PRESBYPHAGIA – HIDDEN RISK IN THE GERIATRIC POPULATION*

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INTRODUCTION
What Is Presbyphagia? Essentially, it is aged swallowing' (Tracy, et al., 89, Dysphagia, 4(2):90; Daniels, et al., 09, AJSLP, 18(1):74; Hiss, et al., , 01, J of Voice, 15, 159-164). It is the second most commonly reported symptom in geriatric medicine (Rumeau & Vellas (03) Rev. Laryngol Otol Rhinol; 123(5):331; McCullough, et al., 07, Topics in Geri Rehab, 23(4):290). This makes the geriatric population an ‘at risk population.’ Regardless of whether the geriatric patient is independent or in an institutional setting, acute or long term, their symptoms take the form of intermittent that persistent regardless of what the patient tries to alleviate them. Hence, presbyphagia affects directly geriatric patient quality of life (Po-Hung, et al., Dysphagia; http://www.springerlink.com/content5p 093m03842269227.MAR.08). This poster will discuss what constitutes the aged swallow, it signs and symptoms, assessment and, finally, treatment, with the goal of making clear the role of th speech-language pathologist in managing presbyphagia.

WHAT IS PRESYBPAGHIA?
Not associated with disease process (Palmer RM, 90, Geriatrics, 45:47-55). However, it may be exacerbated by disease. Aging is 'degenerative' process and daily living wear and tear that impairs one’s compensatory mechanisms (Kayser-Jones , 99, Geriat Nurs, 20(2): 77; Butler, et al., 09, Ann Otol, Rhino, Laryngol, 137(6):956).  Perhaps, it is like GERD, we all get it to some degree.

INCIDENCE AND PREVALENCE
Of all patients in acute care 25-45% have some sort of swallowing disorder (Sitoh, et al., 00, Singapore Med. J., 41(8):376). And 60% in acute and long term care settings also have dysphagia in some degree or other (Paterson, 96, Can. Fam. Physician, 42:925). What these figures say is that with age comes swallowing impairment. These are age prevalent changes (Mari, et al., 97, J Neurol, Neurosurg Psychia, 63:456; Sonies, et al, 89, Dysph, 4:65; Tracy, et al, 89, Dysph, 4:90; Logemann, et al., JSLHR, 43(5):1264), and are directly related to neuromuscular, skeletal and organelle age specific changes. These chnages reduce physiological 'resilience' and decrease in responsiveness of immune system efficiency. Depending on where a patient is, independent and at home lading an active life, or saddled with a chronic disease or in an acute or long term medical crisis, dysphagia is the fifth (65) and third (85) leading cause of death (LaCroix, et al., Pub. Health Rep., 89, 104:350)
NORMAL SWALLOW SUMMARY
The normal human swallow is a set of neuroanatomical mechanisms, anatomic subsystems and time dependent processes coordinated as 'prehension', 'pre-digestion' and 'deglutition'. The goal of normal swallow is to bring about successful nutritional and hydration support for the organism. In prehension, we perceive the need for nutrition and hydration. The initial phase is the oral phase where voluntary food reduction and formation occur. Hydrating and food material brought in and turned into a manageable consistency for swallow while being mixed with saliva and pre-digestion begins through mastication. Once food is ready for swallow, the late oral phase, a voluntary transition, the food bolus is moved to a trigger zone that begins the involuntary aspect of swallow. The lateral phase does three things that aid in the involuntary swallow and these are bolus formation into a coherent mass, stimulates pharyngeal phase activity, the beginning of peristalsis, and the pressurization of the bolus. Once food moves into this phase it is called deglutition. Deglutition is an involuntary process, making a transition into the throat. It is important that both the oral phase and the transition the pharyngeal phase be as efficient as possible to prevent food retention in the oral cavity and efficient bolus movement that is passage around airway. At this stage, the food bolus must make a careful passage past what should be a three valve closure of the airway. For the closure to occur the epiglottis in- and eversion, up-ward larynginal excursion, and tight vocal fold closure must occur in a timely (1-2 second) manner and retaining the pressurization imparted by the oral phase. The last phase is the esophageal. The esophageal phase is and involuntary transit to digestive tract where a stripping wave (peristalsis) initiated at the pharyngeal phase moves the bolus to the stomach. There are three stages for successful esophageal transit, cervical, thoracic and diaphragmatic or abdominal. Typically, bolus movement should in a few occur to close out deglutition.

In the panel below the normal swallow is shown graphically. Figure 1 details the basic anatomy pertinent to a functional swallow. Figure 2 shows the importance of event timing and the time frames required for each of the anatomical sites and features and physiologic events documented to take place during a single normal swallow during a flexible endoscopic evaluation of swallow (FEES). In Figure 3 the stages of swallowing are depicted. Image 1 includes the prehensive and masticatory/preparative phases. Image 2 is the late oral phase including the ‘trigger zone’ and includes the pressurization of the bolus. Image 3 is the initiation of the pharyngeal phase. Note the closure of the velopharyngeal port and complete ‘three valve’ airway closure. Image 4 is completion of the pharyngeal phase and initiation of peristalsis. Image 5 is the initiation of the esophageal with the relaxation of the cricopharyngeus in the cervical esophagus. Image 6 is the completion of deglutition as the bolus moves via a muscular peristaltic stripping wave through the thoracic and abdominal/diaphragmatic esophagus. Figure 4 is a montage of fluoroscopic still images of a normal swallowing in all its stages and phases.
TABLE 1: Effects of Aging on Swallow

<table>
<thead>
<tr>
<th>Phase</th>
<th>Structure</th>
<th>Physiology</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral</td>
<td>Teeth, muscles, sensory, glands</td>
<td>Poor morcellation &amp; bolus form, loss of predigestion, drying, dyscoordination</td>
<td>Dysmastication, bolus control, mucositis</td>
</tr>
<tr>
<td>Late Oral</td>
<td>Glands, muscular, velum, sensory</td>
<td>‘Trigger zone’ dysfunction, VPI, depressurization, dyscoordination</td>
<td>Gag absence, regurgitation into nose,</td>
</tr>
<tr>
<td>Pharyngeal</td>
<td>Muscle, sensory, bony</td>
<td>Delayed passage, dyscoordination &amp; stasis</td>
<td>Dysperistalsis, parathesias, obstructions</td>
</tr>
<tr>
<td>Esophageal</td>
<td>Muscular, connective tissue, sensory</td>
<td>Cricopharyngeal hypertrophy, dyscoordination, dysmotility</td>
<td>Blockades, pouches, build-up</td>
</tr>
</tbody>
</table>

IMPAIRMENTS OF PRESBYPHAGIA
In the oral phase patients anxious about eating because they are experiencing difficulties will develop inappropriate compensatory behaviors. This impaired prehension impaired can lead to gulping, expectorating, pocketing, and poor mastication and reduced conversion of bolus. Weaknesses may lead to poor bolus formation. Oral dryness and parasthesia reduced pre-digestion aspect of the oral phase. Dyscoordination may lead to premature spillage into the pharynx or drooling. In the late oral phase Impairments such as inefficient to ineffective propulsion of bolus into the trigger zone occur. The trigger zone may itself have reduced sensation also leading to premature spillage.
Dyscoordinated velopharyngeal port activity can cause nasal regurgitation and the loss of air pressure created by the oral stage. Pressure reduction or absent will delay movement of the food bolus through the pharynx in a timely fashion. It may also reduce a signal the cricopharyngeal expects in order to coordinate its relaxation with bolus movement.
Pharyngeal Phase Impairments can be marked by poor peristalsis, bolus movement delay and vallecular stasis or accumulation in the piriform recesses. The reduced sensation will also lead to dyscoordiantion with giving the patient a sense that the bolus is stuck in their throat. Bolus stasis within the vallecular and pyriform recesses and pharyngeal wall debris deposition will result. Pharyngeal dyscoordination incomplete epiglottic function, wherein the structure is either delayed in its travel over the supraglottis or is delayed in its return to rest can permit penetration or aspiration. Finally, abnormal cervical spine curvature, large anterior placed osteophytes, swollen mucosal membranes and the occasional empyema create obstructions the retard, misdirect or obstruct bolus movement, thus increasing the likelihood of at least penetration, if no frank aspiration. The esophageal phase of the geriatric patient is typically marked by pouches, masses, mucosal thickening and hypertrophy of the cricopharyngeal sphincter. By far, pouches,
better known as Zenker’s diverticulum, and cricopharyngeal enlargement are the most common findings. In the case of Zenker’s the patient will report regurgitating undigested food. For the cricopharyngeal enlargement it is more of a generalized report of mild discomfort in the throat (patient will point to neck in the paralaryngeal region).

TABLE 3 : Instrumental Studies.

<table>
<thead>
<tr>
<th>IMAGING STUDIES</th>
<th>OTHER USEFUL</th>
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<tbody>
<tr>
<td>Videofluoroscopy</td>
<td>Electromyography</td>
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<tr>
<td>modified Barium swallow</td>
<td></td>
</tr>
<tr>
<td>(Pharyngogram)*</td>
<td></td>
</tr>
<tr>
<td>Upper GI (esophogram)</td>
<td></td>
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<tr>
<td>FEES*</td>
<td>Manometry*</td>
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<tr>
<td>GI endoscopy (esophagoscopy)</td>
<td></td>
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<tr>
<td>Scintigraphy</td>
<td>pH-metry</td>
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<tr>
<td>Ultrasonography</td>
<td>Reflex cough test</td>
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<td>CT and MRI scanning</td>
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SWALLOWING RATING SCALE
(Likert type; Charpied, 09)

- Level 0 = cannot be tested, tube feed
- Level 1 = Swallowing not functional, tube feed
- Level 2 = Inconsistent, delay, to be fed, may not meet nutrition and hydration, tube feed
- Level 3 = Impairment at some level, may meet nutrition and hydration with supervision
- Level 4 = Mild to moderate impairment, airway control, strong cough, Mealtime strategies
- Level 5 = Mild impairment, mealtime management, will meet nutrition and hydration, independent
- Level 6 = Functional but inconsistent swallow
- Level 7 = Within functional limits swallow

The swallowing rating functional scale is a Likert-type scale based on several bits of information the examiner gleans from the interview, examination and instrumental assessment that permits segregating patients into categories that should facilitate treatment planning. Once satisfied that the general signs and symptoms have been clearly defined imaging studies are next. The primary goal of instrumental assessment is the determination of how and what of the process of swallowing is impaired.

Quality of life : Kemp, 01, J Comm Nur, 6(6): 284; Morris, 06, Br J Nurs, 15(10): 55
TREATMENT
The chief character of interventional treatment in presbyphagia is the notion of minimal intrusiveness. The presbyphagic patient is, for the most part, independent and would like to maintain that aspect of their life. Among types of minimal intervention in presbyphagia is dietary modifications. Dietary modifications include changes to viscosity and texture and rate and volume of foods. These changes can be found in the National Dysphagia Standard diets (McCallum, 03, J Amer Diet Assoc., Mar.01) These include several levels. Level I - Diet under this level consists of foods with similar consistency to pureed foods. Level II - Dysphagia diet that includes minced foods. Level III - This level encompasses ground foods. Level IV - Dysphagia diet under this category consists of finely chopped foods. In the main, we have found that Level III and IV to be the most useful when working with the presbyphagic patient. Another important consideration is hydration. It isn't uncommon for patient to be doing poorly because they cough or choke on coffee or water, thus do not have sufficient intake to meet their needs. Hydration modifications include changing the consistency of thin fluids to various degrees of thickness (Williams K, et al., 99. J Am Diet Assoc, 99(suppl):A-125). In the case of the presbyphagic patient, nectar consistency is the most that needs be changed. It isn't uncommon that oral hygiene and dental care are issues for the geriatric dysphagic patient. Prompting them to use daily mild rinses (e.g., level teaspoon of table salt in 4-6 ounces of tepid water, then follow three rinses per session, three times day, with dentures in or out) appear to reduce dryness, soreness and aids in removing debris that result from weakness or change in sensation. In cases of weakness oro-mechanical exercises for improvement of strength and endurance has proven useful as well. Drills using forced pucker and smile, three sets of time, three times per day, and pushing the tongue against the teeth, or a tongue depressor, also three sets of ten, three times a day, help significantly to improve oro-motor strength and endurance. There are also facilitation techniques, such as e-Stim, or the Iowa Oral Performance Instrument (IOPI) biofeedback, that we have found useful when done in conjunction with strength and endurance drills. Additionally, compensatory strategies such as the 'a chuck', 'r chuck' and 'l chuck' (that is, anterior, left and right chin tuck) has provided some facilitative effect in more significant swallowing impairments. These can be done in conjunction with certain types of swallowing maneuvers such as the supraglottic (while seated, a lifting-like action or breath holding creates a forced glottal closure with tilting of arytenoids anteriorly, with some laryngeal elevation, to reduce laryngeal aperture), Mendelson (for reduced laryngeal excursion and limited cricopharyngeal opening) and Shaker (exercise to train patient to increase laryngeal excursion and width and duration of UES opening) during swallows. If the patient progresses after initial identification and a swallowing regime has been established, but the patient continues in a spiral of failure to thrive, enteral feeding as an option can be considered. However, when the patient reaches this point, they are no longer truly presbyphagic. Rather they have crossed threshold and are simply dysphagic.

CONCLUSIONS
Presbyphagia is defined here in this poster as the aged swallow, that is not derived from any disease process, save the progressive degenerative processes of growing older. Its
severity was defined as minimal when compared with those whose dysphagia is disease related. However, it nonetheless impairs the quality of life the active and independent geriatric patient. Presbyphagia differs from other forms of dysphagia in that its complaints appear to be diffuse and there is likely an underlying GERD/LPR. There is a specific set of common symptoms and complaints (i.e., '…globus…', '…things get stuck…', embarrassment, etc.). Presbyphagia can lead to complication such as loss of independence, chronic illness, weight loss and wasting, dehydration, and failure to thrive. Instrumental assessment reveals nominal changes. Treatment intervention, for Levels 4, 5 & 6 presbyphagia, require making small but functional changes to mealtime management along with dietary compensations. Patients appear to do best with infrequent supervision, but do require encouragement and periodic assessments looking for any change in status.

SELECTED REFERENCES

*An data sheet summarizing results of clinical study swill be provided at poster presentation