improving cognitive function. This study aimed to examine the differences in the effect on brain activity by consuming meals of different textures and to identify other factors affecting brain activity by eating.
Materials and Methods: Eleven volunteers aged between 24 to 48 years with no evidence of dysphagia participated in this study (5 females 6 males). Four meal types (normal diet soft diet TMD not requiring chewing and liquid diet) were provided and evaluated for each participant on different days in a random order. We examined short-term memory ability before and after meals using a recall test. Subjective stress levels (SSL 6-grade scale) before and after meals and evaluations on the meals (5-grade scale) were reported by each participant.
Results: In the recall test a significant increase in the number of correct answers was observed only after consuming a normal diet. For the normal and soft diets no other factors affecting brain activity were identified. Higher evaluations for appearance and taste of the liquid diet were related to greater brain activity. SSL changes while consuming TMDs affected brain activity but differed by sex.
Conclusions: For healthy adults physical pressure stimulation to the periodontal ligament due to chewing with normal force appears to induce brain activation and improve short-term memory. Furthermore taste and visual stimuli had a positive influence on short-term memory in stimulating greater brain activity and should be considered alongside the physical benefits of TMDs.

Session 13 Poster session 3.9: Treatment IV

EFFECT OF CEPHALIC POSTURAL CORRECTION ON SPONTANEOUS SWALLOWING FREQUENCY IN PATIENTS WITH MINIMAL CONSCIOUSNESS STATE

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Introduction: Spontaneous swallowing (SS) is one of the protective airway reflexes. Reduction in frequency increases the risk of aspiration lung disease. In neurological patients with chronic consciousness disturbance body posture may result increasingly affected and the frequency of SS consequently decreased. This lower SS frequency is taken as an index of high sensitivity of dysphagia and generates an increase in pharyngeal secretions.

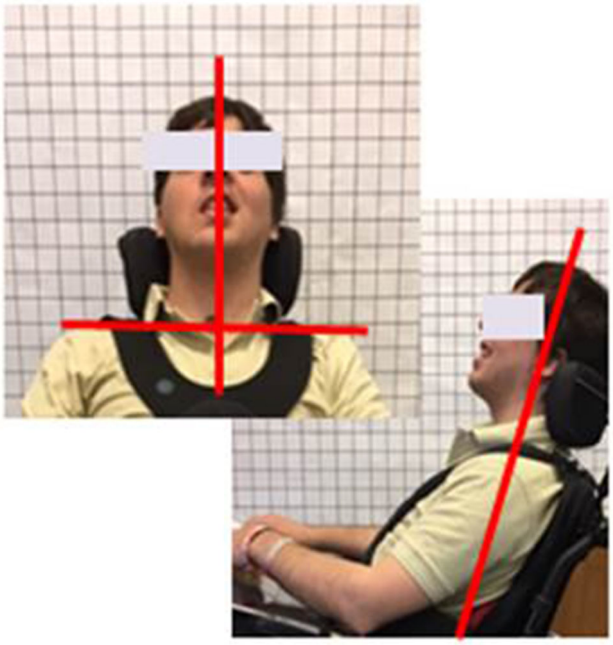
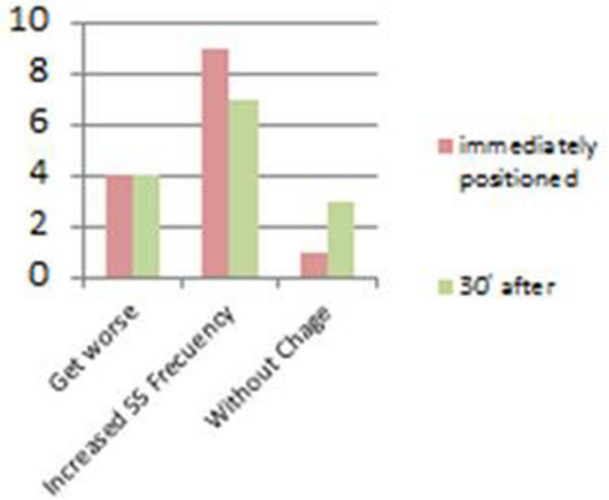


Fig.1: Postural Alignment, front and lateral plane

Efficient posture requires minimal energy in order to maintain correct body segment alignment favoring the proper muscle chains that work on SS function. The neutral position minimizes cervical tension which might contribute to an improvement in SS.



Objective: To study the effects of cephalic and cervical postural correction on the SS frequency in patients with minimal consciousness state.

Materials and Methods: Cross-cohort study of adult patients admitted to a rehabilitation clinic presenting score grade 2 and 3 on JFK awareness scale. SS was measured through three-stage cervical auscultation: a first measurement without postural correction a second measurement with postural correction and a third measurement 30' after postural correction.

Results: An increase in SS frequency was observed in 64% of patients after cervical posture correction. Among these patients 6666% were able to maintain the improvement after 30´.

Discussion: The results obtained suggest that neutral positioning help correct oropharyngeal structure alignment triggering SS and improving secretion management.

HYOID BONE MOVEMENT DURING MAGNETIC STIMULATION OF SUPRAHYOID MUSCLES

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Introduction: Recently laryngeal elevation by functional electrical stimulation has been reported for patients with reduced laryngeal elevation. The suprahyoid muscles consisting of the geniohyoid mylohyoid digastric and stylohyoid muscles and the thyrohyoid muscles (infrahyoid muscle) are responsible to elevate larynx. Among those muscles the geniohyoid mylohyoid and anterior belly of digastric muscles are usually stimulated by using surface electrodes. However we cannot get enough hyoid movement because surface electrodes stimulate skin nociceptors that give pain and discomfort to the subjects. On the other hand magnetic stimulation can penetrate the skin and adipose tissues which have a high electrical resistance. The purpose of this study is to evaluate hyoid bone movement during magnetic stimulation of suprahyoid muscles.
Materials and Methods: This study was approved by the institutional review board and written informed consent was obtained from all subjects. A new coil for stimulating suprahyoid muscles was developed and it was connected to the magnetic stimulator (Pathleader IFG Sendai Japan). Five healthy adult subjects participated in the study. The location of the hyoid bone at rest and during magnetic stimulation was identified by using fluoroscopy and the movements were calculated.
Results: The hyoid bone moved anterior and superior by magnetic stimulation. The maximum movement of hyoid bone was over 10 mm without inducing intolerable pain.
Conclusion: The magnetic stimulation may be an alternative to the electrical stimulation because we can get enough laryngeal elevation with less pain.

PHARYNGO-OESOPHAGEAL DILATATION IS AN EFFICACIOUS BUT SHORT-LIVED THERAPY IN LONG-TERM DYSPHAGIA FOLLOWING HEAD AND NECK CANCER

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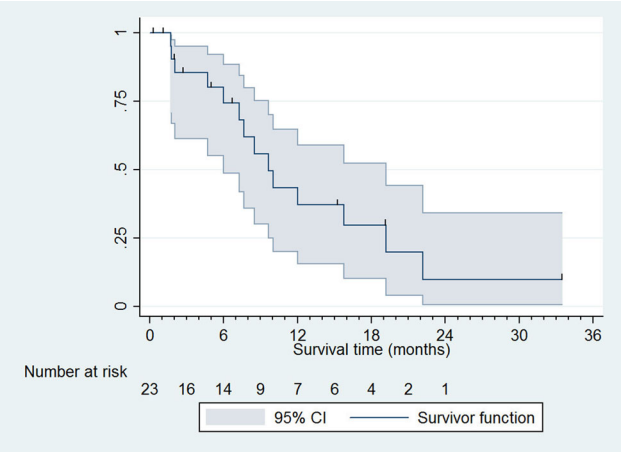
Aim: To evaluate the safety and efficacy of endoscopic pharyngo-oesophageal dilatation in Head and Neck Cancer (HNC) survivors with long-term dysphagia.
Methods: 41 HNC survivors with long-term dysphagia ($\geq$ 12 mths) identified by raised ($>$ 234) Sydney Swallow Questionnaire score (SSQ) were blindly randomized to receive a series of graded endoscopic dilatations (Savary-Gilliard) up to 16 mm or to receive a sham dilatation (diagnostic endoscopy only). The primary endpoint was a short-term clinical response at 3-months after the intervention defined as (1) a decrease in SSQ score by $\geq$ 200 or a score $\leq$ 234; and (2) satisfactory response based on the global assessment. Non-responders from sham arm were offered crossover to the dilatation arm. Relapse of dysphagia was defined as (1) an increase of SSQ score to within 20% of pre-dilatation baseline; and (2) clinical need for intervention.



Results: Short-term clinical response was achieved in 16/21 (76%) of those who received endoscopic dilatations; and in 1/20 (5%) of those who received sham dilatation ($p < 0.001$). In crossover dilatations the response rate was 81% (13/16). The mean of 3.5 (range 1 13) dilatation sessions was required to achieve a clinical response. Presence of mucosal tears post dilatation was associated with clinical response (OR 13.4 95% CI [2.4 74.9] $p < 0.05$). Kaplan–Meier analysis of relapse data with a mean follow-up time of 8.6 months (range [0.3 33]) estimated 50% of responders relapsed by 9.6 months (95% CI [6.0 19.2]) from completion of dilatation (Fig 1). No serious complications (perforation or severe bleeding) occurred.
Conclusion: Endoscopic dilatation is a safe and efficacious therapy for long-term dysphagia in HNC survivors. However the dysphagia relapse rate is disappointingly high. Close follow-up is necessary to detect early dysphagia recurrence.

DYSPHAGIA MANAGEMENT USING TEXTURE MODIFIED CONSISTENCIES: A SURVEY OF SWEDISH SPEECH LANGUAGE PATHOLOGISTS' PRACTICE

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Introducton: Texture modified consistencies (TMC) is a common compensatory strategy to improve safety and efficiency of oral intake in dysphagia management. Lack of consensus on terminology for TMC within/between professions places a person at risk of poor oral intake malnutrition dehydration and aspiration. This study investigates Speech Language Pathologists (SLPs) dysphagia management with TMC terminology used collaboration with other professions and knowledge of research developed TMC guides along with a possible relationship with (a) dysphagia experience (b) frequency of dysphagia work and (c) caseload.
Method: 88 SLPs from 19/21 Swedish regions responded to a study-specific survey. All SLPs managed dysphagia using TMC

(< 6 months) and worked in public healthcare. Recruitment occurred via the regions SLP/department managers and the Swedish SLP association and union website and member forum webpage. Descriptive statistics and inferential statistics using Pearson's Chi square test and Kruskal–Wallis for non-parametric data was employed.

Result: 78 terms for TMC were identified. An overlap of both the term (name given to TMC) and the description of TMC occurred. 70.1% reported to use different terms to describe same/similar textures. No significant results ($p < 0.05$) were found between SLPs knowledge of guides and dysphagia experience frequency of dysphagia work or caseload. Although knowledge of established guides was high (90.9%) TMC was often (59.6%) based on local documents. 96.6% of SLPs collaborated with other professions. Of SLPs 56.8% reported collaboration being inadequate citing difficulties in transferring recommendations as a concern.

Conclusion: A wide variation of terminology is used by Swedish SLPs when communicating TMC within/between professions. Accurate communication with TMC is essential to ensure safe and efficient oral intake. Future research should investigate standardising terminology for improved dysphagia management.

THE UNIAXIAL EXTENSIONAL BEHAVIOUR OF DYSPHAGIA-DESIGNED ORAL NUTRITIONAL SUPPLEMENTS IN THE PRESENCE OF SALIVA

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In the treatment of dysphagia the link between the severity of the diagnosis and the prescription of oral nutritional supplements (ONS) that are considered to be safe to swallow is not always straightforward. The complex rheological nature of ONS makes their characterization difficult. Furthermore the classification as safe for swallowing is based on a single value of shear viscosity at a shear rate of 50 s^{-1} as recommended by the guidelines [1]. However it is already acknowledged that extensional flows are also involved in the oral processing and swallowing [2–4]. Therefore extensional rheology would also need to be considered in the development of new dysphagia-designed products. In this work ONS for dysphagia management have been studied by means of a capillary break-up extensional rheometer (CaBER) with an attached high-speed camera and an axial force sensor. Different commercially available products were tested both pure and mixed with reconstituted salivary α-amylase fluid (saliva) at a ratio of 10:1.

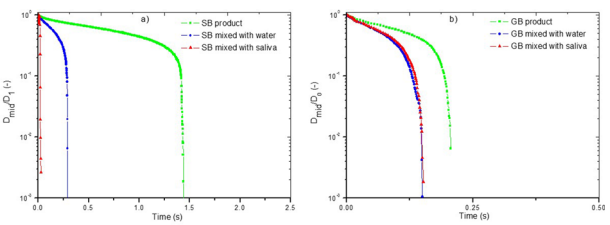

Figure 1: The effect of saliva and water addition, respectively, on the normalized midfilament evolution of a starch-based (a) and a gum-based (b) dysphagia-designed oral nutritional supplement.

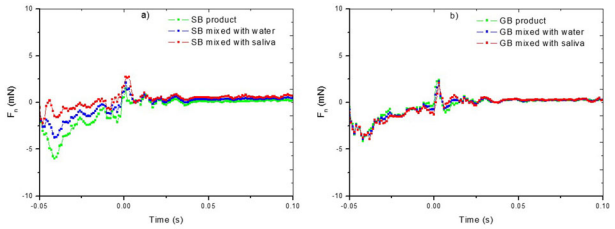

Figure 2: The effect of saliva and water addition, respectively, on the axial force evolution of a starch-based (a) and a gum-based (b) dysphagia-designed oral nutritional supplement, corresponding to spoon-thick consistency.

Elongational behaviour and the full filament profile were both monitored while the axial forces evolving during the stretching were recorded. The results provide a first view of the impact of salivary α-amylase on elongational properties of different type of ONS differentiating between gum-based and starch-based products when considering the midfilament evolution and the axial force recorded during elongation. Capillary break-up extensional rheometry was found to be a fast and sensitive method to characterize the structure changes in the elongational properties of ONS in the presence of α-amylase which could have a significant importance in aspects related to safe swallowing. In addition to this axial force measurements revealed to be an efficient method to identify structure changes in the elongational properties of highly concentrated dysphagia-designed ONS for which the conventional CaBER experiments are technically limited.

AUDIT OF SAFETY AND QUALITY OF SELF-EXPANDING METALLIC STENT (SEMS) INSERTION IN PATIENTS WITH DYSPHAGIA

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Introduction: Dysphagia is a common symptom in late stages of upper gastrointestinal(GI) malignancy. The main aim in palliative treatment is to achieve patency of the digestive tract. In patients with oesophageal cancer and life expectancy of less than 3 months the best therapeutic option would be for oesophageal stenting.

Material and Methods: A retrospective audit was performed in patients who had an endoscopic stent insertion in 2015 across a trust in the UK. The British Society of Gastroenterology(BSG) guidelines were used to outline the measures of this audit. Information from case notes were extracted electronically.

Results: 19 patients were found to have had endoscopic stent insertions but 1 patient was excluded due to a GI bleed related stent insertion. Out of the 18 patients all patients had a malignant cause (oesophageal gastric pancreatic duodenal). The median time from diagnosis to stent insertion was 21(IQR 7–192) days. All patients had a radiographic confirmation post-stent insertion to ensure satisfactory stent position. Only one patient (5.5%) required radiographic assistance throughout the procedure. All patients had the procedure within working hours with full surgical access for possible complications. Only 1 patient (5.5%) was found to have a stent insertion preceding their MDT discussion. However none of these patients had any documentation of dysphagia scores. There were 7 complications identified in 5 patients (27.7%) (immediate = 1 early = 3 late = 3). Re-intervention was noted in 2 patients (11.1%) (dilatation = 1 re-stenting = 2). The 30-day mortality rate was n = 3 (16.7%) with 1 patient remaining alive and the median survival rate of 150(IQR 4–480) days.

Conclusion: The use of SEMS in palliative patients with dysphagia in our trust has been satisfactory against the set guidelines by the BSG and comparable to previous studies. However we need to incorporate dysphagia scores pre and post SEMS to identify improvement of symptoms.

THE IMPACT OF DIETARY RECOMMENDATIONS ON STROKE ASSOCIATED PNEUMONIA BASED ON THE GUGGING SWALLOWING SCREEN

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Background: There is unequivocal evidence from various registries that formal screening for dysphagia following acute stroke is strongly recommended. Surprisingly there is little evidence how diet recommendations based on a dysphagia screening affects the rate of aspiration pneumonia. The study reports the results from a large single centre cohort.
Methods: Retrospective prospective database analysis of all patients (n = 1510) admitted with acute stroke or TIA from 2012 to 2014 at the acute stroke-unit at our university clinic. In 2007 we have developed and implemented a multi-consistency dysphagia test: The Gugging Swallowing Screen (GUSS). Dietary modification was performed according to the recommendations from the GUSS score. The rate of stroke associated pneumonia (SAP) was analysed in relation to the dietary recommendations.
Results: Overall 1051 (69.6%) patients were screened with GUSS; of these 50 (4.8%) developed stroke associated pneumonia (SAP). Of 217 patients who were assigned to receive nothing per mouth (NPO) 30 (13.8%) developed SAP whereas only 20 (2.4%) of the other 834 patients developed SAP. The 233 (22.2%) patients who were assigned to a special diet due to liquid swallowing problems during the GUSS would set NPO when using a water test only.
Conclusion: The multi-consistency and multidisciplinary GUSS allows patients an early oral intake. The international comparatively low rate of SAP is probably due to dietary modifications recommended by the GUSS. Patients with the highest risk of SAP were correctly identified by the GUSS and assigned to NPO. However dietary modifications cannot prevent pneumonia—especially in severe dysphagia cases.

Session 13 Poster session 3.10: Other

POSTOPERATIVE DYSFAGIA AFTER SURGERY WITH FREE FLAP RECONSTRUCTION FROM FORMARM: CASE STUDY

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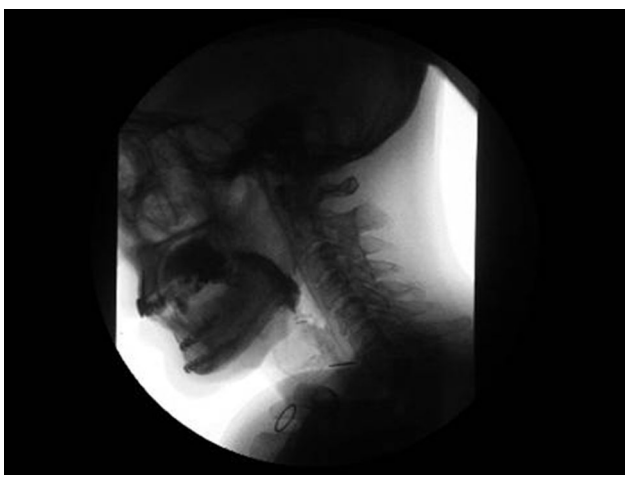
Purpose: Case study of the patient suffered from cancer of oral cavity after hemiglossectomy with free flap reconstruction.
Method: 58 years old women who had: 2008—radiotherapy XII'2015—first surgery (local removal of tongue cancer) and I'2016—second surgery (hemiglossectomy with free flap reconstruction). We made a VFS FEES oral motor assessment EAT-10 questionnaire water swallowing test. Screening nutritional assessment was conducted with Subjective Global Assessment and Nutritional Risk Screening 2002 questionnaires. Body composition was assessed by using electrical bioimpedance method with BioScan 920-2 Standard FDSA + technology (software ver. V1.1.172).

Results: Results indicated that patient had a oropharyngeal dysphagia with no possibility of oral intake. First FEES results (II'2016): silent aspiration; residue; ineffective and multiple swallows; premature spillage; no possibility of solid food intake. VFS (III'2016): residue in oral cavity; partial swallowing; tongue pumping; difficulty forming bolus; pharyngeal reflex delay. After operation patient had a NG-tube (14 days) than gastrostomy. We recommended: nothing by mouth. Patient was at risk of malnutrition (SGA-C NRS-2002—3 points) she lose > 5% of usual weight within 3 months. Fat mass was below the range values. Malnutriton Index (ECM/BCM) was normal (07). She presented good hydration and body cell mass (20 kg) as well as muscle mass (192 kg) were also within the range values. In May 2016 patient was on oral feeding with restriction of drinking thickened fluids and minced and moist diet. In IX'2016 we see: no regurgitation; spontaneous clearing of the hypopharyngs residue; effective swallows and cough reflex; WST negative. EAT 10 questioner—4 points.



Conclusion: Comprehensive care of phoniatrician speech language therapist and dietitian is crucial in recovery of patient with dysphagia after surgery with free flap reconstruction.

Session 13 Poster session 3.10: Other

EFFECT OF LEE SILVERMAN VOICE TREATMENT (LSVT® LOUD) ON DYSPHAGIA IN PATIENTS WITH PARKINSONISM (PROGRESSIVE SUPRANUCLEAR PALSY AND MULTIPLE SYSTEM ATROPHY)

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Introduction: Lee Silverman Voice Treatment (LSVT® LOUD; LSVT) focuses on a simple set of tasks designed to maximize phonatory and respiratory functions. LSVT has Level 1 evidence in the speech and voice treatment of idiopathic Parkinson's disease (iPD). In addition effects for improving deglutition have been reported in a pilot study of a few iPD cases. However few reports have described LSVT effects in advanced Parkinsonism. The purpose of this study was to evaluate whether LSVT can improve swallowing function in patients with Parkinsonism (progressive supranuclear palsy (PSP) and multiple system atrophy (MSA).
Material and Methods: The LSVT program was administered to 3 patients: Patient A a man in his 80 s with PSP; Patient B a woman in her 70 s with MSA; and Patient C a man in his 70 s with PSP who walked and ate meals with assistance. These patients performed LSVT four times a week for 4 weeks with a speech-language-hearing therapist (SLHT) certified in LSVT. They also performed self-training for 15 min every day. Deglutition function was evaluated by videofluoroscopy (VF) before and after the 4-week study period. Speech intelligibility was evaluated by SUGI Speech Analyzer and communication was evaluated by three SLHTs.
Results: In VF residue in the pharynx and penetration were decreased in Patients A and B. Maximum utterance continuation time was increased from 4.2 s to 5.9 s in Patient A and from 5.3 s to 6.1 s in Patient B. Speech intelligibility was improved in both Patients A and B. Patient C temporarily stopped LSVT in week 3 because of rib fracture and pain but continued in cooperation with an at-home SLHT by telemedicine. In Patient C aspiration disappeared within 6 months on VF and speech intelligibility improved.
Conclusions: LSVT improved swallowing and speech in patients with advanced-stage Parkinsonism. If temporary degradation of activities of daily living occurs accidentally LSVT effects can be expected with continued treatment.

CLINICAL FEATURES OF DYSPHAGIA IN ADULTS WITH RHEUMATOID ARTHRITIS

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Introduction: Rheumatoid arthritis (RA) is a common autoimmune disease with an estimated worldwide prevalence of between 0.5 to 1.5%. Up to 30% of people with RA can be affected by extra-articular disorders which include secondary Sjogren's Syndrome head and neck manifestations periodontitis and interstitial lung disease. Dysphagia can also be present as a result to the disease itself or the treatment administered to counteract the symptoms. The aim of this systematic review is twofold: to highlight the specific clinical features of dysphagia in people with RA and to highlight the prevalence of dysphagia in the same population.
Methods: A systematic review was carried out in accordance with PRISMA guidelines on case control studies examining oral pharyngeal and oesophageal features in adult RA populations published between 1996 and 2017. Hand searches of reference lists of included studies were also performed. Bias was assessed using the Cochrane Risk of Bias Tool and study quality appraised via the McMaster quality assessment tool. A data extraction framework was developed based on the PICO framework with outcomes centred on the phases of swallowing and prevalence of dysphagic features.
Results: Results will be presented on the overall quality of papers and risk of bias. Prevalence for the specific clinical features of dysphagia will be retrieved and specific symptomology such as odynophagia xerostomia temporomandibular joint involvement periodontal diseases oral mucosal and additional head and neck manifestations will be gathered and categorised according to the phases of swallowing.
Conclusions: The quality of the studies used in the review will be examined and the basis of findings presented in this context. Risk of dysphagia and the specific dysphagia symptomology of adults with RA will be identified. Recommendations arising from this review will be made.

RELATIONSHIP BETWEEN PHYSICAL CONDITION OF BOLUS AND SWALLOWING INITIATION

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Introduction: During chewing bolus formation is processed by reduction of food and mixture with saliva. Although previous studies suggested that physical condition of food bolus was important to determine the swallowing initiation it is still unknown how it determines the swallowing initiation. In the present study we examined the relationship between physical condition of bolus and swallowing initiation during chewing.
Material and Methods: Twenty-nine healthy participants were instructed to chew 8 g of steamed rice three times in their natural manner. From the recordings chewing time (the time between onset of chewing and first swallow) was determined in each individual. The participants were then asked to chew the same food for 50, 100, and 150% of their averaged chewing time and spit out. The rheological property of the bolus at each time was compared among the times.

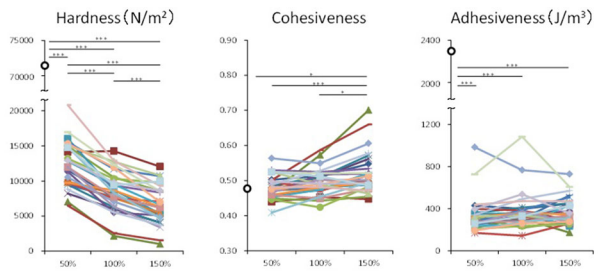

Fig. 1 Changes in rheological property of bolus.
Each color line represents each individual. Open circles on each y-axis indicate the value at baseline (before chewing).

Results: Hardness gradually decreased with the increase of chewing time (Fig. 1). Cohesiveness increased after 100% of chewing time and adhesiveness did not differ among the stages but was significantly smaller at any stage than at baseline (before chewing) (Fig. 1). Although all the variables widely varied among the participants there was a significant negative and positive relationship between chewing time and hardness (Fig. 2) and between chewing time and cohesiveness respectively.

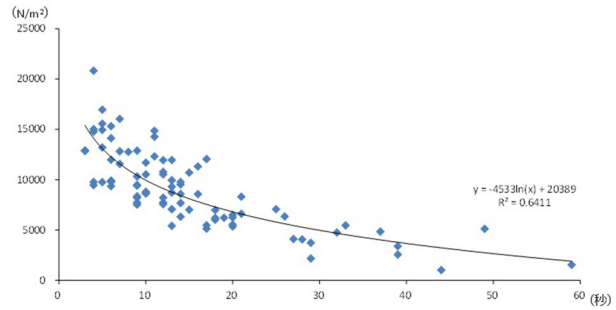

Fig. 2 Relationship between the time (x) and hardness (y). All the data were plotted on this graph.

Conclusion: Swallowing initiation may be determined by each individual's habit and the properties of bolus to determine the swallowing initiation may be not uniform among individuals. Fig. 1 Changes in rheological property of bolus. Each color line represents each individual. Open circles on each y-axis indicate the value at baseline (before chewing). Fig. 2 Relationship between the time (x) and hardness (y). All the data were plotted on this graph.

*NUTRITIONAL STATUS AND INFLAMMATORY RESPONSE IN PATIENTS WITH AND WITHOUT LARYNGEAL PENETRATION/ LARYNGOTRACHEAL ASPIRATION

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Introduction: Studies that reported aspiration syndromes including pulmonary aspiration have observed increased activity of the inflammatory response in patients and in experimental models such as C-reactive protein (CRP) Myeloperoxidase (MPO) and Nitric Oxide metabolites (NOx). Oropharyngeal dysphagia may result in pulmonary aspiration and nutritional complications and these nutritional complications may alter the inflammatory response.
Objective: To evaluate the inflammatory biomarkers: MPO NOx and CRP and the nutritional status of adults/older adults with dysphagia distributed in: group with laryngeal penetration/laryngotracheal aspiration (PAG) (n = 21) (median age: 61.4 years) and group without laryngeal penetration/laryngotracheal aspiration (WPAG) (n = 15) (median age: 62.8 years).
Material and Methods: Cross-sectional study conducted between April/2014 and December 2017. Swallowing was analyzed by videofluoroscopy nutritional status by body mass index (BMI) and the serum biomarkers: MPO NOx and CRP. The relationship between the PAG and the WPAG was performed by logistic regression analysis and the difference median between Control Group (CG) (n = 20) (median age: 57.5 years) and the other groups was performed by Mann- Whitney test ($p < 0.05$).
Results: In multivariate analysis it found not association of MPO NOx and CRP (adjusted: gender age and comorbidities) between PAG and WPAG. Similarly was not association of BMI between PAG and WPAG. However both groups showed elevated inflammatory biomarkers compared to GC: PAG [MPO (806.6 mU/ml p = 0.002); NOx (51.2 μmol/L p = 0.022); CRP (3.19 mg/dL) and WPAG [MPO (960.6 mU/ml; p = 0.001); NOx: (60.2 μmol/L; p = 0.002) and CRP (1.8 mg/L; p = 0.002)].
Conclusions: MPO NOx and CRP were not associated with the presence of penetration/aspiration. These results may indicate that not only the aspiration is involved with the increase of the inflammatory response in oropharyngeal dysphagia.

"EATING IS MY WORST NIGHTMARE": THE EPIDEMIOLOGICAL INVESTIGATION OF ORAL STAGE DYSPHAGIA IN ADULT PATIENTS WITH TEMPOROMANDIBULAR DISORDERS

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Introduction: Temporomandibular disorders (TMDs) cause pain/dysfunction restricted movement and fatigue of the jaw joint which may result in oral stage dysphagia (OD). The epidemiology of TMD-related OD is under-explored and management is uncertain with no specific clinical guidelines. Aims were 1) to determine the epidemiology of TMD-related OD (2) to raise the condition's profile and (3) to provide avenues for future clinical improvements.
Material and Methods: A cross-sectional design was used to study the epidemiology and management of TMD-related OD. Consecutive adults with TMDs who presented to national specialist centres over a 6 month period in 2016 were included. Individuals were excluded if they had comorbid mandibular conditions. Assessment was conducted using a newly developed questionnaire. Descriptive and statistical analysis was conducted.
Results: 178 participants were recruited with 99% (n = 176) reporting at least one sign/symptom of OD. Frequently experienced symptoms included painful mastication (89.88%) difficulty chewing (89.32%) and masticatory fatigue (78.08%). A broad range of psychosocial OD symptoms (e.g.: avoidance of eating (85.39%) and socialisation (94.8%)) were also reported. A range of TMD-related OD interventions were reported including: rehabilitative medical surgical and dental methods; e.g.: diet modifications (81.46%) analgesia (78.65%) and oral splints (74.08%).
Conclusions: TMD-related OD is a prevalent condition which may impact on both functioning and well-being. However a limited amount of epidemiological research has been conducted on this issue and there are a lack of clinical resources and guidelines. Therefore patients may be under-identified with potential effects on recovery. This research provides accurate theoretical information regarding this under-explored condition. It may also influence practice by piloting a new assessment for these patients. However further epidemiological research is needed.

AN INTERNATIONAL PREVALENCE OF SELF REPORT SWALLOWING PROBLEMS (PRELIMINARY RESULTS)

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Introduction: There has been a lot of work on the presence of dysphagia in many medical conditions. Community studies of dysphagia have focussed predominantly either older people or specific localities (Clinics Care Homes one town). Little has been published with respect to the occurrence of self-reported dysphagia in many countries. The EAT-10 has been validated used in many different populations and published in many languages. The rise of social media provides opportunities to reach more people in diverse communities than before.
Methods: We have conducted questionnaire study using the EAT-10 using snowball recruitment. The questionnaire was sent by the authors to one person who was asked to cascade to their contacts between the ages of 18 and 65 years. A score of greater than 2 suggests a problem with swallowing.
Results: 2035 people have responded to the request to complete the questionnaire; responses of come from 51 countries (Africa (8 0.4%) Asia (27 1.30%) Australasia (148 7.27%) Europe (654 32.13%) North America (1219 59.9%) South America (30 1.4%)). Of the respondents 1671 (81.15%0 were female median age 34 years mean age 37.6 years. 259 (17.59%) had a score of 3 or greater a further 108 $>$ 2 (27.96%). 17% had coexisting medical conditions that could contribute to the symptoms of dysphagia.
Conclusions: This is the first study to be conducted across so many continents and countries. 27.96% reported a score of $>$ 2 suggesting a significant number of young people in the general population who have a problem with their swallowing. This concurs with the results from a telephone survey in a Dutch population (28.9% of people $<$ 60 years).
Limitations: These results are interesting but the study has the following limitations. The majority of respondents were female and came from the northern hemisphere (Europe and North America). Recruitment relied on respondents to an email request and as such the denominator is unknown.

EPIDEMIOLOGICAL PROFILE OF CANCER PATIENTS ATTENDED TO BY THE TEAM OF SPEECH THERAPY IN A PRIVATE HOSPITAL IN SÃO LUÍS-MA

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Introduction: The speech therapist has a greater performance in patients with head and neck cancer. However due to xerostomia sarcopenia lowering of the level of consciousness generalized muscle weakness which can affect any cancer patient this can go with dysphagia.
Materials and Methods: Study of retrospective type through the collection and analysis of data found in the speech therapy team statistics in the period from July to December 2015. With the following variables: age gender anatomical location of the neoplasm procedures type of feed speech therapy treatment.
Results: Of 115 cancer patients 93 have been assessed by the team being: 42 were (45%) male and 51 (55%) female. The predominant age was 51–60 years (40%). The prevalent Neoplasms were breast (n = 23) stomach (n = 10) Lung (n = 10) prostate (n = 8). As to medical treatment: chemotherapy held 44 (showing change in taste mucositis and change in consistency of diet) 5 radiotherapy 6 radiotherapy Association and chemotherapy and surgical approach 11; It has been suggested for patients 7 nasogastric tube probe 2 Gastrostomy tube and 1 jejunostomy tube.
Conclusion: It was found that the profile of the patients is of an elderly population predominantly female with breast neoplasm gastric lung and prostate with medical clinic intervention greater than the trailers. The speech therapist had to intervene in 100% of patients. It was observed that patients regardless of the neoplasm need to be evaluated by the audiologist not only with head and neck cancer. As well as further studies are necessary to elucidate the cause of dysphagia in this population
Keywords: Pacient cancer; swallowing; swallowing disorders.