PRE-OPERATIVE COUNSELING IN THE SETTING OF TOTAL LARYNGECTOMY: THE SLP'S ROLE

Rachel Sims, M.S., CCC-SLP

Vanderbilt Voice Center

Department of Otolaryngology-Head & Neck Surgery

IMPORTANCE OF COUNSELING/ "INFORMATION GIVING"

Longobardi et al. (2019) discussed a growing body of literature that laryngectomized patients would be more likely to express anxiety, depression, and have a severely impaired QOL as compared to the general cancer population.

- Visible physical changes which may impact body image and self esteem
- Loss of voice
- Loss of smell/taste
- Significant alterations to the respiratory tract

Shenson et al. (2017) found that pre-operative counseling may decrease hospital length of stay.

- LOS reduced by 2.5 to 3.1 days

COUNSELING EFFECTIVENESS: PATIENT POINT OF VIEW

- Zeine & Larson (1999) found that only 53% of laryngectomees surveyed reported that they were satisfied with the information that was given to them before surgery.
  - 90% were provided information by a surgeon, 20% by SLP, 22% by other laryngectomees.
  - 21% of laryngectomees surveyed reported they were **not** told that they would not be able to speak following surgery.
  - Only 34% of laryngectomees were informed of speech rehabilitation options prior to surgery.
  - 54% of patients did not know what to ask prior to surgery.
  - 84% felt pre-operative counseling could make it easier to cope with post-operative changes.

COUNSELING EFFECTIVENESS: PATIENT POINT OF VIEW

- Zeine & Larson (1999) also asked laryngectomees and their spouses what topics they felt were most important to discuss during a counseling session…
  - 94% of patients felt inability to speak must be addressed.
  - 61% wanted more in-depth explanations of physiologic changes (stoma care, mucus production, changes in taste/smell, and changes in feeding).
  - 63% wanted more information on physical changes.
  - 54% wanted more information on social changes.

OUR PROCESS

- Following referral from MD, a sixty-minute session (preferably in person) is scheduled with the patient. Ideally a spouse/caregiver/family member/friend is also present. Telehealth can be considered if transportation is an issue.
- Avoid counseling on the same day that a patient receives their cancer diagnosis **if possible**.
- Each patient is provided with a blue folder of information that reiterates everything discussed during our session. This folder also contains our contact information for any follow-up questions/concerns.

PRE-OPERATIVE COUNSELING: FOOD FOR THOUGHT

- What do we want to know about the patient?
  - What do they do for a living?
  - How is their manual dexterity?
  - Cognitive status?
  - Ability to read and write?
  - Visual and hearing acuity?
  - Support system?
  - Level of motivation to communicate and maintain self-care post-operatively?
  - What is their current swallowing, voice, and respiratory status prior to TL?
  - What other treatments have they received prior to TL or what adjuvant treatments are planned post TL?
  - What medical conditions are present prior to TL and how might this impact them post-operatively?
  - What is the patient's interest in the possibility of a laryngectomy patient advocate visit to discuss the lived experience of a laryngectomee and learn more about communication options? (TEP, AL device, esophageal speech)

THE SLP'S ROLE: PRE-OPERATIVE COUNSELING

- Understand patient's treatment plan as directed by MD (surgery & reconstruction method, primary/secondary TEP candidacy, chemotherapy/radiation treatment history).
- What does the patient understand about the upcoming surgery and its purpose?
- Review present anatomy and how the current system works during voicing , breathing, and swallowing.
- What anatomical changes result from total laryngectomy and/or placement of TE puncture?
- What changes physiologically in terms of voicing, breathing, and swallowing?
- How does radiation therapy affect the healing process and functional outcomes?
- What safety risks are associated with status as a laryngectomee?
- What is the typical post-operative recovery time?
- What should a patient expect in the post-operative rehabilitation period?
- What communication options are available?
- What support systems are available?
- Allow patient and family ample time to ask questions.
- Expect family and patient to express a variety of emotions related to upcoming procedure (sadness, fear, reluctance, etc.)

HEAD AND NECK CANCER

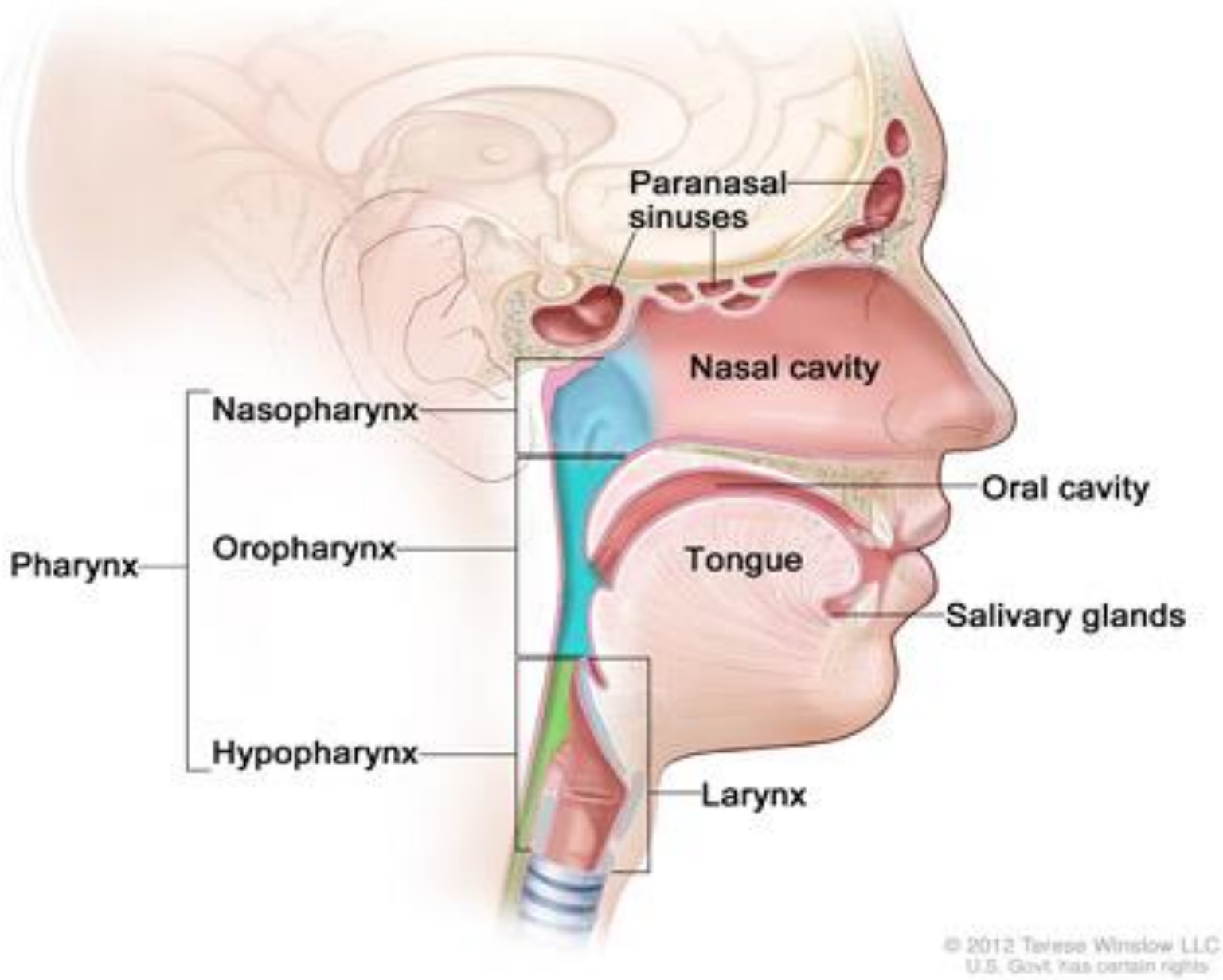
Cancers that typically begin in the squamous cells that line the mucosal surfaces inside the head and neck; also referred to as squamous cell carcinomas of the head and neck.

- Subtypes:
  - Salivary glands (less common, many different types)
  - Oral cavity
  - Pharynx (nasopharynx, oropharynx, hypophraynx)
  - Larynx
  - Paranasal sinuses and nasal cavity

Head and neck cancers account for approximately 4% of all cancers in the US. They are 2x as common among men versus women and median age at diagnosis is 65.

National Cancer Institute

Head and Neck Cancer Regions



National Cancer Institute

RISK FACTORS FOR DEVELOPMENT OF HEAD AND NECK CANCER

Alcohol and Tobacco use- synergistic effect	**HPV type 16**	Preserved or salted foods	Poor oral health
Occupational exposures	Radiation exposure	Epstein-Barr virus	GERD

National Cancer Institute

SYMPTOMS OF HEAD AND NECK CANCER

- Lump or sore that does not heal
- Persistent sore throat or globus sensation
- Dysphagia, odynophagia
- Dysphonia or changes in resonance
- Dyspnea
- Frequent headaches
- Tinnitus
- Trouble hearing
- Otalgia
- Persistent throat clearing, coughing, or hemoptysis
- Halitosis or foul odor

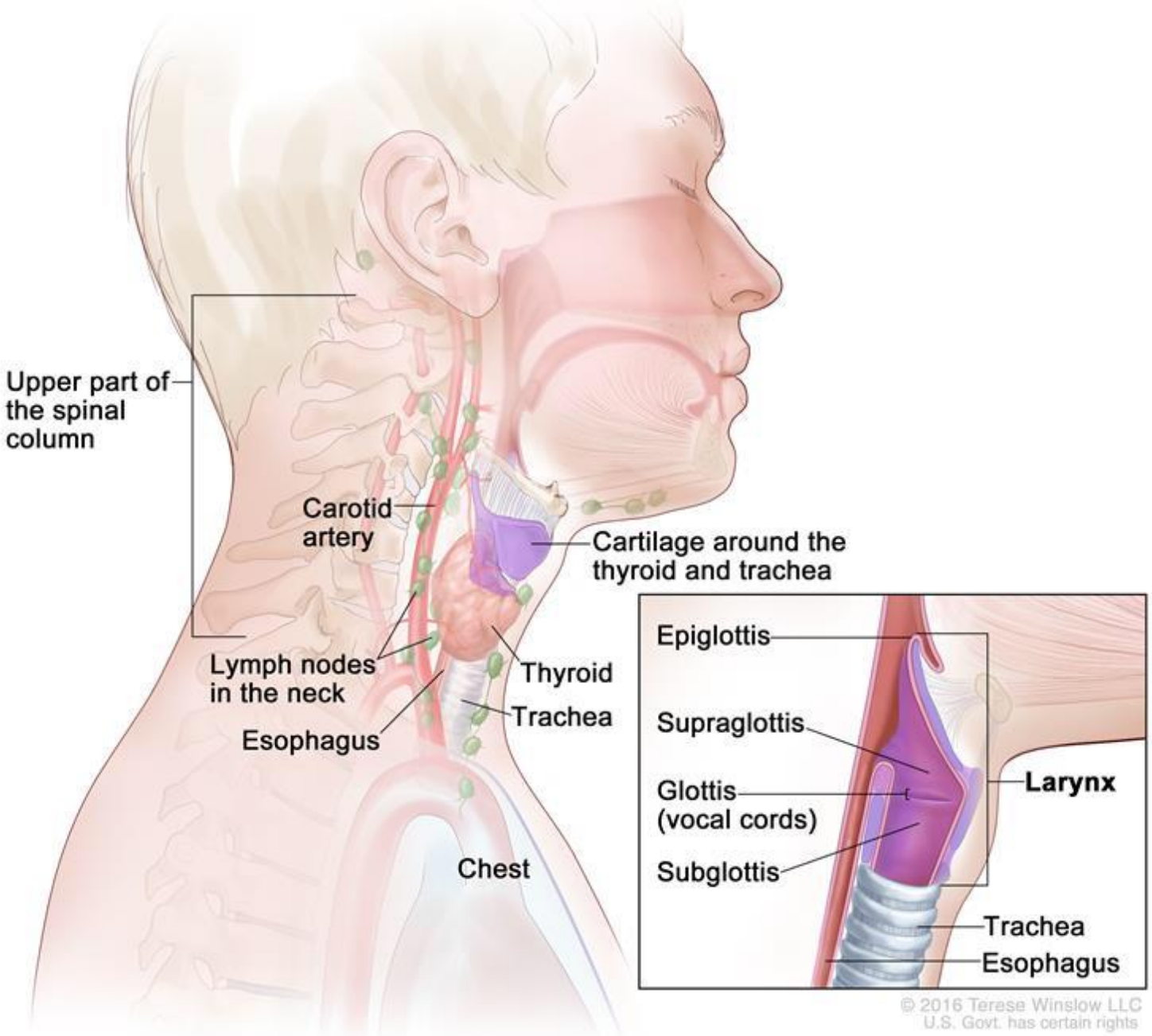
National Cancer Institute and (Stemple, Roy, & Klaben, 2014)

LARYNGEAL CANCER

- **Laryngeal Cancer** : a disease in which malignant cells form in the tissues of the larynx. Laryngeal cancer can occur in any part of the larynx, including the:
  - *Supraglottis*: above the level of the vocal folds
  - *Glottis*: at the level of the vocal folds
  - *Subglottis*: the lower level of the larynx beneath the vocal folds and above the trachea.
  - The larynx is lined with squamous cells, which is where the cancer is most likely to form. This type of cancer is referred to as squamous cell carcinoma (Scca)
  - **Carcinoma in Situ**: a group of abnormal cells that remain in the place where they first formed…these abnormal cells may become cancer and spread into nearby normal tissue. (Stage 0 disease)

National Cancer Institute

Areas Where Laryngeal Cancer May Form or Spread



National Cancer Institute

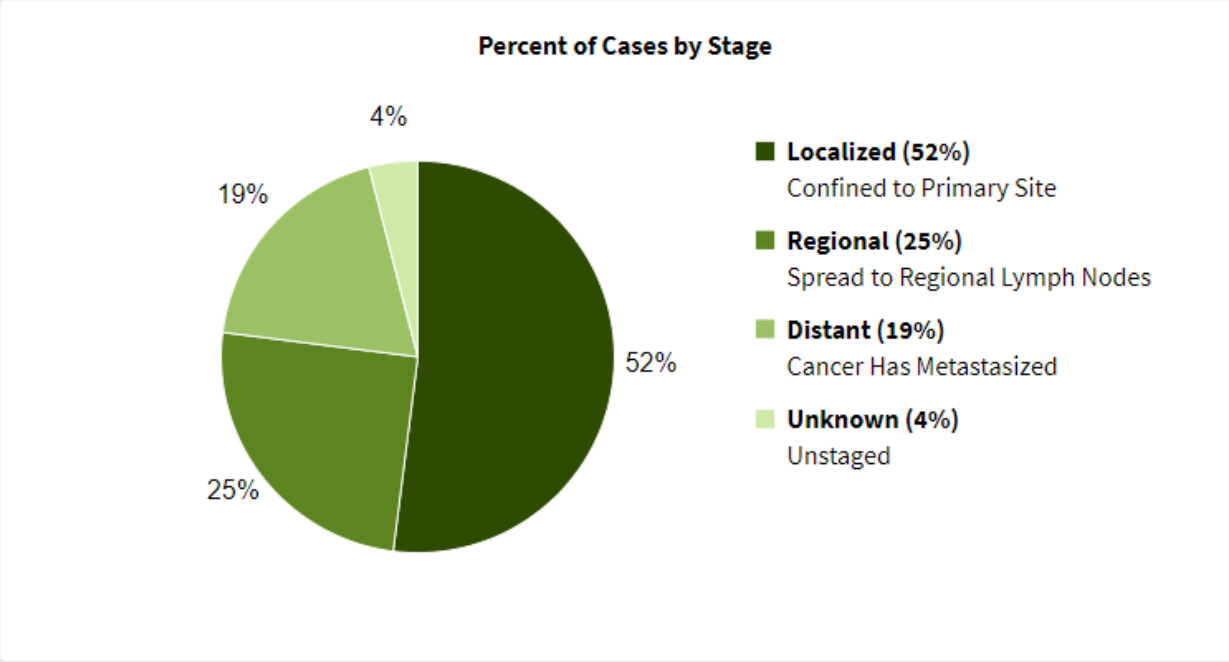
CURRENT LARYNGEAL CANCER STATISTICS

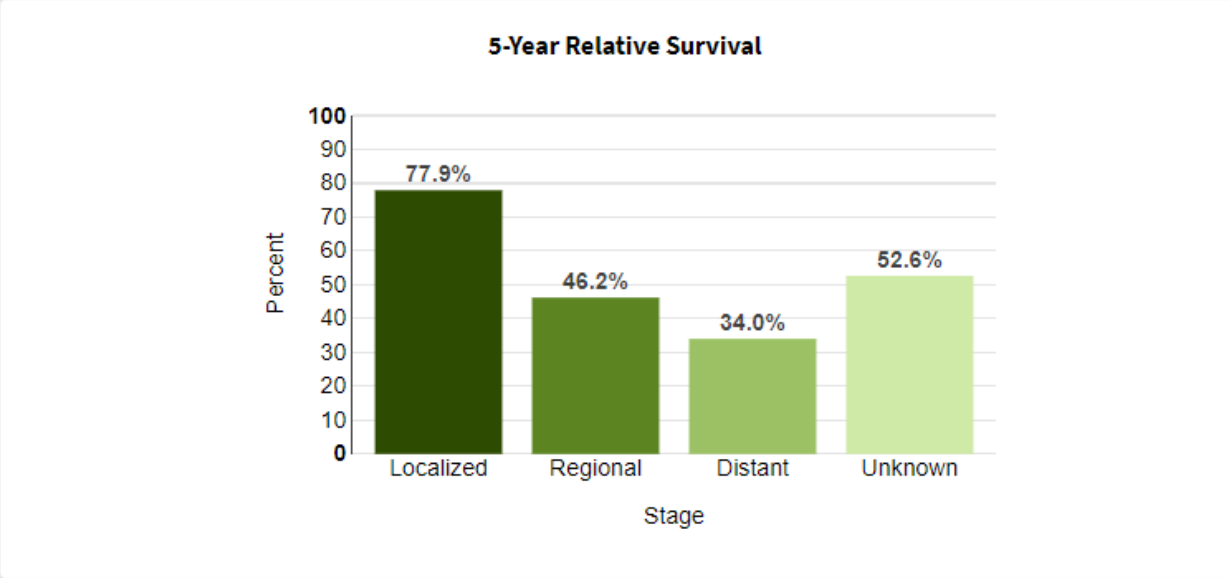
- The National Cancer Institute estimates that approximately 12,620 people will be diagnosed with laryngeal cancer in 2021, accounting for 0.7% of all new cancer cases. Laryngeal cancer deaths were estimated to be 3,770 in 2021, accounting for 0.6% of all cancer deaths.
- The number of new cases was 4.9 per 100,000 men of all races and1.1 per 100,000 women of all races, per year in data collected from 2014-2018. The number of deaths was 1.0 per 100,000 men and women per year.
- Laryngeal cancer is most frequently diagnosed from ages 55-64.
- Approximately 0.3 percent of men and women will be diagnosed with laryngeal cancer in their lifetime, according to data collected from 2016-2018.
- Prevalence: in 2018, an estimated 96,022 people were living with laryngeal cancer in the US.
- 60.7% of people reached the 5 year survival mark according to data collected from 2011-2017.

National Cancer Institute
SEER fact sheet

LARYNGEAL CANCER STATISTICS

Percent of Cases & 5-Year Relative Survival by Stage at Diagnosis: Laryngeal Cancer





National Cancer Institute SEER fact sheet

DIAGNOSIS OF LARYNGEAL CANCER

Physical Exam by otolaryngologist with indirect laryngoscopy

Biopsy (direct laryngoscopy)

Imaging (CT scan, MRI, PET scan, PET-CT scan)

SLP may assist with indirect laryngosocpy

Image courtesy of VUMC

LARYNGEAL CANCER STAGING

- Most commonly used staging system is the American Joint Committee on Cancer (AJCC) TNM system.
  - **T**: extent of tumor.
  - **N**: extent of lymph node involvement
  - **M**: the spread of disease (metastasis)
- ***Tx***: tumor cannot be adequately assessed
- ***Nx***: regional lymph nodes cannot be assessed.
- ***Mx***: metastasis cannot be assessed.

TNM STAGING: NODAL INVOLVEMENT

- **N0**: no nodal involvement
- **N1**: The cancer has spread to a single lymph node on the same side of the neck as the tumor, which is no larger than 3 centimeters (cm) across
- **N2**:
  - It has spread to a single lymph node on the same side of the neck as the tumor, which is larger than 3 centimeters (cm) but no larger than 6 cm across, OR
  - It has spread to more than one lymph node on the same side of the neck as the tumor, none of which is larger than 6 cm across, OR
  - It has spread to at least one lymph node on the other side of the neck, none of which is larger than 6 cm across.
- **N3**: The cancer has spread to at least one lymph node that is larger than 6 cm across, OR it has spread to a lymph node and then grown outside of the lymph node

American Cancer Society

STAGING OF GLOTTIC LARYNGEAL CANCER

AJCC Stage	Stage Grouping	Stage Description
0	Tis N0 M0	Tumor is only in the top layer of cells lining the inside of the larynx.
I	T1 N0 M0	Tumor has grown deeper, but it is only in the vocal cords, and they move normally.
II	T2 N0 M0	Tumor has grown into the supraglottis or subglottis, and/or the vocal cords do not move normally
III	T3 N0 M0 OR T1 to T3 N1 M0	The tumor is still only in the larynx, but it has **caused a vocal cord to stop moving**, OR the tumor is growing into the paraglottic space, OR the tumor is growing into the inner part of the thyroid cartilage. The tumor might or might not have grown into structures just outside the larynx, and it might or might not have affected a vocal cord (T1 to T3). The cancer has spread to a **single lymph node on the same side of the neck as the tumor**, which is no larger than 3 centimeters (cm) across (N1).

American Cancer Society

STAGING OF GLOTTIC LARYNGEAL CANCER CONT.

IVA	**T4a N0 or N1 M0** **OR** **T1-4a N2 M0**	The tumor has grown through the thyroid cartilage and/or is growing into tissues beyond the larynx (such as the thyroid gland, trachea, cricoid cartilage, esophagus, tongue muscles, or neck muscles). This is also known as **moderately advanced local disease.** The tumor might or might not have grown into structures outside the larynx (as far as moderately advanced disease), and it might or might not have affected a vocal cord (T1 to T4a)
IVB	T4B any N M0 OR Any T N3 M0	The tumor is growing into the area in front of the spine in the neck (the prevertebral space), surrounds a carotid artery, or is growing down into the space between the lungs. This is also known as **very advanced local disease** (T4b)
IVC	Any T Any N M1	The tumor might or might not have grown into structures outside the larynx, and it might or might not have affected a vocal cord (any T).

American Cancer Society

ORGAN PRESERVATION

- **Organ Preservation**: "to **maximize survival**, and, whenever possible, **preserve voice and swallowing function**…end points for effective organ preservation surgery are similar to nonsurgical organ preservation: serviceable speech without a tracheostomy and oral nutrition without a gastrostomy tube" (Forastiere, Weber, & Trotti, 2015). Treatment options considered within organ preservation include:
  - Intensity-modulated radiation therapy, proton beam radiotherapy
  - Chemotherapy
  - Chemoradiation therapy
  - Surgical examples:
    - Transoral endoscopic laser resection or transoral laryngeal microsurgery: used most effectively in early stage disease (T1) with high rate of tumor-free margins.
    - Transoral robotic surgery (TORS)

(Forastiere, Weber, & Trotti, 2015)

SURGICAL OPTIONS

Laser surgery (ex: KTP): CIS or early staged glottic cancers

- Candidacy depends on a variety of factors

Examples of **partial laryngectomy:**

- Vertical Hemilaryngectomy
- Supraglottic laryngectomy
- Supracricoid laryngectomy

Total laryngectomy

- Total or partial pharyngectomy
- Neck dissection
- Glossectomy
- Esophagectomy
- Thyroidectomy (hemi or total)

CHEMOTHERAPY

- Chemotherapy: cytoxic drugs delivered systemically via the circulatory system to the individual cells, killing or changing the cancerous cells and inhibiting tumor growth.
  - Two most common drugs used: Cisplatin and 5-fluorouracil
    - Alkylating agents (e.g., Cisplatin), create a chemical reaction and damage the DNA in the cell nucleus, preventing cell division and growth.
    - Antimetabolites (5-fluorouracil) interfere with production of DNA, preventing essential nutrients for cell's normal growth process.
    - Chemotherapy can also be used as palliative treatment

Stemple et. al, (2014)

COMMON SIDE EFFECTS OF CHEMOTHERAPY

- Nausea/Vomiting
- Fatigue
- Loss of appetite secondary to change in taste
- Weakened immune system
- Mucositis or sores in the mouth
- Xerostomia
- Bowel changes
- Hair changes or hair loss
- "Chemo brain"
- Hearing loss
- Low blood counts
- Depression

Stemple et. al, (2014)

RADIATION THERAPY

- **Radiation Therapy:** use of high-energy X-rays or particles directed to a marked treatment field targeting the tumor site and surrounding tissue.
  - *Intensity Modulated Radiation Therapy:* occurs when high-precision computer-guided treatment generates small radiation pencil beams that conform to the tumor, minimizing toxicity to nearby normal tissues… BUT, there is still some unavoidable radiation delivered to nearby healthy tissue with large doses.
  - *Proton Beam Radiotherapy:* a form of external beam radiation therapy (EBRT) that uses a linear accelerator to generate a concentrated beam of protons directed at a specified target for therapeutic usage. There is a molecular difference between photons (IMRT) and protons. With PBRT, a high dose of radiation is delivered to the tumor with minimal to no exit dose reaching nearby healthy tissue.
    - There is limited availability of this form of therapy nationwide and it is costly.

- Most often utilized in the early stages of laryngeal cancer as **definitive** treatment; can be used in later stage cancer as **definitive** or **adjuvant** treatment.

Stemple et. al, (2014)
Kim, J.K, et. al, (2018)

SIDE EFFECTS OF RADIATION THERAPY

- Dysphagia or odynophagia
- Diminished taste/loss of appetite
- Skin irritation or redness of the radiated area
- Tissue swelling
- Tissue fibrosis
- Fatigue
- Possible dyspnea secondary to edema
- Decreased salivary flow
- Xerostomia
- Sore throat
- Nausea
- Dysphonia
- Middle ear fluid, dryness of the ear canal
- Mucositis
- Hypothyroidism
- Hair loss in the radiated field
- Dentition damage
- Tissue necrosis
- Osteoradionecrosis
- Lymphedema

***Side effects tend to develop **progressively**.

Stemple et. al, (2014)

POST RADIATION TISSUE EFFECTS

Acute stage (edema) → Chronic stage (fibrosis) → Late stage (denervation)

- How do these issues affect voicing, breathing, and swallowing?

Radiation associated dysphagia

- Physiologic impairments are common (more than 50%)
- Bolus transport is impaired
  - Pharyngeal residue is common (>75%), aspiration is seen in up to 30% of patients
- Stricture is less common (<15%)

Hutcheson, K. (n.d.). *Radiation-associated dysphagia "RAD": Etiology and toxicity*. MedBridge. https://www.medbridgeeducation.com/player/course/5005099/2/1

CHEMORADIATION THERAPY

- 1) Organ preservation
- 2) Chemotherapy acts as a radiosensitizer by improving probability of local control and survival secondary to destruction of radioresistant cells
- 3) Possibility that treatment may potentially eradicate distant micrometastases.

Stemple et. al, (2014)

SALVAGE LARYNGECTOMY

When alternative forms of treatment fail…

Salvage laryngectomy: performed when there is a "lack of response to treatment or progression or recurrence [of disease]" (Weber, 2003, p. 45).

- "Although salvage TL is necessary in approximately one third of patients treated by induction chemotherapy and RT or RT alone, fewer patients require salvage TL when the initial treatment is concomitant chemotherapy and RT. Furthermore, only 5% of patients will require laryngectomy for treatment-related toxic effects such as radiation necrosis or aspiration" (Weber, 2003, p. 49).

Weber et al., (2003)

TOTAL LARYNGECTOMY (TL)

- Laryngectomy: surgical removal of the larynx. This includes the vocal cords, epiglottis, hyoid bone, extrinsic strap muscles, and may also include 2 or 3 tracheal rings.
  - The trachea is sutured to the neck, just above the sternum, which creates the **stoma**.
  - **The trachea is now separated from the pharynx, nose, and mouth.**

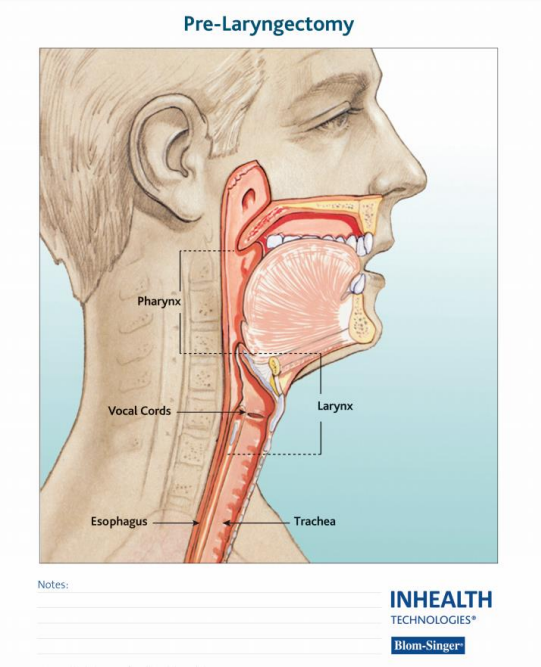
Surgery may also include…

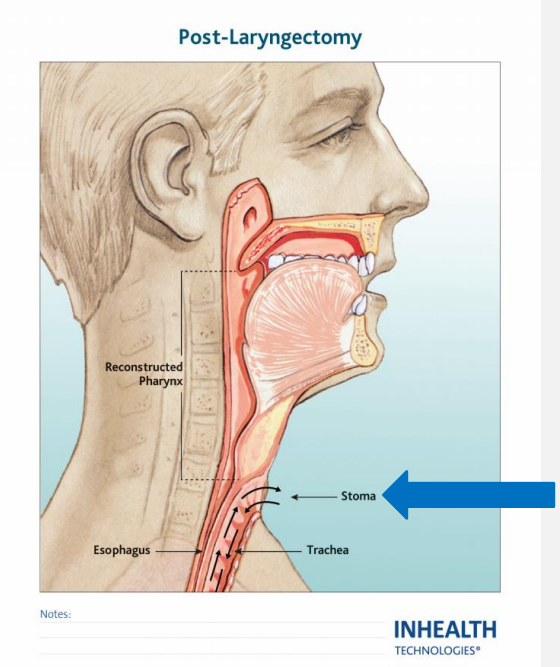
- ✓ Partial or total pharyngectomy, esophagectomy
- ✓ Neck dissection (radical, modified radical, selective, or extended)
- ✓ Glossectomy
- ✓ Thyroidectomy (hemi or total)

Reconstruction:

- ✓ Primary closure
- ✓ Myocutaneous flap closure (ex: pectoralis major flap)
- ✓ Free flap closure
- ✓ Jejunal free flap
- ✓ Gastric Pull-Up (when esophagectomy is involved)

CHANGES IN ANATOMY AND PHYSIOLOGY POST TL





The patient is breathing through the stoma

POST TL CHANGES CONT.

- S/p TL, the upper and lower airways are *permanently disconnected.*
  - *Upper airway*: responsible for warming, humidifying, and filtering inspired air before it reaches the lower airway. The upper airway also provides pulmonary resistance that maintains pulmonary strength.
  - Unfiltered, cold air with reduced humidity results in dryness of the tracheobronchial tree and rigidity of the cilia, resulting in…
    - ✓ Mucus overproduction
    - ✓ Increase in viscosity of mucus
    - Tracheobronchial irritation also results in changes to the tracheal tissue with resultant excessive sputum production, frequent involuntary coughing, and repeated forced expectoration to clear the airway.

    *Symptoms typically increase over a period of 6-12 months before stabilizing.

Foreman, A., De Santis, R.J., Sultanov, F., Enepekides, D.J., & Higgins, K.M. (2016)

POST OPERATIVE CHANGES

- Status as a neck-breather
  - Must register with local 911 dispatchers; resuscitation must be mouth-to-stoma. Anesthesia must also be delivered to the stoma.
- Loss of ability to voice
- Diminished sense of smell and taste
  - However, olfactory rehabilitation can help alleviate severity of this side effect in some cases (e.g., Polite-Yawn technique).
- Extreme caution near bodies of water
- Difficulty with activities involving weight bearing due to inability to utilize the larynx to build thoracic air pressure (Valsalva maneuver).
- Sanitary considerations (cover the stoma when coughing or sneezing).
- Increased viscosity of mucus and frequency of mucus expectoration s/p TL.
- Presence of a feeding tube post-operatively until MD clears patient for trials of PO intake and ensures patient can maintain weight with PO intake.
- Changes in appearance while admitted as an inpatient immediately s/p TL: neck edema, possible neck erythema, presence of drains protruding from the neck, donor site edema/erythema/bandaging (depending on type of reconstruction), etc.

HME FILTERS

Images courtesy of Atos Medical and InHealth Technologies

- Created to compensate for lost functions of the upper respiratory tract.
  - Expired air moisturizes the HME filter which then warms air and filters particles during inspiration.
  - There is also a slight increase in pulmonary resistance which can provide a positive end expiratory pressure to splint the distal airways open.
    - Benefits:
      - ✓ Reduced cough and forced expectoration
      - ✓ Improved sleep
      - ✓ Reduction in in-hospital complications (mucus plugs)

      *Early intervention and patient compliance are **essential** to long-term benefits of HME use.

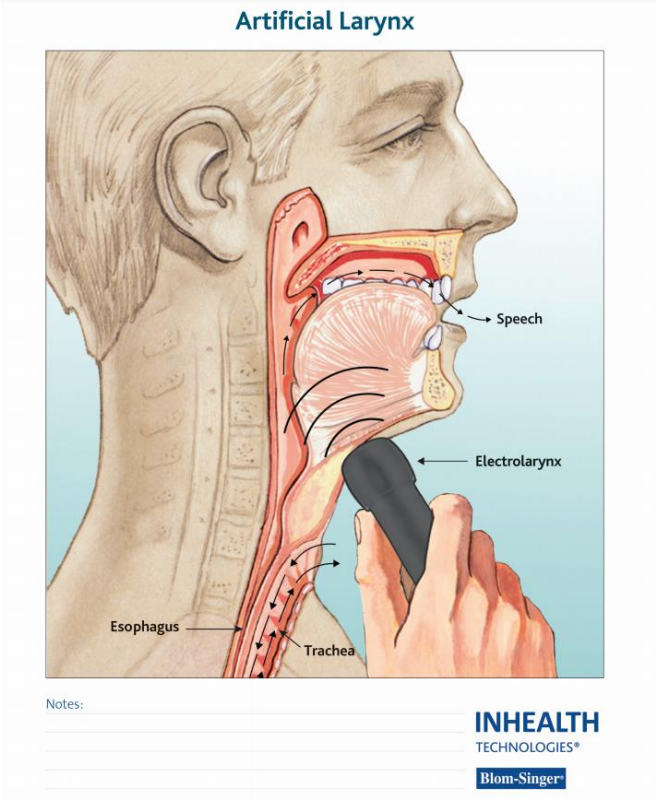
Foreman, A., et al, (2016).

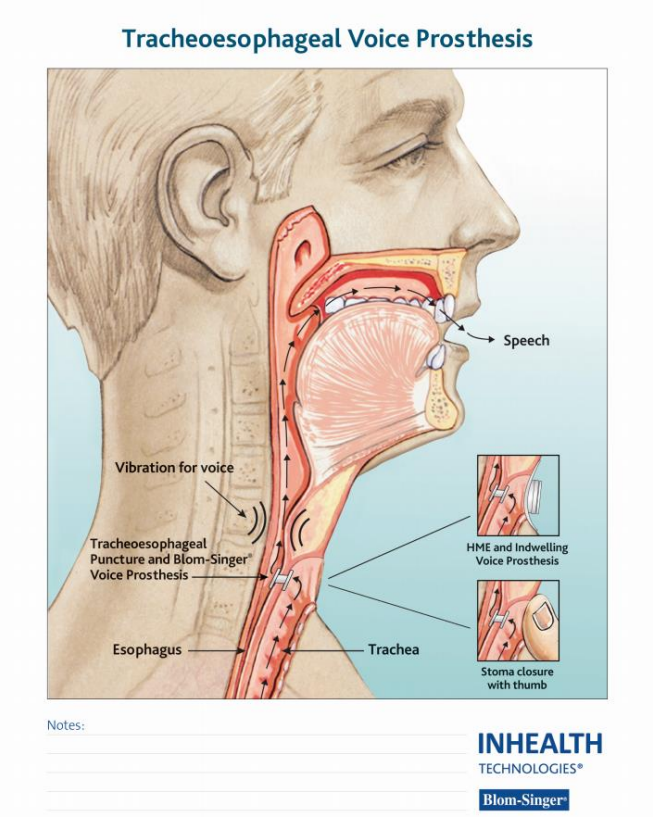
PULMONARY REHABILITATION/STOMA CARE

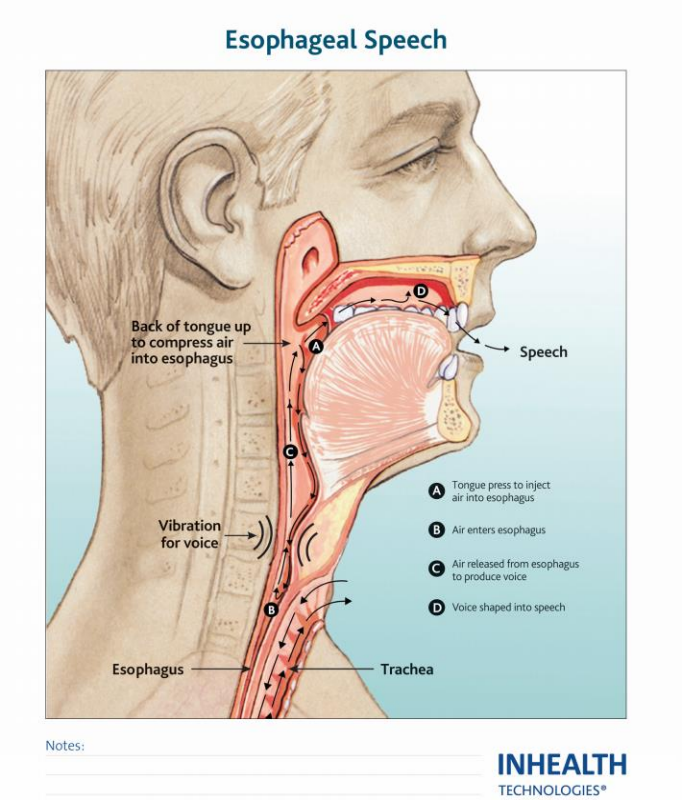
-Patients are educated regarding the following procedures and devices in the immediate post-operative period, including…

- Consistent wear of lary tube to maintain stomal patency with HME filter to heat, moisturize, and filter air.
- Use of ShowerAid or other ShowerGuard to protect the airway during bathing.
- How to clean and maintain products.
- How to independently insert and remove all products.
- How to order additional supplies to maintain stoma care.

Images courtesy of Atos Medical







VOICE RESTORATION METHODS

Images courtesy of InHealth Technologies

VOICE RESTORATION

- Alaryngeal Device: source of **external** mechanical sound via a diaphragm within the device which vibrates; this allows for sound to be transmitted through tissue. This is what our patients utilize in the immediate post-operative period for communication with an intraoral adapter.
- Esophageal Speech: utilizing the patient's PE segment in order to generate sound via ambient air present within the oral and nasal cavities.
  - *Inhalation method:* creating negative pressure within the thoracic cavity to draw ambient air into the esophagus.
  - *Injection method:* compressing the intraoral air into the esophagus with assistance from the tongue, lips, and sometimes cheeks; accomplished via glossopharyngeal press or consonant injection method.

Stemple et. al, (2014)

VOICE RESTORATION CONT.

- Tracheoesophageal Puncture: developed by Blom and Singer. The TE puncture creates an opening between the trachea and esophagus (fistula) which accommodates a voice prosthesis. This procedure allows for pulmonary air to enter the esophagus and vibrate the PE segment upon occlusion of the stoma.
  - Primary puncture: at the time of TL.
  - Secondary puncture: a separate, outpatient procedure. The majority of our patients receive **secondary** punctures at Vanderbilt.

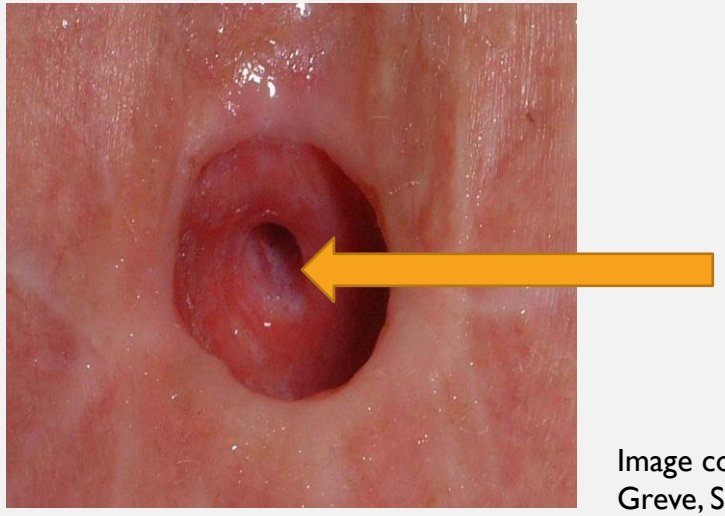
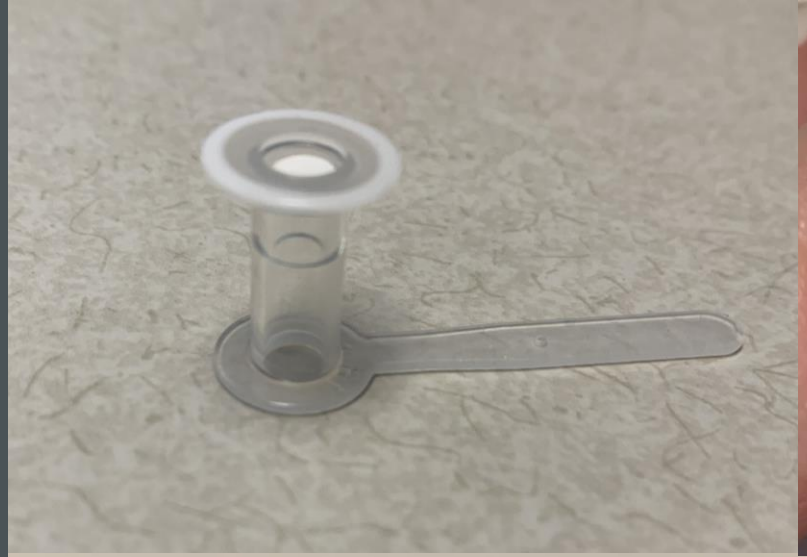


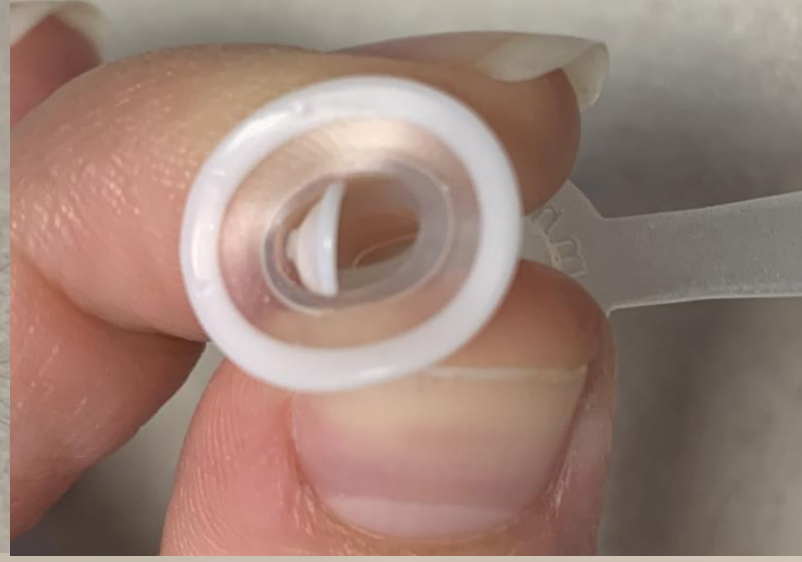
Image courtesy of Morgan Greve, SLP

Stemple et. al, (2014)

TRACHEOESOPHAGEAL PROSTHESIS

- The prosthesis is a ONE-WAY valve. It is CLOSED during swallowing and quiet breathing and OPENS during voicing. Digital occlusion of the stoma results in the flow of positive pressure into the esophagus.
- The puncture itself is responsible for ability to voice, NOT the prosthesis.
- Prosthesis is typically evaluated and replaced every 2-3 months secondary to failure of the one-way valve which results in leakage.





VOICE RESTORATION METHODS

Courtesy of Morgan Greve, SLP, with InHealth Technologies

PRE TEP COUNSELING

- If TEP is done secondarily, it is completed as an outpatient procedure. If completed as a primary procedure, TEP will be placed at the time of TL.
- Review risks associated with TEP usage (dislodgement, leakage, difficulty voicing, etc.)
- Patient will need to wait at least 3-5 days, per MD discretion, to initiate TE voicing s/p fistula creation.
- Patient will need to be willing to return to clinic ~3-5 days after TE puncture in order to complete a one hour initiation of TE voicing session with one of our SLPs.
  - Training in occlusion of the stoma to generate TE voicing and to practice coordination of respiration and occlusion.
  - Training in use of cleaning brushes, dilator, and plug insert.
  - Continued education on how to troubleshoot TEP issues at home (central or periprosthetic leakage, dislodgement).
  - Trialing products to help the patient find the optimal stomal seal during voicing attempts (fenestrated lary tube, lary button, baseplates, etc).

CONSIDERATIONS FOR TEP CANDIDACY

- What co-morbidities are present that may impact success of TE speech?
- Are there significant radiation side effects that may impact success of TE speech?
- What is the patient's manual dexterity and visual acuity?
- What is the patient's level of motivation to communicate and maintain daily self-care of the prosthesis?
- What is the patient's current living situation? Can they secure transportation to clinic periodically for prosthesis changes and evaluation?
- Is the patient willing to assume cost associated with maintaining TEP speech?
- What is the patient's current cognitive status and level of understanding of the anatomical and physiological changes associated with TEP?
- What is the patient's understanding of how to trouble-shoot and manage issues at home (leakage, dislodgement, etc.)?

* Esophageal insufflation can be trialed prior to a patient proceeding with TEP placement to determine vibratory capacity of the patient's PE segment.

TEP CLEANING

- To be completed at least twice per day with cleaning brush.
- Patient should be able to easily visualize the TEP's tracheal flange and **gently,** with a swivel motion, insert and remove the cleaning brush from the barrel of the TEP.

Examples of InHealth and Atos cleaning brushes

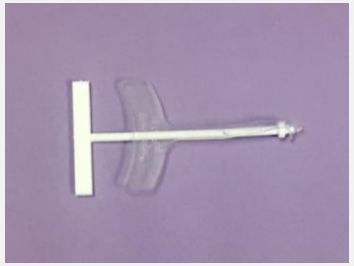
TEP LEAKAGE

Patient should be prepared to manage central or periprosthetic leakage and report to clinic in a timely manner to resolve this issue.

Central leakage

-Plug insert

-Thickened liquids



Periprosthetic leakage

-Thickened liquids

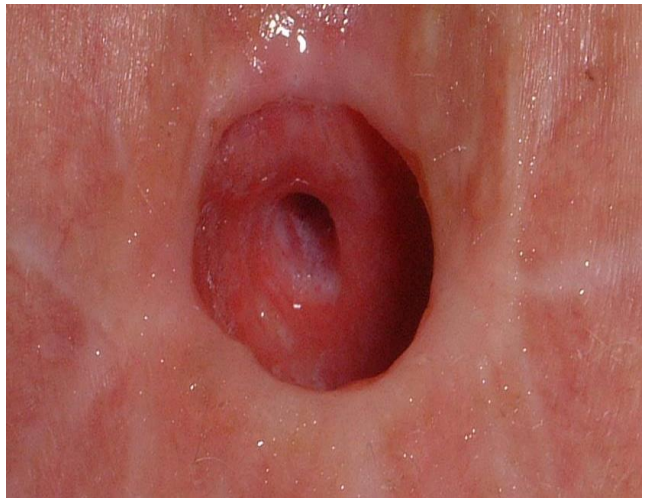
-Consideration of larger flange/XtraFlange at next TEP change if tract sizing is stable

TEP DISLODGEMENT

Necessity of a chest X-ray to rule out dislodgement into the lungs (the TEP is radiopaque).

Use of appropriate dilator to maintain puncture patency.

Importance of scheduling a return visit to clinic to have appropriate fitting TEP replaced.



RESOURCES FOR LARYNGECTOMEES AND THEIR FAMILIES

- WebWhispers
- IAL- International Association of Laryngectomees
- Nashville New Voice Social Club
  - One Sunday per month here at Vanderbilt
- Gilda's Club

QUESTIONS?

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