A predictive model for swallowing dysfunction after curative radiotherapy in head and neck cancer

Langendijk, J. A.; Doornaert, P.; Rietveld, D. H.; Verdonck-De Leeuw, I. M.; Rene Leemans, C.; Slotman, B. J.

Published in:
Dysphagia

DOI:
10.1007/s00455-011-9343-3

Dysphagia (2011) 26:324–331
DOI 10.1007/s00455-011-9343-3

COMMENTS

Comments on Selected Recent Dysphagia Literature

Clarence T. Sasaki · Steven B. Leder

Received: 17 March 2011 / Accepted: 20 April 2011 / Published online: 12 May 2011

Swallowing Dysfunction in Trauma Patients with Cervical Spine Fractures Treated with Halo-Vest Fixation

Bradley JF 3rd, Jones MA, Farmer EA, Fann SA, Bynoe R

J Trauma 2011;70(1):46-48

This study hypothesized that use of halo-vest fixation in traumatically injured adult patients ($n = 56$) was associated with a high incidence of dysphagia and aspiration. Nineteen of 56 (34%) patients had no evidence of swallowing problems, while 37 of 56 (66%) had dysphagia and 13 of 37 (23%) exhibited signs of aspiration. No significant differences were reported regarding age, gender, presence of a tracheotomy, Injury Severity Score, arrival Revised Trauma Score, or arrival Glasgow Coma Scale score. Dysphagia was associated with longer intensive care unit stays, and more severe dysphagia was associated with longer requirements for mechanical ventilation, longer intensive care unit requirements, and longer hospital stays. Therefore, all trauma patients who require halo-vests for cervical spine fractures should be formally evaluated for dysphagia.

Comment

Not only does this study underscore the importance of performing timely and reliable swallowing screening assessments with all trauma patients who require a halo-vest, but inclusion of the audience question-and-answer session provides interesting insight into how (some) trauma surgeons view the role of speech-language pathology and the importance (or lack thereof) of swallowing testing in these patients. For example, there appears to be a lack of understanding of the difference between a bedside screening and formal objective dysphagia evaluation when it was stated that "I often try to stay away from swallowing evaluations because many, many patients fail their swallowing evaluation but can eat perfectly well and do not clinically aspirate." And this problem is compounded with unsubstantiated bias, to wit, "I suspect that if the members of this audience underwent swallowing evaluations right now many of us would not pass and would show evidence of some dysfunction, but we're all going to do just fine when we eat lunch later on today." This is nonsense. Other comments did differentiate screening from formal testing and rightly pointed out the risk:benefit ratio of performing a *validated and reliable* (italics ours) swallow screen in trauma patients with cervical spine fractures treated with halo-vest fixation: "…there is a much greater benefit in preventing one case of aspiration pneumonia than getting an extra bedside swallow evaluations (sic)…." It can only be hoped that the latter comment will replace the former erroneous ones in order to provide trauma patients with optimal care.

C. T. Sasaki · S. B. Leder (✉)
Department of Surgery, Section of Otolaryngology,
Yale University School of Medicine, P.O. Box 208041,
New Haven, CT 06520-8041, USA
e-mail: steven.leder@yale.edu

Impact of Tracheotomy on Swallowing Performance in Duchenne Muscular Dystrophy

Terzi N, Prigent H, Lejaille M, Falaize L, Annane D, Orlikowski D, Lofaso F

Neuromuscular Dis 2010;20:493-498

The purpose of this study was to investigate the impact, if any, a tracheotomy and placement of a tracheotomy tube combined with positive-pressure mechanical ventilation had on breathing and swallowing interactions and swallowing performance. Seven adult patients (25 $\pm$ 4 years of age) with Duchenne muscular dystrophy were evaluated first before and then 3 months after tracheotomy and placement of a tracheotomy tube. The test consistency was water in three volumes, i.e., 5, 10, and 15 ml. Electromyographic recordings were used to analyze the swallows, i.e., swallow onset was defined as the onset of phasic submental electromyographic activity and swallowing termination was defined as the onset of downward laryngeal movement. Swallow duration, number of swallows, and number of ventilation cycles required to swallow the entire bolus were recorded for each bolus volume. Piecemeal deglutition occurred in all patients and over several breathing cycles. The percentage of swallows followed by expiration was not significantly different before compared with after tracheotomy. Total bolus swallowing time was significantly shorter and the number of swallows per bolus significantly smaller after than before tracheotomy. It was concluded that mechanical ventilation via tracheotomy may improve swallowing success.

Comment

This study needs to be interpreted with caution. Although the authors purport to investigate swallowing, what they are really reporting on are variables associated with swallowing. As the authors stated, "Our test protocol did not involve the detection of aspiration." Since it is well known that small water bolus volumes can be aspirated silently, there is no way to know if swallowing "improved" when pre- and post-tracheotomy data were compared. All one can say is that there was a change in some of the variables investigated, e.g., swallow duration and number of swallows per bolus. What is of interest, and unknowable due to limitations of the present study, is did these changes result in a safer swallow? Reasons given for not using fiber-optic endoscopic evaluation of swallowing to objectively determine dysphagia and aspiration status are flimsy and inaccurate, e.g., less likely to allow a safe and nonstressful evaluation before tracheotomy in patients with respiratory compromise and does not detect bolus stasis in the pharynx and larynx. The adage "One can see a lot by just looking" is very relevant to the present issue.

Eagle Syndrome: A Rare Cause of Dysphagia and Head and Neck Pain

Dunn-Ryznyk LR, Kelly CW

J Am Acad Physician Asst 2010;23:28-48

The etiology of Eagle syndrome, first described by W. W. Eagle in 1937, is an elongated and ossified styloid process. Classic Eagle syndrome symptoms include sore throat, ipsilateral ear and/or eye pain, dizziness, nausea, and/or globus sensation. Styloid-carotid artery Eagle syndrome includes the classic Eagle syndrome symptoms in addition to syncopal or near-syncopal episodes, blindness, and stroke symptoms. Diagnosis is made through a high index of suspicion and radiographic studies. Treatments include nonsurgical approaches, i.e., nonsteroidal anti-inflammatory medications, massage therapy, and corticosteroid injections, while surgery involves pharyngeal and extraoral approaches. An illustrative case study is included.

Comment

It behooves all dysphagia specialists to be aware of rare disease entities with dysphagia symptoms. This case report provides both diagnostic criteria and therapeutic options that clinicians will find valuable.

Swallow Characteristics in Patients with Oculopharyngeal Muscular Dystrophy

Palmer PM, Neel AT, Sprouls G, Morrison L

J Speech Lang Hear Res 2010;53:1567-1578

This study had two purposes: (1) to describe oral deficits associated with oculopharyngeal muscular dystrophy (OPMD) and make appropriate linkages of deficits to swallow function, weight, and quality-of-life, and (2) to provide insight into the oral motor deficits associated with oral motor decline and relate them not only to disease processes but also to healthy aging. OPMD is a rare myopathic disease that is genetic in origin, as evidenced by a high incidence in Hispanic New Mexicans, and often does not become evident until 50 years of age. Hallmarks of the disease include progressive degeneration of the

muscles of the eyelids and pharynx, and later proximal limb weakness. Eleven adult Hispanic subjects (8 F and 3 M) participated. Intraoral pressure, swallow pressure, and endurance were measured with the Iowa Oral Performance Instrument. In addition, a timed 50-cc water swallow, weight, and quality-of-life testing with the SWOL-QOL were assessed. Subjects with OPMD were weaker than age- and gender-matched controls. Oral weakness impacted strength, swallow pressure, swallow capacity, swallow volume, and swallow time. Quality-of-life was lower for subjects with OPMD. Tongue endurance was not affected by oral weakness. Weight, but not nutritional status, was lower for subjects with OPMD.

Comment

We are in agreement with the authors that future research needs to incorporate pharyngeal visualization and more specific biomechanical measures of pharyngeal and laryngeal physiology in order to provide a more comprehensive picture of oropharyngeal swallowing issues associated with OPMD. We look forward to future reports in this area.

A Comprehensive Evaluation for Aspiration after Esophagectomy Reduces the Incidence of Postoperative Pneumonia

Berry MF, Atkins Z, Tong BC, Harpole DH, D'Amico TA, Onaitis MW

J Thorac Cardiovasc Surg 2010;140:1266-1271

This study investigated the hypothesis that detecting aspiration via a comprehensive swallowing evaluation before starting oral alimentation post-esophagectomy results in a reduction in pneumonia incidence. A retrospective chart review was performed and identified 799 patients who underwent esophagectomy before ($n = 379$), i.e., early era (January 1996-December 2002), or after ($n = 420$), i.e., later era (January 2003-June 2009) implementation of a comprehensive swallowing evaluation. The swallow evaluation included a bedside assessment of oral motor functioning, laryngeal elevation during volitional swallowing, and evaluation of the oral and pharyngeal swallow with minimal oral feeding trials, i.e., ice chips and sips of thin liquid, to identify coughing, throat clearing, or voice changes. If overt signs of dysphagia were eliminated with a cup-sip trial or chin-tuck posture, the patient continued with a videofluoroscopic swallow study combined with a barium swallow to determine anastomotic integrity. Implementation of a comprehensive swallow evaluation in the later era resulted in both a significantly increased detection of aspiration, i.e., 16% vs. 7% in the early era, and reduction in incidence of pneumonia, i.e., 11% vs. 18%. It is recommended that a comprehensive swallow evaluation be performed before starting oral alimentation in post-esophagectomy patients.

Comment

We concur with the goal to reduce morbidity and mortality in patients post-esophagectomy by determining aspiration status and thereby potentially decreasing respiratory complications. However, the optimal way to accomplish this is to use a clinically reliable and validated swallow screening protocol that is easy to use by a variety of health-care professionals, e.g., the 3-ounce water-swallow challenge protocol [1, 2]. The use in this study of a bedside evaluation incorporating oral motor assessment, palpation of laryngeal elevation during the swallow, and assessing the pharyngeal swallow indirectly with ice chips and small sips of thin liquid and observing for clinical signs of dysphagia, i.e., coughing, throat clearing, or voice quality changes, is unreliable. Although this crude set of variables was successful in improving detection of aspiration and decreasing pneumonia rates, use of a state-of-the-art dysphagia screening protocol would result in much improved outcomes.

References

1. Suiter DB, Leder SB. Clinical utility of the 3 ounce water swallow test. Dysphagia. 2008;23:244-50.
2. Leder SB, Suiter DM, Warner HL, Kaplan LJ. Initiating safe oral feeding in critically ill intensive care and step-down unit patients based on passing a 3-ounce (90 milliliters) water swallow challenge. J Trauma. 2011;70:000-000. doi:10.1097/TA.0b013e3181fc607a.

Premature Infant Swallowing: Patterns of Tongue-Soft Palate Coordination Based Upon Videofluoroscopy

Goldfield EC, Buonomo C, Fletcher K, Perez J, Margetts S, Hansen A, Smith V, Ringer S, Richardson J, Wolff PH

Infant Behav Dev 2010;33:209-218

This is an initial report in a longitudinal study focused on the coordination between tongue and soft palate of

premature infants who were clinically diagnosed with poor coordination during oral feeding and had a subsequent videofluoroscopic swallow study (VFSS). It was hypothesized that (1) suckling during oral transfer is characterized by an anterior-posterior lingual wave, as measured by a phase lag between the anterior, medial, and posterior points of the lingual surface, and (2) soft palate lowering and elevation during oral transfer, i.e., as liquid is filling the mouth, is characterized by a phase lag close to 180^{o} (antiphase). Twelve premature infants (born before 33rd week of pregnancy and postmenstrual age between 36 and 42 weeks) and with poor oral feedings and/or suspected aspiration participated. The digitized VFSS allowed for analysis of the continuous relative phase, i.e., the relationship between two time series in which a point on one is related over time to a second point on the other, for each lingual or soft palate point over successive frames. Results generally confirmed the study's two hypotheses. Coordination of preterm infant swallowing is organized around patterns of relative phase that may transform intrinsic rhythmic lingual motions into distinct and organized stages. Specifically, suckling during oral transfer is characterized by an anterior-posterior lingual wave in order to propel liquid to the back of the mouth. Then, as successive cycles of tongue movement fill the mouth with liquid, the relative phase between the tongue dorsum and an alternating elevating and lowering soft palate moves toward an antiphase pattern. That is, changes in tongue shape result in lingual movement that is simultaneous with but in an opposite direction to soft palate movement. A lingual-palatal space is created for containing liquid during suckling, provides a seal against leakage into the nasopharynx, and allows for bolus movement through the pharynx to the upper esophageal sphincter.

Comment

It would be important to determine tongue-soft palate movement patterns for infants who are deemed oral feeders compared with those deemed nil per os based on VFSS. How different are the patterns? And, if different, when do the patterns become similar to allow for recommendations for oral alimentation to begin? Also, how and why do tongue-soft palate movement patterns change depending on the viscosity of the liquid being ingested? Lastly, are there tongue-soft palate movement pattern differences between preterm and full-term infants? If so, when do the disparate patterns converge to normal? This is a fascinating subject area.

Impact of Oropharyngeal Dysphagia on Long-term Outcomes of Lung Transplantation

Atkins BZ, Petersen RP, Daneshmand MA, Turek JW, Lin SS, Davis RD

Ann Thorac Surg 2010;90:1622-1629

This retrospective study investigated what impact, if any, previously unrecognized oropharyngeal dysphagia had on bronchiolitis obliterans syndrome and mortality post lung transplantation. All 263 lung transplant patients had a clinical swallow evaluation early after surgery and 149 had additional objective testing via either fiber-optic or videofluoroscopic swallow evaluation. Swallow evaluation results were correlated with bronchiolitis obliterans syndrome and mortality. Laryngeal penetration and/or tracheal aspiration were identified in 70.5% of patients. Preoperative tobacco abuse, gastroesophageal reflux, and cardiopulmonary bypass independently predicted oropharyngeal dysphagia, but it was not associated with bronchiolitis obliterans syndrome. Independent predictors of mortality were ventilator dependence and peak forced expiratory volume in the first second of expiration, while a normal swallow evaluation was associated with improved survival. Oropharyngeal dysphagia, although often overlooked from a clinical perspective, is common after lung transplantation, and while normal swallowing may improve survival, it does not independently affect bronchiolitis obliterans syndrome.

Comment

It is most gratifying to learn that after initial use of a bedside swallow screen, the authors realized that a formal swallow evaluation, mostly with a fiber-optic endoscopic evaluation of swallowing (87.9%) but also with a videofluoroscopic swallow study, resulted in an improved diagnosis of oropharyngeal dysphagia and prevented complications associated with previously unrecognized dysphagia. The high silent aspiration rate of 77.6% following lung transplantation underscores the need for objective testing. In this highly-at-risk population it is very important to determine when safe swallowing can begin and what strategies are needed to prevent aspiration risk.

Red Wine Polyphenols and Swallowing Reflex in Dysphagia

Ebihara S, Maruyama Y, Ebihara T, Oshiro T, Kohzuki M

Geriatr Gerontol Int 2010;10:329-330

This brief report described the successful use of red wine as a treatment for dysphagia and elucidated the cellular mechanism from which this beneficial effect specific to red wine polyphenolic compounds was derived. Fourteen nursing home residents (mean age = 84 years) who exhibited delayed swallow reflex when provoked by a 1-ml water bolus injected via nasal catheter into the pharynx participated. Variables used were distilled water, red and white wines without alcohol, and red grape juice. In order to remove the ethanol, the wines were evaporated under reduced pressure at 40°C to half their original volume. Swallow reflex latency decreased as a function of the percentage of red wine polyphenolic compounds. It was hypothesized that the molecular basis for the effect of red wine polyphenolic compounds was as least partially attributed to activation of the capsaicin receptor TRPV1. That is, tonic activation of TRPV1 in the pharynx could be caused by endogenous activators and local temperature enhanced by red wine polyphenolic compounds. The precise molecular mechanism by which red wine polyphenolic compounds facilitate the activation of TRPV1 needs to be determined.

Comment

From time immemorial, through the age of the Egyptian pharaohs, Greek warriors-kings, Roman emperors, and continuing to the present day, the fermented juice of the grape has been prized for its aid to digestion and enhancement of eating pleasure. It would be interesting to replicate this study without removing the alcohol from the wine. There may well be more volunteers for the replication than original study.

Thickened Fluids for People with Dementia in Residential Aged Care Facilities

Hines S, McCrow J, Abbey J, Gledhill S

Int J Evid Based Healthc 2010;8:252-255

This systematic review (1995-2008) was performed to establish best practice regarding thickened fluids for people with dementia who live in residential aged-care facilities. Fourteen of 112 identified papers met inclusion criteria and two independent reviewers appraised each using the relevant Joanna Briggs Institute for the Unified Management, Assessment, and Review of Information instruments. A meta-analysis could not be performed due to clinical and methodological heterogeneity. Nine studies recommended use of thickened liquids as an intervention strategy for the maintenance of adequate fluid intake for individuals with dementia and dysphagia in residential aged-care facilities, four papers recommended thickened liquid use for people with dementia in general, and one reported use of thickened liquids to be acceptable for older people in the event of dementia and dysphagia. The retrieved data did not allow for evidence-based best practices to be determined. Thickened liquids, however, may be effective for people with dementia in residential aged-care facilities if proper guidelines are implemented and followed by the appropriate health-care professionals.

Comment

Due to the paucity of information obtained from the systematic review, much work needs to be done to determine the qualitative and quantitative effectiveness of using thickened liquids for persons with dementia, whether they are in a residential care facility or at home. Clinicians working with this patient population would benefit from reading the findings and recommendations of this study.

Is It Ethical to Provide Enteral Tube Feedings for Patients with Dementia?

Hartsell ZC, Williams JS

J Am Assoc Phys Asst 2010;23:55-56

This case presentation deals with the ethical quandary of whether or not to provide enteral tube feedings for patients with dementia when they are no longer able to maintain adequate nutrition and hydration orally. Four bioethical principles are discussed: autonomy, beneficence, nonmaleficence, and futility. Although additional research is needed on both sides of the argument, i.e., to either support enteral tube feedings in patients with dementia or to justify its medical futility, at the present time there is insufficient evidence to support use of enteral tube feeding in patients with dementia.

Comment

This case study succinctly defines relevant terms and discusses the ethical dilemmas associated with end-of-life

care for the patient with severe dementia who can no longer take adequate oral alimentation. The best available published evidence on the risks and benefits of starting enteral tube feedings does not support its use in patients with dementia. Rather, a new medical order, i.e., comfort feeding only [1], has been proposed to specifically address this issue and provide both care-givers and clinicians a viable and humane alternative when caring for these patients.

Reference

1. Palecek EJ, Teno JM, Casarett DJ, Hanson LC, Rhodes RL, Mitchell RL. Comfort feeding only: a proposal to bring clarity to decision-making regarding difficulty with eating for persons with advanced dementia. J Am Geriatr Soc. 2010;58:580-4.

The Effects of Oral-Motor Exercises on Swallowing in Children: An Evidence-Based Systematic Review

Arvedson J, Clark H, Lazarus C, Schooling T, Frymark T

Dev Med Child Neurol 2010;52:1000-1013

A single, systematic literature search for peer-reviewed studies published in English from 1960 to 2007 was performed for this unregistered evidence-based systematic review. Four aims were proposed: (1) What is the effect of oral-motor exercises on swallowing physiology, e.g., pressures, efficiency, aspiration, and timing, in children? (2) What is the effect of oral-motor exercises on pulmonary health, i.e., aspiration pneumonia, in children? (3) What is the effect of oral-motor exercises on functional swallowing outcomes, e.g., oral feeding, volume intake, weight gain, and growth, in children? and (4) What is the effect of oral-motor exercises on drooling management in children? There were 899 potential citations identified, and after exclusion criteria were applied, a total of 16 studies were identified for inclusion in the evidence-based systematic review. Eight studies examined the effects of oral-motor exercises on swallowing physiology (question 1), six studies examined functional swallowing outcomes (question 3), and five studies reported on the effects of oral-motor exercises on drooling (question 4). (The total exceeds 16 due to studies addressing multiple issues.) No study was found that investigated the effect of oral-motor exercises on pulmonary health in children (question 2). The systematic review showed limited support for the application of some specific oral-motor exercises treatments and no support for many others. Overall, there were no definitive results reported in support of treatment of swallowing disorders in children with oral-motor exercises regimens. Directions for future research are addressed.

Comment

This review has provided a great service in reporting that there is insufficient evidence found in the literature to support the use of oral-motor exercises to improve oral sensorimotor deficits and swallowing problems in children. It should serve to wake-up clinicians world-wide about the paucity of data and the great need for well-designed studies in this area in order to identify interventions that actually work.

Using Voluntary Cough to Detect Penetration and Aspiration During Oropharyngeal Swallowing in Patients with Parkinson Disease

Pitts T, Troche M, Mann G, Rosenbek J, Okun MS, Sapienza C

Chest 2010;138:1426-1431

This pilot study's primary aim was to investigate whether objective measures from an airflow waveform produced during a voluntary cough could identify people with Parkinson's disease ($n = 58$ years; mean age = 72 years; Hoehn and Yahr stage II-III) who are at risk for aspiration. Airflow measures during voluntary cough production and degree of laryngeal penetration and aspiration on a 3-ounce swallow task during a videofluoroscopic swallow study were evaluated. Four cough variables, i.e., compression phase duration, reduced expiratory phase rise time, decreased expiratory phase peak flow, decreased cough volume acceleration, differentiated normal swallows from swallows with laryngeal penetration and aspiration. Decreased expiratory phase peak flow alone was successful in accurately detecting aspiration with a sensitivity of 57.15% and a specificity of 100%.

Comment

These interesting and promising results (despite low sensitivity) may eventually lead to clinicians including objective cough measures in their clinical swallow armamentarium. More research is needed, however, with a larger cohort of patients who present with a wider range of

disease severity and etiologies other than Parkinson's disease, e.g., chronic obstructive pulmonary disease. At the present state of subjective (bedside) dysphagia assessment, especially regarding determination of laryngeal penetration, "You can see a lot by just looking" still holds true.

A Predictive Model for Swallowing Dysfunction After Curative Radiotherapy in Head and Neck Cancer

Langendijk JA, Doornaert P, Rietveld DH, Verdonck-de Leeuw IM, Rene Leemans C, Slotman BJ

Radiother Oncol 2009;90:189-195

This prospective study was designed to assess what pretreatment and treatment-related factors were associated with swallowing dysfunction following curative primary or postoperative chemoradiotherapy in order to construct a clinically easy-to-use predictive model to determine at-risk groups for dysphagia. A total of 529 patients (398 M and 131 F; 45.6% age range = 18-60 years and 54.4% age range >60 years) with head and neck cancer participated. The primary end point at 6 months post-treatment was grade 2 or higher swallowing dysfunction as determined by the Radiation Therapy Oncology Group (RTOG). RTOG grade 2 swallowing dysfunction was defined as moderate dysphagia and/or odynophagia that may require narcotic analgesics and/or puree or liquid diet. RTOG grade 3 swallowing dysfunction was defined as severe dysphagia or odynophagia with dehydration or weight loss requiring nasogastric feeding tube, intravenous fluids, or hyperalimentation. The total population was divided into three risk groups based on the Total Dysphagia Risk Score (TDRS): a low-risk group (TDRS = 0-9), intermediate-risk group (TDRS = 10-18), and high-risk group (TDRS >18). The multivariate logistic regression analysis revealed five independent prognostic factors for swallowing at 6 months post-treatment: advanced T stage of T3-T4, bilateral neck irradiation, weight loss, primary tumor site of oropharynx or nasopharynx, and treatment modality of either accelerated radiotherapy or concomitant chemotherapy. The TDRS is a simple and validated measure to predict swallowing dysfunction following curative chemoradiotherapy for head and neck cancer.

Comment

The authors are to be congratulated in validating a simple scale to predict dysphagia in head and neck cancer patients following curative chemoradiotherapy. In order for this aggressive treatment modality to be most effective, adequate nutrition and hydration need to be maintained both during and after completion of therapy. It would be most advantageous to be able to predict which patients will require enteral tube feeding and which will be able to continue with oral alimentation. We look forward to corroborating data from other institutions.

Validation of the Total Dysphagia Risk Score (TDRS) as a Predictive Measure for Acute Swallowing Dysfunction Induced by Chemoradiotherapy for Head and Neck Cancers

Koiwai K, Shikama N, Sasaki S, Shinoda A, Kadoya M

Radiother Oncol 2010;97:132-135

This retrospective study was performed to investigate the validity of the Total Dysphagia Risk Score (TDRS) as a predictive measure for acute swallowing problems in patients who underwent definitive chemoradiotherapy for head and neck cancer ($n = 47$, mean age = 63 years, range = 16-81 years). TDRSs were compared with scores from the Radiation Therapy Oncology Group (RTOG). The TDRS was derived from a summation of the following risk points: T3 or T4 classification (4 points), bilateral neck irradiation (9 points), weight loss (1-10% = 5 points, >10% = 7 points), primary tumor site (oropharynx = 7 points, nasopharynx = 9 points), and treatment modality (accelerated radiotherapy = 6 points, concomitant chemotherapy = 5 points). Specifically, a low-risk group (TDRS = 0-9), intermediate-risk group (TDRS = 10-18), and high-risk group (TDRS >18) were compared with RTOG grades 2 and 3 swallowing dysfunction. TDRS is a valid measure for predicting acute swallowing problems in patients with head and neck cancer undergoing definitive chemoradiotherapy and could potentially allow for selection of patients most likely to benefit from prophylactic percutaneous endoscopic gastrostomy tube placement.

Comment

It is most gratifying that the initial report on a predictive model for swallowing dysfunction after curative chemoradiotherapy for head and neck cancer by Langendijk et al. has been corroborated by Koiwai et al. but with a slightly different patient population, i.e., acute versus late swallowing dysfunction. It is hoped that this new and informative rating scale will be beneficial in maintaining optimal nutritional support for patients during and after therapy, whether it is oral alimentation, enteral tube feeding, or a combination.

Effects of Respiration on Soft Palate Movement in Feeding

Matsuo K, Metani H, Mays KA, Palmer JB

J Dent Res 2010;89:1401-1406

Soft palate motion during nasal breathing and eating occurs in opposite directions, i.e., the soft palate is lowered for nasal breathing and is elevated cyclically to open the fauces during eating. It was hypothesized that during inspiration the frequency and the amplitude of the elevation of the soft palate would be reduced. Eleven healthy adult volunteers (6 M and 5 F; mean age = 24 years, range = 19-37 years) had small metal markers either glued (left upper molar and canines) or placed near (soft palate) anatomical areas of interest and monitored with fluoroscopy. Palatal elevation was less frequent and its displacement was smaller with inspiration than with expiration during food processing, and the soft palate elevated less frequently during inspiration than during expiration during stage II transport. The hypothesis that breathing impacts significantly on soft palate elevation during mastication is supported.

Comment

These findings support the view that central control of soft palate movement during eating helps to prevent pulmonary aspiration. What is unknown are the underlying neural mechanisms that control this behavior. For example, is it due to inhibition of levator muscles or excitation of depressor muscles? It would be interesting to replicate the methods with head and neck cancer patients who have had surgery or radiation to the soft palate as well as with individuals who present with congenital clefts of the soft palate.

Gastric Juice from Patients "On" Acid Suppressive Therapy Can Still Provoke a Significant Inflammatory Reaction by Human Bronchial Epithelial Cells

Mertens V, Blondeau K, Vanaudenaerde B, Vos R, Farre R, Pauwels A, Verleden G, Van Raemdonck D, Dupont L, Sifrim D

J Clin Gastroenterol 2010;44:e230-e235

The goal of this study was to evaluate the effect of gastric juice from patients with and without proton pump inhibitor (PPI) treatment on production of IL-8 by human primary bronchial epithelial cells in culture. These cells were exposed to gastric juice from patients "on" ($n = 10$) and "off" ($n = 13$) PPI and to nonacidic gastric components (pepsin and bile acids) in buffered solution for 24 h. IL-8 concentration in the supernatant was measured with enzyme-linked immunosorbent assay. Endotoxin level in gastric juice samples was analyzed with an LAL assay. Exposure of epithelial cell culture to gastric juice from patients "on" PPI resulted in a higher production of IL-8 than exposure to gastric juice from patients "off" PPI. No correlation was found between IL-8 production and concentration of bile acids or pepsin. A positive correlation was found between IL-8 production and endotoxin levels of gastric juice samples. The authors conclude that exposure of bronchial epithelial cells to gastric acid from patients "on" PPI is able to induce high IL-8 production. They suggest that aspiration of gastric juice in patients treated with PPI might still be able to induce a significant bronchial inflammatory reaction based on elevated endotoxin levels found in gastric aspirate of patients on prolonged PPI therapy.

Comments

The results from this study are thought-provoking since many patients on PPI continue to exhibit reflux-related respiratory symptoms. It is possible that acid stimulation of the lower esophagus actually confers retrograde protection by reflexively stimulating contraction of the UES [1]. It is also possible that "neutralizing" acid refluxate may reduce UES protective closure, allowing bile and bacterial endotoxins contaminate respiratory organs retrograde. Aside from the potential effects of bacterial endotoxin, readers should be cautioned against direct extrapolation of other findings in this study by realizing that all gastric aspirates were first buffered before contact with bronchial epithelial cell cultures, diminishing that pH-dependent activity of refluxate containing pepsin or bile [2].

References

1. Chernichenko N, Woo JS, Hundal JS, Sasaki CT. Response of cricopharyngeus muscle to esophageal stimulation by mechanical distention and acid and bile profusion. Ann Otol Rhinol Laryngol. 2011;120(2):137-42.
2. Sasaki CT, Marotta J, Hundal J, Chow J, Eisen RN. Bile-induced laryngitis: is there a basis in evidence? Ann Otol Rhinol Larygol. 2005;114:192-7.

Clarence T. Sasaki MD

Steven B. Leder PhD