Swallowing after a Total Laryngectomy

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Disclosure

Objectives

- To identify anatomical and surgical factors changing swallow function following Total Laryngectomy (TL).
- To identify additional risk factors impacting probability of dysphagia in primary and salvage Total Laryngectomy (TL) patient population.
- Illustrate common swallowing problems associated with Total Laryngectomy.
- Understand the role of the SLP in swallowing assessment and nature of intervention for the laryngectomized patient.

Introduction

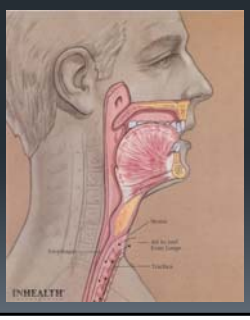
Myths

- A Total Laryngectomy (TL) is a cure for intractable **DYSPHAGIA.**
- A Laryngectomee only needs gravity to swallow.
- Incidence of dysphagia after total laryngectomy is low.
- Dysphagia after Total Laryngectomy is due to stricture.

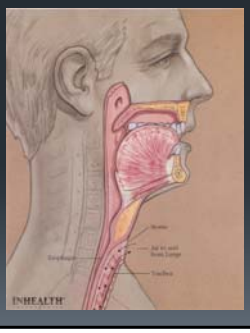
Reality

- A TL maybe a cure for intractable "traditional" **aspiration**.
- Swallowing after Laryngectomy still requires propulsive forces to clear a bolus.
- Dysphagia is often under reported and prevalence maybe up to 71.8% of patients (Maclean 2009)
- Stricture is one of many swallowing issues that can affect the TL patient

Anatomical changes associated with Total Laryngectomy



Anatomical Differences after Total Laryngectomy



- Separation of the airway from the esophagus; trachea brought forward below level of larynx creating a permanent tracheostoma (trans-nasal airflow eliminated)
- Removal of laryngeal structures and hyoid bone.
- Neo-pharyngeal creation and pharyngeal closure with alteration of base to tongue as upper anastomosis leading to the pharyngo-esophageal sphincter now known as PE segment (formally UES).
- Cricopharyngeal (CP) myotomy is completed to release muscle fibers superiorly and inferiorly to ensure that all of the muscle has been released and decrease tonicity of sphincter.
- Formation of tracheal-esophageal puncture with intra-operative placement of primary prostheses (indwelling) vs. red rubber catheter.

POST-OP

Things to consider

- Consider if laryngectomy is definitive primary treatment vs. "salvage" treatment. ?Radiated vs Non-Radiated neck?
- Consider how defect closure was achieved (primary; patch flap; pedicled flap—what type?)
- Consider How pharyngeal closure was achieved? reconstruction was needed (partial; circumferential)
- Consider if prior lingual deficits were present? Was a glossectomy required?
- Consider if pre-existing dysphagia? h/o BOT cancer? h/o prior radiation to pharynx?

Immediately Post-op Total Laryngectomy

- Post-op NPO with tube feeds (NG tube vs. G-tube
- 7 days (primary); 14 days to 6 weeks for (flap/salvage) prior to p.o challenge
- Physician may complete bedside "leak test" looking for "blue" in JP ; "murky" contents or leak at suture lines
- An esophagram +/-MBS may be requested (omnipaque)

Esophagram Leak Study

- Conducted by Radiologist or can be done in conjunction (prior) to MBS with SLP.
- Use a water soluble contrast (Omnipaque)—advantage due to material is re-absorbed into neck tissue; does not impair healing
- Not as radio-opaque and disperses quickly—may miss subtle leaks
- Should be done prior to initiating P.O diet with a known h/o fistula or as a post-operative protocol.

+ LEAK

Pharyngocutaneous Fistula

- A pharyngocutaneous fistula or tract is an abnormal communication between pharyngeal mucosa and the skin.
- Characterized by a salivary leak developing from the pharyngeal closure to the skin, which indicates a breakdown of the pharyngeal suture line or insufficient healing

Pharyngocutaneous Fistula

- Most frequent and common complication after total laryngectomy (5-65% rate)
- Usually occurs in 1-3 weeks after surgery and may be coupled with infection.
- Risk factors: Salvage TL; h/o XRT; +neck dissection @ time of surgery ; DM; anemia; poor albumin; Low hemoglobin; pyriform sinus tumor; hypothyroidism
- Oral feeding on hold (NPO) until fistula is either healed or repaired
- Rate may depend on type of flap reconstruction.
- Usually identified by physician prior to inpatient discharge but can be found by SLP after discharge
- Presence of fistula will impact progress with alaryngeal speech methods

Pharyngocutaneous fistula

Rates:

Primary Closure: *34%(Patel 2013) (30) * increased with salvage TL

Free Flap (general-25%) Circumferential: 10% vs Partial: 6%(Selber 2014)(29)

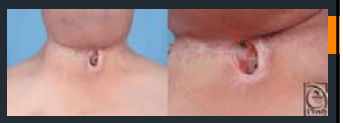
- **Pec Flap**: 15% (Patel 2013) (30) **fastest healing time and lowest rate (Hanasono 2013) (31)
- **Radial Forearm Flap** (RFFF): 16% (Lopez 2013) (32)
- **ALT flap: 9 %** (Lopez 2013) (32)
- **Jejunum Flap: 0-12%**

PE fistula MBSS

PE fistula MBSS

PE Fistula MBS

PC Fistula Video



Pharyngocutaneous Fistula

Solutions:

- Outpatient wound care via "ribbon" packing or specialized dressing to promote wound contraction and formation of granulation tissue.
- Complex/non-healing/recurring cases may require wound vac or surgical closure with flap.
- May be associated with "abscess" or infection and may require additional antibiotic treatment

SLP

- May be identified and induced by gently pressing in the surrounding area to express secretions.
- SLP will proceed with training with alaryngeal communication methods as possible via electrolarynx (TEP goals on hold)
- The role for the speech-language pathologist (SLP) is primarily supportive until healing has occurred and rehabilitation may resume

Pharyngocutaneous Fistula

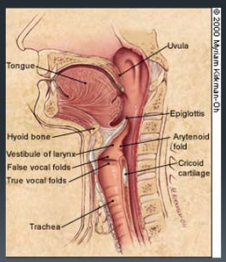
Solutions:

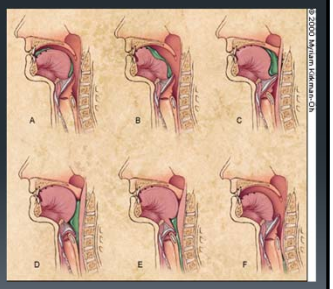
No LEAK

NO LEAK/ P.O PASS

- Initial Liquid diet and gradual upgrade regular p.o diet
- Some might report odd sensation; difficulty with swallowing due to new but normal changes with swallow function post TL
- SLP may need to encourage p.o intake if h/o prolonged NPO status
- Need basic reflux precautions and upright positioning after meals
- Recommendations for xerostomia (dryness) and for optimizing taste/smell impacing appetite.

Normal Swallowing pre-TL





Normal MBS

FEES—non-TL

Normal swallowing w/TL

Structure

- Funnel shape of neo-pharynx
- Edema (submental/ prevertebral tissue)
- BOT alteration formation of upper anastomosis site (destabilized? w/removal of hyoid)
- Leading to Pharyngo-esophageal segment (PES) location C5-C7
- Location of TEP

Function

- Mildly decreased BOT retraction
- Increase with pharyngeal bolus transit times (decrease with intra-bolus pressure); mild residue
- GERD
- Need for upright positioning after meals

Oral Phase

- Altered sensory recognition of food due to lack of trans-nasal airflow (hyposmia-smell; Dysguesia-taste) *oral preparatory*
- Hyoid resection—*stability of tongue? (oral prep/oral transit)*
- If Partial glossectomy required as part of resection- may impact lingual propulsion of bolus (complex resection) *oral transit Salvage TL*
- Altered Saliva production—if h/o xerostomia (XRT) *oral preparatory*
- Jaw opening/ROM—restricted mastication and opening if has post-operative facial/submental edema or premorbid trismus (both common w/ h/o XRT-Salvage) *oral preparatory*

Neo-Pharyngeal Phase

- Altered neo-pharynx dynamics– requires higher tongue base to posterior pharyngeal wall pressures to propel a bolus through the pharynx.
- **Pharyngeal closure technique:** native vs non-native tissue—contractility of pharynx; diameter of neo-pharyngeal lumen; post-op complications
- Increased delay with pharyngeal transit times (PTT): some pharyngeal residue is normal
- Lower hypopharyngeal peak (contractile) pressures (hPP) (Maclean 2016) (21)
- Higher hypopharyngeal intrabolus pressure (hIBP) (Maclean 2016)—difficulty with larger bolus size (20-30 ml). (21)

Pharyngeal/Esophageal Phase

- Varying degrees of Pharyngoesophageal junction (PEJ) restriction correlates with dysphagia (Maclean 2016)—responds to dilation (21)
- **Separation of trachea and esophagus:** no traditional aspiration but also eliminate necessary negative pressure (sub-atmospheric pressure) to create pressurization of swallow or vacuum for bolus propulsion and CP relaxation.
- CP Myotomy: aides with relaxing CP junction to assist with bolus transit
- High incidence of GERD and pharyngeal reflux!

Esophageal Phase

- Interruption of the cricopharyngeal muscle and pharyngeal plexus may produce "local derangement of the upper esophageal sphincter function" (Choi 2003) (22)
- Sacrifice of local pharyngeal vagal branches bilaterally may impair motor function of UES and produce abnormalities in peristalsis. (Duranceau 1976)(23)
- Abnormalities in peristalsis(decreased wave) of proximal esophageal body (Choi 2003) (22)
- Co-existent esophageal dysmotility needs to be considered in the dysphagic laryngectomee, particularly if they fail to respond to dilatation of the frequently identified concurrent cricopharyngeal stricture. (Maclean et al 2012) (24)

Oral Phase

Without experiencing the aroma of food, interest in eating can deteriorate

Solutions:

- Try foods never tried before
- Try foods that were previous dislikes
- Uses seasonings, spices, and salt (if adding sodium is not contraindicated)
- Avoid dependence on liquid supplements (BOOST ENSURE)
- Wafting aromas to promote smell
- Olfaction technique (ATOS)

Poor pharyngeal peristalsis

- Solutions:
- Modified Barium Swallow Study
- Traditional swallowing exercises i.e. tongue base retraction
- Compensatory Swallow Strategies
  - Upright sitting posture
  - Alternate liquids and solids
  - Effortful swallow
  - Head Rotation

Normal TL (post-op 2015)

Normal TL MBSS

Normal (2018)

TL Swallow (endoscopic)

Normal TL Swallow +voicing (endoscopic)

Dysphagia after total laryngectomy

Prevalence

- 2006-study from UK- Kazi, R et al

Questionnaire analysis of the swallowing-related outcomes following total laryngectomy. 62 patients s/p TL completed MDADI Conclusion: found that "most reported a supraglottic 'cough swallow" and glossectomy and method of PE segment closure impacted swallowing outcomes. (14)

- 2009-study from Australia-McLean 2009)-

Post-Laryngectomy: It's Hard to Swallow: An Australian Study of Prevalence and Self-reports of Swallowing After a Total Laryngectomy. 120 patients s/p TL completed questionnaire

TL MD reported some difficulty with food choices

71% reported changes to diet 39.7% reported severe distress
86% required liquid to wash down solids
49.9% reported difficulty with medication
57% reported "less saliva" (15)

- 2012-study from Brazil- Kazi, R et al:-8

A case series study 15 patients completed SWAL-QOL; involved 11 domains related to Quality of Life (*burden, eating durations, eating desire, frequency of symptoms; food selection; communication; fear; mental health; social functioning; sleep and fatigue*) Conclusion: swallowing issues have Moderate to severe impact on "fear; communication and eating duration".

The patient might report…….

- Feeling of food becoming "stuck" in throat
- Increasing difficulty with swallowing solids
- Increasing "liquid nutrition"
- Oral or Nasal Regurgitation
- Wet or gurgly TEP voice
- Peripheral/Peri-prostheses leakage resulting in peri-prostheses or peripheral leakage with p.o intake due to enlarging TEP or atrophic TEP
- Poor prostheses life span due to bio-film collection related to dysphagia causing recurrent central leakage (trans-prostheses)
- Increased duration with meals

Clinical Exam

- Ask about swallowing during every follow-up visit
- Ask detailed, probing questions about:

Ability to maintain nutrition (+/- G-tube; need supplements)
Modification of diet texture (food selection)
Frequency of symptoms and need for strategies
Duration of meal
Impact on social functioning (eating in public/restaurants)
Impact and interaction with TEP functioning. (may include leak/aspiration)

- Completed Oral Mechanism Exam
- Complete a Self-assessment Measure (MDADI)

Self-Assessment Measures

- MDADI (M.D Anderson Dysphagia Inventory) (18)
- Swallowing after Total Laryngectomy (SOAL) (19)
- Swallowing Quality of Life questionnaire (SWAL-QOL)
- Eating Assessment Tool (EAT-10) (20)
- Head and Neck Quality of Life Questionnaire
- Functional Assessment of Cancer Therapy (FACT)
- University of Washington Quality of Life (UWQOL)
- European Organization of Research and Treatment of Cancer (EORTC)
- The Performance Status Scale for Head and Neck Cancer

Instrumental Assessment

Videofloroscopic (MBS)

- Gold standard for assessment
- Assess swallow function and troubleshooting TEP voicing during same exam.
- Assess in lateral/oblique/AP views.
- Oral/pharyngeal esophageal view

Videoendoscopic (FEES)

- Limited view of impact of swallowing on voicing and vice versa
- Allows close view of esophageal flange of prostheses (residue coating)
- View of neo-pharyngeal secretion collection
- View of Bolus backflow
- Useful adjunct to MBS

Barium swallow vs. MBS

- Many physicians will order a Barium exam if dysphagia is reported to "find a stricture"—BUT….
- Barium swallow will be limited in the information it can tell you due to reliance on liquid textures only and varying levels of skill of radiologist interpreting unique anatomy.
- MBS allows for assessment of different textures to determine functional p.o intake capabilities.
- Pharyngeal narrowing and pharyngeal transit with solids are an important part of dysphagia profile—more of a goal w/MBS
- MBS allows for attempts at strategy implementation; provides a visual to help laryngectomee understand their anatomy and swallow function; alleviate fears associated with eating

Lingual Deficits/h/o Pre-TL dysphagia

Neo-Pharyngeal Dysmotility

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Neo-pharyngeal Dysmotility

Pharyngo-esophageal wall Hypertrophy--?incomplete myotomy?

Pharyngo-esophageal wall Hypertrophy--?incomplete myotomy?

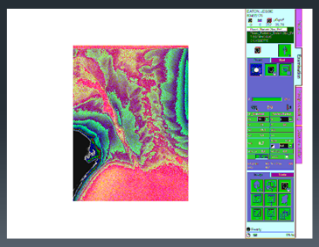
Pharyngo-esophageal wall Hypertrophy--?incomplete myotomy?

Pharyngo-esophageal wall Hypertrophy--?incomplete myotomy?

Pharyngo-esophageal wall Hypertrophy--?incomplete myotomy?

Reconstruction Issues

Pharyngeal Reconstruction



Pharyngeal Reconstruction

Pharyngeal Reconstruction

Pharyngeal Closure Technique

Pedicled/Rotation Flap

- Pectoralis Major & Delto-Pectoral Flap (DP) & Cervicodeltopectoral rotation flap (CDP)
- Geographically close to partial defect and may have a better color and texture match.
- Provides large area of skin cover (large defect) but are bulky
- DP--Less bulky than pectoralis major flap
- Bulky tissue is good for protecting carotid artery with a radical neck dissection
- No need for transplantation of vascular supply

- Lowest fistula rate with – PEC flap closure.
- Some use a "salivary bypas tube prior to p.o intake)
- Flap can be "weighty" at anastomosis sites.
- Stricture rate: 0-17%

Reflux or GERD

- Action of food & liquid coming back up through the esophagus all the way to the level of the oral and/or nasal cavity
- Very common with all TL due to disruption of structures that aim to "keep food/acid down"
- Presence of Pepsin; esophageal/tracheal tissue inflammation contribute to enlargement of TEP site

Solutions:

- Teach patient to not bend at the waist for everyday tasks
- Strict dietary/behavioral reflux recommendations
- PPI regimen (x 1 a day vs BID)
- Alginates (Gaviscon advanced)
- Alkaline diet: Alkaline water?

Pseudo-Epiglottis/Pseudo Diverticulum

Pseudodiverticulum/Pseudo-epiglottis

- Occurs when a band or partition exists of scar tissue forms at the base of the tongue or in the pharynx and creates a "pouch" / diverticulum where food collects.
- Visually looks like an epiglottis but does not have the functionality of one.

- Incidence post TL 35-85% (Anderson et. Al 2014) (33)
- Incidence per closure type:
  - Vertical: 63%
  - T-shaped: 32%

*less frequent with T-shaped

Causation is multi-factorial

Theories:

-separation caused by opposing BOT contraction and pharynx

--hyper-flexed neck and tongue w/vertical closure; tissue folds on itself when released

--reduced muscle contraction of constrictor muscle remnants—force w/swallow causes point of weakness.

Pseudoepiglottis / Pouches

- Pooling of residue
- Decreases efficiency with pharyngeal transit
- Regurgitation
- foreign body sensation

Solutions:

- Postural changes
- Digital pressure
- Dietary changes
- Medical/Surgical Referral
  - Laser excision
  - Endoscopic "division" or splitting.

Pseudoepiglottis/Pouches--MBS

Pseudoepiglottis/Pouches--MBS

Pseudoepiglottis/Pouches--MBS

STRICTURE

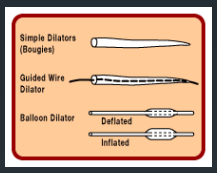
Stricture

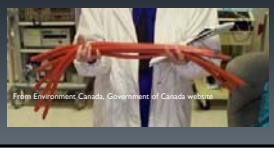
- A stricture is a narrowing along the pharyngo-esophagus which blocks or inhibits the ease of bolus passage.
- Can be proximal or distal; short vs. long
- Can be due to anastomosis sites/closure or be late onset due to scar tissue and XRT
- Visually the esophagus can have an hour-glass configuration during MBS
- Stricture incidence 19% (Sweeny 2011) (27)

Stricture

Solutions:

- MBS and refer for medical management:
  - Dilation (OR; self-dilation)
  - Dietary or postural changes
  - Surgical resection and reconstruction
  - R/o esophageal issues?





Stricture---MBS

Stricture---MBS

Stricture

Swallowing after Radiation

- Xerostomia; mucositis; odynophagia
- Submucosal fibrosis scaring
- Lymphadema
- GERD
- Fibrosis and scaring of pharynx and proximal esophagus
- Abnormal proximal esophageal motility; peristalsis
- Stricture
- Edema
- Tissue necrosis

Radiation Therapy (XRT)

- Irradiated tissue prior to total Laryngectomy can result in reduced healing response, post-operative swelling, increased risk for PC fistula.
- After Laryngectomy is recommended to stop the growth of any remaining cancer cells.
- XRT can damage skin, mucosa, vascular tissue, connective tissue, muscles, salivary glands, bone, and nerves.
- Can involve Early changes (up to 90 days) and Late Changes (after 90 days)
- Side effects can include dental decay, loss of taste, odynophagia, xerostomia, trismus, fibrosis and scar tissue formation

Xerostomia

- Xerostomia is dryness of the mouth as a result of decreased salivary function (related to toxicity from XRT)
- Saliva begins the digestive process as we chew and may impact taste
- Lack of saliva production impacts ability to break bolus down

PROBLEMS:

thick; "stringy" saliva
sticky, dry sensation in mouth and/or throat; mouth sores
burning feeling
cracked lips
halitosis

Xerostomia

SOLUTIONS:

- artificial saliva (MouthKote, Salivart, etc)
- saliva stimulant (Salagen)
- Guaifenesin for thick secretions
- drink water throughout the day
- Biotene mouth wash/gel
- avoid caffeine, alcohol or tobacco
- sour and sweet flavors such as citrus (lemon and lime) and cranberry can be helpful.
- use sauces and gravies to keep foods moist – especially with meats
- alternate liquids and solids
- sugarless gum and sugarless hard candy can help stimulate saliva
- take liquid in while food is still in mouth
- rinse your mouth with water salt, water and baking soda solution before and after meals .
- Oil Pulling (1-2 tablesppon) swish 10-20 min

Xerostomia

Trismus

- Trismus, or mandibular hypomobility, is any restriction in mouth opening due to decreased range of motion of the jaw
- Normal mouth opening ranges from 37-48mm.
- Trismus has implications on oral hygiene, swallowing, speech intelligibility and may involve osteoradionecrosis

Trismus

Problems associated with trismus:

- inability to open mouth wide
- pain and stiffness with chewing
- limits food options

Solutions:

- oral motor exercises
- stretching exercises
- jaw stretching device: i.e Therabite®; Ora-stretch; ARK-J; Dynasplint
- early intervention!

General treatment principles

- Encourage "smart" food choices and calorie loaded meals when it comes to eating/drinking.
- Work hand in hand with your dietitian to map out the most beneficial diet plans.
- Your role and recommendations will be different than with your general dysphagia population
- Set the standard that "no food is off limits"
- Do not underestimate the importance of the "normal" mealtime experience.
- Strategies will be very different and of a wider variety than "traditional dysphagia therapy"

Swallowing Summary

- Change your focus and think outside the box
- Review MBS tapes with an experienced SLP
- Review tape with physician
- Communicate well with dietitian
- Ask your patient questions – get the details!

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