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The United States population is growing older and otolaryngologists will need to be prepared to take care of the elderly patient. During the 20th century the number of persons in the U.S. under age 65 has tripled while the number of persons over 65 has increased eleven times! According to the 1994 U.S. Census, 1 in 8 Americans was elderly. The Census Bureau's middle projections estimate that the elderly population will more than double by the year 2050 and that 1 in 5 Americans will be elderly. Those persons 85 and over are the fastest growing group.

Elderly patients are estimated to have 3.5 times more medical problems than those under age 65. These patients are also likely to be on multiple medications and have an increased sensitivity to side effects of those medications. There are important socioeconomic factors that need to be considered in the care of the geriatric patient. Medical problems can often contribute to diminished independence and depression. The elderly can also have diminished social interaction that is worsened by head and neck problems. Some of the common otolaryngology related complaints are hearing loss, dysphagia, balance disorders, nasal complaints, vocal disturbance, head and neck cancers, and cosmetic problems.

Presbycusis is the age-related decline in auditory function. This decline in function is from true cellular aging as well as possibly multiple other factors including noise exposure, toxin exposure, nutrition, metabolism, genetic factors, smoking, and cardiovascular disease. Approximately 60% of people over age 65 have at least a 25dB hearing loss. It has been estimated that 30% have a hearing loss that adversely affects their receptive communication ability. Age related hearing loss affects quality of life in that people with untreated hearing loss can become increasingly isolated by their inability to communicate. The elderly commonly are also having increasing problems with vision making hearing difficulty more of a handicap.

Generally, presbycusis results in a bilateral, symmetric hearing loss with the greatest loss in the high frequencies. This produces a "down-sloping" pattern on an audiogram. Schuknecht suggested four types of presbycusis based on clinical and histological characteristics. First, sensory presbycusis results in the classic down-sloping audiogram with mostly high frequency sensorineural loss. The speech discrimination scores remain generally good. Histologically, this type of hearing loss shows degeneration of the basal portion of the Organ of Corti

(predominately in the outer hair cells). Second, neural presbycusis is a more rapid hearing loss resulting in a flat audiogram with poor speech discrimination scores. This is from a loss of spiral ganglion cells histologically. Third, metabolic presbycusis is slowly progressive loss with a flat audiogram and good speech discrimination scores. There is atrophy of the stria vascularis with this type of hearing loss. Last, conductive hearing loss is characterized by a gradual down-sloping high frequency hearing loss and thickening of the basilar membrane. There are frequently cases where these types of presbycusis are mixed resulting in a variety of clinical presentations and audiogram patterns.

Elderly patients with hearing loss should not be assumed to have presbycusis. Other possible causes of hearing loss should be ruled out. If a patient does have presbycusis there are a variety of courses of action. Patients with mild losses and minimal complaints may benefit from repeat testing at regular intervals (yearly is a suggestion). Assistive devices may be helpful to some patients including vibrating alarm clocks, flashing telephone and doorbell signalers, television listening systems, and personal amplifiers. Hearing aids can be helpful to many patients with presbycusis. Patients are often fearful of hearing aids because of many factors. There are some social stigmata of a hearing aid, and the cost, seemingly endless options, and fear of sales pressure may dissuade people who would potentially benefit from amplification. If a patient has serious complaints of hearing loss, then a hearing aid evaluation can demonstrate to the patient how much benefit one or preferably two hearing aids could be to them. All patients should be cautioned that the use of a hearing aid will require a period of acclimatization and adjustment.

Dysphagia is another common problem in the geriatric population. The primary determination should be the patient's risk of aspiration. But in this age group malignancy must also be ruled out. The many causes of dysphagia include stroke, neuromuscular disease, medications, cricopharyngeus dysfunction, Zenker's diverticulum, and neoplasms.

Swallowing has been divided into three phases: oral, pharyngeal, and esophageal. There are multiple changes in each phase of the swallowing mechanism that occur with age. In the oral phase, there is reduced facial muscle strength, decreased masticatory strength, reduced tongue control, and missing dentition/poor denture fit. During the pharyngeal phase there is some delay in response, decreased pharyngolaryngeal sensory discrimination, abnormal upper esophageal sphincter function, and increased glottic penetration and aspiration. Changes in the esophageal phase include decreased or absent secondary peristalsis resulting in poor clearance of material from the esophagus.

Evaluation for dysphagia begins with a history to determine whether the patient has a problem with feeding or swallowing. Other important points to cover include dysphagia for solids versus liquids, globus sensation, halitosis, wet vocal quality, reflux, odynophagia, weight loss, recurrent pneumonia, hoarseness, and dysarthria. Physical exam should include examination of the oral cavity with and without any dentures, evaluation of the upper aero digestive tract with flexible fiber optic laryngoscopy if possible, salivary quality/quantity, and dentition. Neurological evaluation is also important including level of arousal, orientation, cognition, and cranial nerves.

There are many adjunctive tests available for the patient with dysphagia. A bedside

swallowing evaluation by a speech pathologist can grossly examine for swallowing problems but may fail to identify 33-50% of aspiration. A barium swallow is best for identifying anatomic lesions such as neoplasms, diverticuli, or webs. The modified barium swallow is the gold standard dysphagia study allowing evaluation of the swallowing mechanism from the oral cavity to the lower esophageal sphincter. The use of different consistencies of barium contrast from liquid to cookies can be tested. Functional endoscopic evaluation of swallowing or "FEES" has become a more widely used testing method. A flexible fiberoptic scope is placed via the nose and used to visualize the hypopharynx and larynx from above while the patient swallows blue dyed liquids and foods. This allows evaluation of abnormal laryngeal elevation, epiglottis inversion, pooling, and importantly aspiration.

Treatment for dysphagia depends on the cause and the risk of aspiration resulting in pneumonia. Possible treatments include swallowing therapy, dietary modifications, elimination of troubling medications, cricopharyngeal myotomy, BoTox injection of a cricopharyngeal bar, surgical repair of a Zenker's diverticulum, or gastrostomy tube placement.

Balance disorders are among the most common complaints of elderly patients who visit an otolaryngologist. An estimated 30-50% of persons 65 and older fall in a given year. After age 80, that increases to 50% of persons falling. Falls are a serious cause of morbidity in this age group with 1% of falls suffering a hip fracture and 5% some type of fracture. Roughly half of hip fracture patients never recover normal function again.

Vestibular problems are by no means the only cause of balance disorders in this age group. Other factors include cerebrovascular disease, cerebellar degeneration, Parkinson's disease, Huntington's disease, vitamin B12 deficiency, dementia, diabetic neuropathy, brain and spinal cord tumors, postural hypotension, atherosclerosis, musculoskeletal disease, metabolic disorders, cardiovascular disorders, medications, and visual impairment. Postural stability is provided by a combination of sensory (visual, hearing, vestibular, proprioceptive), musculoskeletal, cognitive, and integrative functions.

Vestibular changes that occur with age are termed presbystasis. These changes include a loss of hair cells primarily in the ampulla, a decrease in the number of vestibular nerve axons, a loss of neurons in the vestibular nuclei, and a reduction in the gain of the vestibular ocular reflex.

Evaluation of a patient with balance problems includes a detailed history with a description of the symptoms such as dizziness, disequilibrium, or vertigo. Since geriatric patients often have multiple medical problems a thorough medical history should be taken. A complete list of all prescription and over-the-counter medications should be obtained. The physical exam includes evaluation of sensory functions, posture, gait, and neurological function. Adjunctive tests that can be helpful include audiography, electronystagmography, MRI, and posturography. Treatment is obviously based on the cause, remembering that balance disorders can be multifactorial. Patients with vestibular dysfunction can often benefit from vestibular rehabilitation training. Fall precautions should be reviewed with these patients, their family and care providers if possible.

Common nasal complaints among geriatric patients are nasal obstruction, rhinorrhea, epistaxis, and olfactory dysfunction. Nasal complaints are also common in the remainder of the

population but there are factors that are prominent in elderly patients. Factors that can lead to increased nasal inflammation include a decrease in immune function, mucociliary dysfunction, allergies, dehydration, and thickened nasal secretions. Dystrophic changes in the nose which have been described are both atrophy of the nasal mucosa and an increase in vasomotor rhinitis. Nasal tumors can present with nasal obstruction, pain, epistaxis, or rhinorrhea. Previous trauma or nasal surgery can cause structural changes that worsen with age and loss of support in the nose. Hypothyroidism and vitamin deficiencies can contribute to nasal complaints. Many medications have nasal side effects. Diuretics, tricyclic antidepressants, and antihistamines can all cause drying. Anticoagulants such as coumadin, aspirin, and others often contribute to an increase in epistaxis among these patients.

An estimated 12% of the elderly have vocal dysfunction. With age, the fundamental frequency of the male voice tends to increase while the fundamental frequency of the female voice decreases. Common vocal cord findings include atrophy, bowed cords, and edema. Histological changes include a loss of collagen and elastic fibers, a decrease in the density of fibroblasts, atrophy of mucous glands, fibrosis, and disorganization of collagen fibers. In the cricoarytenoid joint there is a reduction of ground substance and cartilage matrix. The laryngeal muscles can also show some atrophy. Many neurological disorders can cause changes in vocal function. Disorders to consider are: essential tremor, Parkinson's disease, stroke, myasthenia gravis, and amyotrophic lateral sclerosis. Vocal cord paralysis can certainly cause vocal dysfunction and necessitates evaluation of the entire course of the recurrent laryngeal nerves. Treatments for vocal problems include speech therapy and medialization thyroplasty.

Cancer is common in geriatric patients. Aero digestive tract squamous cell cancer, basal and squamous cell skin cancers, thyroid malignancies, salivary gland malignancies, and lymphomas are all encountered in elderly patients. Anaplastic thyroid cancer is more common in the geriatric age group and has a poor disease course. Several authors have examined the surgical treatment of elderly patients compared to younger patients. Clayman, et al. compared complication rates after surgical treatment of head and neck cancers in patients based on age. The authors found no significant difference in major or minor complication rates even in patients over 80 years of age. Blackwell et al compared free flaps performed in octogenarians versus younger patients and found that 62% of the elderly patients suffered a major complication versus 15% of the younger patients. Obviously each patient should be evaluated on an individual basis for general health and surgical morbidity/mortality risk.

Geriatric patients are leading longer lives with a much greater period of health and activity than in decades past. Along with the growth of the elderly population there is an explosive growth in cosmetic surgery. This group of patients will increasingly demand cosmetic procedures to provide a more youthful appearance.

Many changes occur in the face and neck with age. In the skin, there is loss of tone, dynamic and static wrinkling, pigmentary changes, and gravitational descent of the skin and underlying soft tissues. Cosmetic procedures to address these changes include chemical peels, laser skin resurfacing, Botox injection, and rhytidectomy. In the upper third of the face, descent of the eyebrows and wrinkling of the forehead can be addressed with either direct, pretrichial, coronal, or endoscopic brow lift. Possible periorbital changes include lower eyelid laxity, prolapsed lacrimal gland, and upper lid ptosis (usually dermatocholasis). These problems can be

treated with dacryoadenopexy, lower lid shortening, or upper/lower lid blepharoplasty. In the nose there is tip ptosis from loss of attachments between the upper and lower lateral cartilages, loss of connections between the medial crura and the septum, and loss of ligamentous connections between the domes of the lower lateral cartilages and the anterior septal angle. Rhinoplasty can treat these problems. Possible techniques to address these problems are shortening of the lateral crura and placement of a septal strut to rotate the tip and increase projection. In the lower third of the face and neck age can cause loss of the premental fat pad, cheiloptosis, and platysmal bands. Treatments include genioplasty, lip-lift, and placcation/imbrication/suture suspension/Z-plasty of platysmal bands.

With the explosive growth of the elderly population this group will become a larger percentage of patients in the future. The problems these patients encounter include many that have not been mentioned in this brief review. The otolaryngologist must consider the patient's health and well being as a whole to provide care for the geriatric patient.

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