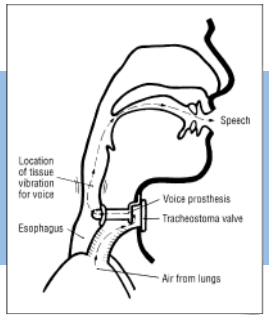

Clinical Insights

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Leakage Around a Tracheoesophageal Voice Prosthesis

Leakage of liquids around a voice prosthesis will not occur if the tracheoesophageal tissue is healthy and if the puncture is fit with an appropriate length prosthesis. Two factors contribute to the prevention of leakage. First, a viable tracheo-esophageal puncture has a natural tendency to try to spontaneously close and therefore snugly "hugs" the shaft of the prosthesis to prevent leakage around the device. Second, the retention collar or flange on the esophageal tip of the voice prosthesis simultaneously prevents dislodgement and provides a circumferential "seal" against the anterior esophageal wall mucosa.

Leakage around a prosthesis, although a relatively infrequently reported problem, is annoying and can lead to aspiration pnemonia. It results 1) when the puncture dilates or 2) when the tissues fail to naturally tighten around the shaft of the prosthesis. A prosthesis that is too long for the puncture "pistons" back and forth within the tract and this constant motion causes a mechanical dilation. Remeasurement of the tracheo-esophageal puncture and subsequent placement of a shorter voice prosthesis that does not piston back and forth will allow the tract to tighten and the leakage stops within approximately twenty-four (24) hours.

A puncture that leaks despite an appropriately fitting voice prosthesis warrants comprehensive medical evaluation including esophagoscopy. Factors that may affect tissue viability include: radiation exceeding 6,500 Rads, uncontrolled diabetes, significant nutritional imbalance, and recurrent cancer. Increasing the prosthesis from a standard 16 Fr. to a larger 20 Fr. diameter prosthesis in an effort to "fill" an expanding puncture ultimately results in even greater dilation. Also contrary to previous belief, neither cautery of an enlarged tracheoesophageal puncture or temporary placement of a small diameter catheter to encourage the puncture to shrink usually offer anything more than a temporary solution. A more appropriate prosthetic solution is to fit a voice prosthesis with a tight tolerance in the anterior-posterior direction thereby achieving maximum seal between the esophageal retention flange and the anterior esophageal wall mucosa. In some cases the use of a custom, larger diameter esophageal flange further increases seal effectiveness.

Cleaning and Sterilization of Reusable Voice Restoration Devices

Careful cleaning and sterilization of reusable tracheoesophageal voice restoration devices is critical. Most clinical facilities have established and strictly enforced policies and procedures that you should become familiar with. Components manufactured of silicone (tracheoesophageal dilator, measurement device) may be either steam autoclaved or gas sterilized, whereas plastic components (inserters, tracheostoma valves) that will be destroyed at high temperature must only be gas sterilized. Each individual item must be carefully cleaned with soap and water using a small brush to remove all particulate matter prior to packaging and submission for sterilization. During this cleaning phase each device should also be inspected for structural damage, i.e., cracks, tears, and discarded if indicated.

Recent Scientific Publications of Interest

Starting with this issue, *Clinical Insights* will alert readers to recent scientific publication that may be of interest.

Hoffman HT, Fisher H, VanDemmark D, et al: Botulinum Neurotoxin Injection After Total Laryngectomy.

Head and Neck Surg. 1997 (March): 92-97

Grolman W, Blom ED, Branson R, et al: An Efficiency Comparison of Four Heat and Moisture Exchangers Used in the Laryngectomized Patient.

Laryngoscope 1997: 107: 814-820

Excessive Stomach Gas

Flatulence, or excessive stomach gas, is a disturbing problem experienced by a small number of tracheoesophageal voice prosthesis users. It is usually attributable to one of four possible causes including: 1) inhaling air through the prosthesis to the esophagus, 2) inhaling air through the mouth and nose to the esophagus, 3) pharyngeal constrictor muscle spasm, and 4) pharyngoesophageal stricture.

During the inhalation cycle of respiration the pressure within the esophagus becomes more negative and creates a pseudo-vacuum that in some tracheoespohageal speakers actually pulls the valve in the voice prosthesis to the slightly opened position and air enters the esophagus. Sometimes this is accompanied by a simultaneous "click" sound caused by the flap of the valve opening. The solution to this problem is to refit the patient with a higher resistance voice prosthesis, i.e., a "duckbill" type prosthesis that opens less easily.

A second circumstance under which flatulence may occur is when the pharyngoesophageal segment (esophageal inlet) is hypotonic. Air is unintentionally exhanged in and out of the esophagus simultaneously with each respiratory cycle. Esophageal speech is spontaneously produced and tracheoesophageal voice is effortless to the point of being weak and breathy. An elastic band worn "comfortably tight" around the neck directly above the stoma to slightly constrict the pharyngoesophageal mucosa may improve voice quality and decrease air ingestion.

Both pharyngeal constrictor muscle hypertonicity and scar formation (stricture) may also be factors responsible for flatulence, but by different mechanisms. Active contraction of the pharyngeal constrictor muscles elicited by speech airflow distention of the esophagus during tracheoesophageal voice production results in airflow resistance and air being driven in the reverse direction to the stomach. Successful surgical (myotomy) or chemical (Botox) treatment of the pharyngeal constrictor muscles can eliminate hypertonicity, i.e., vocal effort and associated flatulence.

Stricture formation severe enough to significantly decrease deglutition may also restrict the egress of tracheoesophageal speech airflow. Consequently, air is forced to the stomach. Treatment for severe stricture is either mechanical dilation or surgical reconstruction.

Heat and Moisture Exchangers (HME) for Postlaryngectomy Mucus Reduction

The architecture of the nose and pharynx provides an efficient system which assures that gas (air) reaching our lungs is sufficiently warmed, humidified and filtered. The way this works is seemingly simple. During exhalation the moisture and heat in our breath stream is deposited in the pharynx and nose. On return, inhaled air which is usually dry and dirty is filtered by the hairs in the nose and the previously stored moisture and heat are picked up and returned to the lower airway and lungs.

Total laryngectomy bypasses the body's natural heat, moisture and filtration system. Air breathed out the tracheostoma loses essentially all of its heat and moisture. Inhaled air is devoid of moisture and is dirty. This is especially true during the winter months when humidity is low and residential heat is on, but is also true in warm, humid climates like Florida because most people are in air-conditioned areas where the air is chilled and the moisture is removed.

Loss of heat, moisture and filtration in tracheostoma breathing results in the pulmonary system producing increased amounts of phlegm basically in an effort to 1) maintain sufficient moisture and 2) to carry out dirt particles in the mucus discharge. Remarkably some laryngectomized individuals are less affected than others. Cloth stoma covers worn for cosmetic purposes provide minimal physiologic benefit whereas commercially available foam stoma covers do seem to decrease airway heat and moisture loss.

Recently, heat and moisture exchangers specifically designed for use by laryngectomized individuals have become available, i.e., Humidifilter®. Most patients who allow a trial period sufficiently long enough to allow the airway to recognize the benefit of the HME (minimally seven (7) days of consecutive use of a Humidifilter®) can expect to experience a 50-60% reduction in phlegm production. Those interested in learning more about HMEs are directed to the article by Grolman, et al, listed in this issue of Clinical Insights.