Introduction:
Care of the elderly patient involves some fundamental premises which must be taken into account in treatment by otolaryngologists. Often multiple diseases coexist in these patients which often present a diagnostic dilemma in treatment. The elderly also suffer from a unique set of illnesses which only occur in old age. Illnesses can present with unusual symptoms without common symptoms of pain and fever which may lead to diagnostic dilemmas. Otolaryngologists play a pivotal role in prevention of illness and other problems in the head and neck area. With our knowledge, early cancers can be detected, vestibular and hearing problems can be addressed, facial plastic and reconstructive procedures can improve patients’ outlook and often straightforward and needed treatment of otitis media, sinusitis and upper respiratory infections can improve someone’s quality of life.

Biology of Aging:
Wounds heal slower in the elderly for a multitude of reasons. Fibroplasia occurs later and is more retarded in older individuals. Collagen and elastin are markedly affected by the aging process. Soluble collagen decreases with age in both sexes, whereas the insoluble collagen content increases with age. Elastin increases with age but the quantity of elastic fibers (especially in vessels and the skin) decreases. This greatly affects wound healing. The effect of age on the rate of wound healing does not seem to be related to the cell count in the repair tissue but rather to the functional capacity of the cells. The equilibrium between synthesis and decomposition of the connective tissue becomes less congruent with age. In older patients, there may be a greater amount of collagen deposited at the end of wound healing but this may not be as well organized as in younger patients.
Medical and Surgical Treatment in the elderly:
The proper use of medications is particularly important in the elderly. One study has shown that the adverse effects of medication were the most common cause of symptoms confused with senile dementia. Sensitivity to drugs increases with age but the reasons are not completely clear. Renal clearance and hepatic metabolism both decrease with age but this may not explain the entire phenomenon. Drug drug interactions should be evaluated carefully before starting any new medications. Surgical procedures in the elderly should be performed with caution however healthy elderly patients continue to have surgical procedures performed without suffering major complications. Here, age should not be a deterrent in performing needed surgery on an elderly patient.

Geriatric Voice and Laryngeal Dysfunction:
As many as ten to fifteen percent of elderly individuals have vocal dysfunction. Voice weakness and articulatory imprecision are particularly difficult when an individual’s peer group is also likely to have significant hearing losses. This impact on day to day existence can be devastating. Dysfunctions may be classified into those that are part of the aging process and those associated with other pathologies. Some characteristics of the aging voice include altered pitch, roughness, breathiness, weakness, and tremulousness.

Routine laryngoscopy often reveals a yellowish or dark grayish discoloration of the vocal folds with bowing, incomplete glottic closure, visibility of the ventricle and sometimes vocal fold edema. Fundamental frequency has been used as an acoustic correlate to study these age related changes. Jitter (cycle to cycle frequency variation) continues to be significantly greater in the aging population when compared with younger patients. Some reports have shown an increase in fundamental frequency in aging men and most reports have shown a decrease in fundamental frequency in aging women. Some structural changes to the vocal folds may contribute to these changes in voice. The decreased amounts of collagen fibers, decreased density of these fibers and fibrosis of the vocal ligaments commonly seen in aged men may result in thinner vocal cords that vibrate more rapidly. These changes may contribute to the vocal fold atrophy and glottal gap commonly observed in aged men. This often results in a higher fundamental frequency. In contrast, vocal fold edema, commonly found in the larynges of aged women, would add mass to the vocal folds and decrease the fundamental frequency. The cause of these changes may be endocrine related after menopause in addition to the lowering of laryngeal position after 60 in women. These edematous changes can lead to vocal fold irregularities which may be reflected in a rough harshness to the voice. Surface irregularities can also prevent complete approximation of the cords and result in breathiness and reduced vocal intensity. Aging laryngeal muscles also undergo some degree of atrophy. Increased amounts of connective tissue and fatty infiltration are found interspersed among the degenerating fibers. These age related degenerative changes may be due to a decreased blood supply while others feel that the changes are due to a reduction of metabolic enzymes in muscle fibers which results in biochemical inefficiency and degeneration of the fibers. Poor mucosal hygiene is another common cause of dysphonia. This reduction in vocal fold moisture may contribute to a slowing of the mucosal wave and vocal difficulties. Medications are common offenders of mucosal
drying. These may include diuretics, steroid inhalers, tranquilizers and antidepressants with anticholinergic side effects. Improved function can be readily achieved by careful withdrawal and/or substitution of drugs and the use of mucolytic drugs.

Some of the perceived acoustic characteristics of geriatric voice such as tremulousness, weakness, and pitch variability are suggestive of neuromuscular impairment of laryngeal control. As a result, dysphonia may be the presenting symptom of some neurologic disorders such as essential tremor and Parkinson’s disease. Tremor may be present through all phonatory efforts and attempts to superimpose phonation on tremor can result in ventricular dysphonia. In Parkinson’s disease, the voice is low in volume, breathy and monotonic and the ability to read rapidly is reduced. The general alterations discussed above lead to “husky” voices in females and less masculine voices in males. As a result, women may strain to increase vocal pitch which can result in hyperadduction of the false vocal folds and in men, attempts to lower the pitch may result in a gravelly, breathy voice that is easily fatigued. It is also important to keep in mind that a whole host of benign and malignant laryngeal lesions may contribute to dysphonia and that presbylarynges should remain a diagnosis of exclusion. It is important to prevent compensatory functional misuse of the voice so early diagnosis of voice alterations is important.

Once a malignancy has been excluded, patients can usually be reassured and relieved of their anxiety. Rehabilitation should be multidisciplinary and speech therapy should be the mainstay of rehabilitation. Speech therapy involves having the patient reduce their compensatory maneuvers to change vocal pitch. For example, in the elderly man with a gravelly and breathy voice, vocal therapy is focused on encouraging upward adjustment of the vocal pitch. This is learned through having the patient repeatedly practice phonation at a higher fundamental frequency. In women who strain to increase their vocal pitch, therapy is directed toward relaxation of the laryngeal muscles during phonation. Surgical procedures have been devised in an attempt to adjust vocal pitch as well as strengthen the voice of patients with flaccid or bowed vocal folds. Isshiki has advocated a type 4 thyroplasty for this problem while others have advocated similar advancement of the anterior commissure to adjust vocal fold tension through anterior commissure laryngoplasty. Still others have used gelfoam or lipojection to add bulk to the vocal folds. Short-term success with these procedures has been achieved with improvement in loudness and clarity and a decrease in breathiness and air escape. However, surgery remains an option only after other more conservative measures have failed to achieve the results expected by the patient and surgeon.

**EFFECTS OF AGING ON THE SWALLOWING MECHANISM**

A number of age related changes have been noted in the oral, pharyngeal, and esophageal phases of swallowing. These changes include an increase in fatty and connective tissue in the tongue; atrophy of the alveolar bone with lost dentition; reduced chewing capabilities and decreased esophageal muscle tone. Swallowing slows with age such that the pharyngeal phase of swallowing is delayed. During the oral phase of swallowing, bolus formation is also delayed and the bolus is held slightly more posteriorly in older patients. During the esophageal phase of swallowing, findings show prolonged esophageal transit and smooth peristalsis is less efficient with age. These temporal
changes in the esophageal phase are more significant than those during the pharyngeal phase of swallowing. Most of these changes are academic because these age related changes do not increase the overall incidence of dysphagia, laryngeal penetration and frequency of aspiration. Some age related disease processes can affect the swallowing process. Right and left cortical strokes can lead to swallowing difficulties. Investigators have noted that left sided cerebrovascular accidents often lead to difficulties during the oral phase of swallowing including problems in initiating the swallow and delay of propulsion of bolus through the oral cavity. In contrast, patients with right sided cortical strokes tended to have problems with the pharyngeal phase of swallowing resulting in pharyngeal residue and aspiration tendency. Motor neuron disease can present with swallowing difficulty as an initial symptom with reduced lingual control and reduced labial and palatal movements. Parkinson’s has a typical pattern of swallowing problems including repetitive tongue pumping to initiate the oral stage of swallowing, delayed pharyngeal swallow and pharyngeal residue. In addition, a number of general medical conditions including rheumatoid arthritis, diabetic neuropathy and polymyositis can lead to swallowing difficulties as a consequence of their disease process. Important in diagnosis of swallowing disorders of the elderly is performance of a modified barium swallow. This critical study provides physiological information including bolus formation, swallow transitions, timing and etiology of aspiration as well as the effectiveness of rehabilitative strategies. Treatment of swallowing disorders requires multidisciplinary involvement which may include medical or surgical treatment. Often rehabilitation is all that is needed to improve swallowing. Many rehabilitation techniques involve having the patients apply voluntary control to their disordered swallow. The supraglottic swallow or Mendelsohn maneuver can often be implemented in some patients. In those who are not able to comply with voluntary instructions, postural techniques, volume changes or changes in food or diet consistency is all that is needed to improve swallowing.

THE GERIATRIC AUDITORY AND VESTIBULAR SYSTEMS

Estimates of hearing loss on the aging population has been difficult to quantify for a variety of reasons. Differing patient populations and failure to quantify hearing loss in the very elderly have led to varying rates of hearing deficits in the general population. The same holds true for vestibular problems. The external ear including the pinna are commonly involved in actinic disorders, especially basal and squamous cell carcinoma. The external auditory canal suffers a decrease in cerumen production due to degeneration of cerumen glands. The external ear tragi hairs may become long and obstruct the passage of this drier cerumen. This frequently leads to increased cerumen impactions in the elderly. Middle ear histologic changes have been noted in the ossicles including calcification of the joint capsules and degenerative arthritis of arthrodial joints. However these changes do not usually produce any significant hearing loss. Presbycusis can be broadly defined as an age-related decline in auditory function. This definition includes true cellular aging in addition to acoustic trauma, cardiovascular diseases and ototoxic medications. Histologically, an age-related loss of outer and inner hair cells can be noted primarily from the basal turn of the cochlea. This in addition to the noise induced hearing loss commonly suffered throughout one’s lifetime contributes to the high frequency nature of any one patient’s hearing loss. Hearing losses from noise exposure
can be predicted by several formulas. These losses are separate and additive to presbycusic losses. Presbycusis can also include difficulties in auditory processing that are not measured by pure tone audiometry. Rarely does presbycusis alone produce severe to profound hearing loss. If this is seen, other diagnoses need to be entertained. Aging has a detrimental effect on the perceptual processing of speech which leads to speech discrimination scores lower than expected for pure tone averages. Interaural time differences which are useful in discriminating high frequency tones requires an increased time difference in the elderly to accurately delineate these sounds. This again leads to decreased speech discrimination as most of the fricatives and plosives useful in understanding speech are located in these high frequencies. This is important when listening to several people positioned about the listener because this inability to determine very small interaural time differences leads to problems with speech understanding.

Schuknecht has suggested four categories of presbycusis based on histopathologic and clinical characteristics. Sensory presbycusis present with bilateral abruptly sloping high frequency sensorineural hearing loss. Their speech discrimination remains relatively good and pathologically, degeneration is noted near the basal portion of the organ of Corti. Neural presbycusis patients notice a rapid hearing loss and have severe difficulty with speech discrimination. Pure tone audiometry reveals a moderate, flat pure-tone loss with poorer speech discrimination. Histologic exam reveals loss of spiral ganglion cells. Metabolic presbycusis affects patients by causing a slowly progressive sensorineural hearing loss. Their audiograms generally show a flat loss with good discrimination. Histologically, atrophy of the stria vascularis may be noted. Cochlear or conductive presbycusis reveals thickening of the basilar membrane without hair cell loss – hearing loss in this condition may reveal a gradual sloping high tone loss with preservation of speech discrimination. Treatment of presbycusis involves hearing aide amplification. Successful use of a hearing aide requires a significant degree of manual and visual dexterity, an investment of time and money and a willingness to wear the device.

Presbyastasis has been proposed as a term to encompass the dysequilibrium of aging. It is important to remember that this remains a diagnosis of exclusion. Due to degeneration of vestibular, proprioceptive, and visual senses, the ability to walk and drive, as well as spatial orientation, can be reduced to the point of incapacitation. The most common vestibular malady voiced by the aged is usually a sense of imbalance. The significance of vestibular dysfunction cannot be overstated because of the risk of falling. Up to a quarter of patients have reported falling because of their dizziness. Presbyastasis may be manifested by increased body sway which can be correlated with decreased vibratory sensation in the lower extremities commonly seen in elderly patients. Histologic correlation has revealed a reduction in the hair cells particularly of the crista ampullares and of the macula and also a reduction in vestibular nerve fibers. Asymmetrical loss of vestibular function can contribute to patients’ dizziness which may make these changes histologically significant. Presbyastasis most commonly encountered by otolaryngologists involves the peripheral labyrinth where generalized hypofunction is often found. Treatment of balance disorders in the elderly must take into account the multiple causes and interactions involved. Balance disorders involve the vestibular, proprioceptive, visual and central nervous systems. Deficits in any one of these systems can at least be
partially compensated by the others. This compensation is most complete when the balance system is stimulated by ordinary movements or special exercises. Nonvestibular causes of presbyostasis need to be identified and treated specifically. Examples include postural hypotension associated with antihypertensive medications, endocrine abnormalities, malnutrition and cardiovascular insufficiency. Vestibular habituation training is a more recent treatment modality that offers promise for presbyostasis. These exercises are based on feedback control initiated by the habituation effect. Mechanisms of adaptation and compensation are stimulated through repeated elicitation of minor degrees of vertigo. Other maneuvers include visual tracking with the head held stationary and gaze stability with head movement. These exercises aim to reestablish balance and reduce disorientation.

THE AGING FACE

Senile changes affect the upper, middle and lower thirds of the face and neck. Aging leads to atrophy of the subcutaneous fat and a slow degeneration of the skin’s elastic and collagen network. Gradual resorption of the facial skeleton may occur. This results in a loss of skin tone and elasticity and relatively loose cervicofacial skin cover. With aging, the brows and glabellar tissues descend below the bony supraorbital margins giving the eyes a sad, angry or tired look. Long-term hyperactivity of the forehead and glabellar musculature can create permanent cutaneous creases. Standard or endoscopic browlifts are often incorporated in treatment of these age related changes. Skin redundancy and ptosis are classically manifested by deep nasolabial grooves and cutaneous sagging in the central third of the face. When atrophy of subcutaneous and buccal fat accompanies these changes, the aging face reveals marked hollowing over the cheeks. Correction in this area may involve malar or submalar implants, cartilage grafts and sometimes rhytidectomy. The external nose frequently changes its shape with advancing age. Tip ptosis, the finding most commonly recognized, results from stretching and weakening of the major tip-supporting elements. These support mechanisms that are weakened include the attachment of the upper portion of the lower lateral cartilages to the lower portion of the upper lateral cartilages, the fibrous connections between the medial crura and the caudal septum, and the ligamentous sling that joins the anterior septal angle with the domes of the lower lateral crura. All of this results in an inferior and posterior repositioning of the nasal tip which leads to tip ptosis. Sagging can result in the impression of a newly formed nasal hump as the dorsum begins to appear more prominent in relation to the posteriorly displaced nasal lobule. Techniques can include a “nose lift” to counteract these forces. Elevation of the lobule can be partially achieved by resection of the cephalic border of the lateral crus of each lower lateral cartilage. In addition, autogenous septal cartilage can be placed in between the medial crura as a strut on the premaxilla which allows the medial crura to be positioned more anterior and at the same time re-establishes a more normal relationship with the caudal septum.

FACIAL FRACTURES

As one ages there is resorption of mandibular and maxillary alveolar bone (mandible to a greater degree) leading to a loss in the vertical dimension of the face and a purse-string appearance of the mouth. The upper and lower alveolar ridges undergo resorption with
or without teeth but without teeth, total mandibular height may be reduced by more than 50%. This reduces the amount of force required to cause facial fractures. Techniques used in the elderly to fix facial fractures involve techniques that are less invasive, require less dissection, and introduce less hardware into the wound. Healing is often prolonged by up to 50% compared to young adults. Generally, age-related decrease in the vascularity of the soft tissues does not occur but it still remains very important to maximize the blood supply to the region of the facial fractures. Bone resorption and the loss of connective tissues around nerves also allow the neurovascular surfaces to be more easily damaged. The TMJ can also be affected by the aging process. There is loss of elasticity and hardening of the articular disc and capsular ligament, thinning of the articular disc, fibrosis of the articular space and flattening of the articular surfaces. Complaints can include joint clicking, dislocation, subluxation and fracture of the articular head with subsequent decrease in mouth opening.

AGING AND PULMONARY FUNCTION

Aging effects on pulmonary function are significant. Pulmonary perfusion, forced expiratory volume, forced vital capacity, elastic recoil, and dynamic pulmonary compliance decrease with age. Ventilation perfusion mismatch increases and an increase in alveolar dead space occurs. Body weight generally increases with age, which increases the demand on the respiratory system. Decreased vital capacity may require more intrasentence breaths. The laryngological manifestation of pulmonary dysfunction may include poor breath support during sustained phonation. This leads to a decrease in the ability to maintain a steady pitch, loudness and constant airflow control. Treatment of this includes increasing breath support before speaking by increasing tidal volumes taken in with each breath.

AGING AND THE PARANASAL SINUSES

Studies have generally demonstrated that there is no definite relationship between age and the type of nasal epithelium. Neither age nor smoking has been related to a reduction in ciliated cells. In addition, the effect of age on mucociliary transport is modest. However, loss of nasal structural support can increase symptoms of nasal obstruction. The most common nasal complaints in the elderly include nasal drainage, postnasal drip, sneezing, coughing, olfactory loss and gustatory rhinitis. Nasal discharge and postnasal drip among the elderly may be explained by loss of autonomic control. Gustatory rhinitis may be caused by overactivation of the autonomic control of the mucoserous and Bowman’s glands. In general, nasal resistance increases with age although many patients do not complain about this symptoms because they believe it to be a consequence of aging. Treatment of these problems should entail humidification and avoidance of topical or systemic decongestants because they may aggravate dryness or mucosal atrophy. In patients with vasomotor or gustatory rhinitis, anticholinergics such as ipratropium bromide spray may be effective. Some medications commonly used by the elderly such as diuretics and antihypertensives may dessicate the nose and treatment with topical or systemic decongestants should be avoided because they may aggravate dryness and mucosal atrophy. Treatment should include cessation of offending medications if possible, humidification, nasal irrigations, appropriate antibiotic therapy and sinus surgery when indicated.
HEAD AND NECK ONCOLOGY

More than one half of all cancer patients are older than 65 at the time of original diagnosis. Most elderly patients with head and neck cancers are able to tolerate cancer surgery fairly well. Understandably, their increased incidence of coexistent diseases makes treatment more hazardous but with the proper patient selection, they can do well. Speech and swallowing rehabilitation may also be somewhat retarded in older patients for a variety of reasons. It is worth mentioning a few neoplasms and their different behavior in the elderly. The most common nonsquamous tumors are those involving the thyroid and salivary glands. Anaplastic thyroid carcinoma is much more common in patients over 65 with 90% of patients presenting after age 50. Medullary and thyroid lymphomas are also commonly seen. Fibroosseous tumors and hemangiomas are rarely found in elderly patients. Even well differentiated thyroid cancer behaves more aggressively with an increased recurrence rate. In addition salivary gland malignancies are more frequently seen in patients over the age of 50 years with high grade neoplasms also being more common in older patients compared to their younger counterparts.

BIBLIOGRAPHY


