Laryngectomy Standard of Care for the SLP:
Enhancing Communication, Pulmonary Rehabilitation, & Patient Education

Brienne Ruel MA, CCC-SLP
Jodi Hernandez MS, CCC-SLP
UW Voice & Swallow Clinics
Disclosures

• No relevant financial or non-financial relationships to disclose
The More You Know

- Laryngectomy & Cancer basics
- Purpose of Pre-Operative Counseling
- Anatomical Changes
- Communication Options
- Pulmonary Rehabilitation
- ICE (In Case of Emergency)
- Trouble shooting: leakage, voicing, swallowing
Indications for Laryngectomy

- Malignant Tumor
  - Size
  - Location
  - Invasiveness
  - Spread

- Less common:
  - Severe Laryngeal trauma
  - Non-functional larynx with unmanageable aspiration
  - Irreparable supra-glottic stenosis
Etiology of Laryngeal Carcinoma

- Smoking
- Risk increases with:
  - Smoking + drinking
  - Smoking + exposure to inhaled chemicals

- Radiation-induced tumors (Rare)
- No documented genetic link
- Mutation of HPV
Laryngeal Cancer comprises 1% of all new cancer diagnoses each year

Incidence
12,000 new cases per year

Commonly diagnosed around age 50-60 years

Male > Female
(6:1, previously 15:1)
Laryngeal Carcinoma

- Hoarseness
  (remember voice rule of thumb!)
- Difficulty breathing
- Bad Breath
- Unexplained weight loss
- Lump in the neck
- Sore Throat
- Earache
- Persistent Cough
Timeline of care includes physical exam, indirect/direct laryngoscopy, CT scan, MRI & biopsy

*N=Node (N0, N1-3) → Spread to lymph nodes

M=metastasis (M0, M1) → Spread to other organs

**TNM classification of cancer larynx: (T)**

- Very important for deciding the way of management.

T=Primary tumor size

Tis: carcinoma in situ.

T1: Tumor confined to one subsite (glottic, supra- subglottic) + mobile cords.
   - In Glottic: T1a: limited to one VC
   - T1b: involves both VC.

T2: Tumor extend to more than one subsite with mobile cords
   - In Glottic to supra –subglottic.
   - In Supra-subglottic to glottis.

T3: Tumor (anywhere) within the larynx with fixed cords.

T4a: Tumor invades the thyroid cartilage &/or extra-laryngeal (resectable).

T4b: Tumor invades prevertebral space, carotid artery (irresectable).
Laryngeal Carcinoma
Treatment: Radiation

**Radiation only:**
- small tumors
- patients who are not surgical candidates.

**Radiation + surgery:**
- to shrink a large tumor before surgery or to destroy cancer cells that may remain in the area following surgery.

**Radiation + chemotherapy:** May be offered before, during or after chemotherapy.
Treatment: Chemotherapy

Before surgery or radiation therapy:
  -to shrink a large tumor before surgery or radiation therapy.

After surgery or radiation therapy:
  -to kill remaining cancer cells or for metastatic disease.

Instead of surgery:
  -Conservation approach, in an attempt to preserve anatomy
Laryngectomy: a surgical procedure wherein all or part of the larynx is excised

- **Partial**: less than half of larynx is removed
- **Hemi**: Sagittal cut removal of half of larynx
- **Total**: entire larynx is removed
- **Supra-glottal**: structures above true vocal folds are removed
Psychological & Quality of Life Considerations
Psychological impact: Preoperatively

Knowledge of cancer creates concern about dx, surgery, and survival.
Psychological impact: Early Post-op

- Concerns about recovery
- Adjustment to body changes
- Must learn to manage/clean stoma
- Must communicate using writing, gesture, mouthing words, and/or pointing to communication board
- May begin alaryngeal device training
Psychological impact: Post discharge

- Fear of recurrence
- Concern regarding ability to complete ADLs adequately
- Potential for depression/feelings of isolation due to significant life change
- Employment
- Social activities
Other impacts to consider

- **Family**
  - Fear of losing family member to cancer
  - Adjustment to anatomical and communication changes
  - Pt’s role in family may change
  - Intimacy

- **Financial**
  - Medical/surgical/rehab costs
  - Loss of income
  - Lifetime of related supplies
The SLP role in Pre-operative Laryngectomee Counseling is vital and needs to be Standard of Care!

- Post-operative Pulmonary Rehabilitation
- Communication restoration
- Team referrals prn
  - ENT
  - Oncologist
  - Psychologist
  - GI
  - (Pulmonary, dietician)
Pre-laryngectomy counseling:
What has the physician told the patient re:
surgery and related expectations?

- Many physicians do not have time to discuss all associated life changes
- Patients sometimes not aware that they will lose their normal voices.
- Patients not always aware they will permanently breathe through a hole in their neck!
Pre-laryngectomy counseling:
Has the pt had chemoradiation pre-surgery or expected post-surgery?

- Irradiated tissue → stiffer & more irregular than non-irradiated tissue
  - May decrease vibratory ability of tissues needed for a sound source.
  - May make adhesion of baseplates for pulmonary rehabilitation more challenging due to topographical neck area
Pre-laryngectomy counseling

➢ Ability to complete ADLs following surgery?
  • Caretaker or living independently?
  • Reading and writing level?
  • Computer access/savvy?
Pre-laryngectomy Counseling: Review anatomy pre & post surgery

Before laryngectomy
- Thyroid cartilage
- Cricoid cartilage
- Arytenoid cartilages
- Epiglottis
- Intrinsic membranes/muscles
- Hyoid bone
- Associated strap muscles of neck
- One or more superior tracheal rings
Anatomical changes

- Total laryngectomy
  - Excision of the entire larynx
  - Creation of new airway: the stoma
  - Continuous esophagus
Stoma
the only access to the airway
<table>
<thead>
<tr>
<th>Associated changes post-op</th>
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</thead>
<tbody>
<tr>
<td><strong>Respiratory concerns</strong></td>
</tr>
<tr>
<td>• Smell</td>
</tr>
<tr>
<td>• Taste</td>
</tr>
<tr>
<td>• Blowing nose</td>
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<tr>
<td>• Lifting</td>
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<td>• Spitting</td>
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<tr>
<td>• Whistling</td>
</tr>
<tr>
<td>• Bathing</td>
</tr>
<tr>
<td><strong>Additional concerns</strong></td>
</tr>
<tr>
<td>• Swallowing</td>
</tr>
<tr>
<td>• Digestion</td>
</tr>
<tr>
<td>• Coughing/sneezing</td>
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<tr>
<td>• Dental concerns</td>
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<tr>
<td>• Head and neck limitations</td>
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<td>• Lymphedema</td>
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</tbody>
</table>
Smell and Taste

• No nasal/oral airflow = decrease in sensory info sent to the brain to register odors and flavors.

• Olfactory rehabilitation: “Polite yawn technique”

“With the SmellAgain, you can again!”
Pre-laryngectomy counseling

- **Stoma Protection**
  - Need nose replacement to moisten, humidify and filter air
  - Safety and aesthetics

- **Communication Options:**
  - Electrolarynx (alaryngeal device) training, two to three days post-surgery
  - Esophageal speech
  - TEP (tracheoesophageal puncture) speech

- **Changes to swallowing mechanics**
3 Communication options are available to create a new sound source (organic or artificial)

1. Electrolarynx (alaryngeal device)
2. Esophageal speech
3. TEP (tracheoesophageal puncture) speech
Communication options:
Alaryngeal device (Electrolarynx):

- Artificial sound source that is buzz-like
- May be used to communicate as soon as 48 hours after TL.
- Electrolarynx may be patient’s preference for communication
Alaryngeal Speech: Electrolarynx

Intelligibility

- Reduce rate of speech
- Maintain correct intraoral adaptor placement, laterally between gum and teeth
- Over-articulate
- Press "on" button upon speech initiation, release button upon completing speech and not earlier
- Initially only say most important, relevant words
Communication options: Esophageal Speech

- Organic sound source
- Involves swallowing of air into the esophagus which vibrates the PE segment and can be the sound source for speech.
Communication options: 
**Tracheoesophageal (TE) speech:**

- A tract (puncture) is created to house a speaking valve called a tracheoesophageal voice prosthesis (TEP)
- Primary vs. secondary puncture
Tracheoesophageal puncture
TEP speech: Indwelling vs. Non

**Indwelling**
- SLP manages fitting and placement
- Replaced 3-4x/yr
- Outer strap is removed
- Examples:
  - Provox II
  - InHealth Classic
  - Provox Vega
  - Provox Activalve

**Non-indwelling**
- Patient managed
- Outer strap MUST remain in place at all times to anchor the prosthesis
- Examples:
  - Duckbill
  - InHealth Low Pressure
Non-Indwelling
Tracheoesophageal prosthesis placement
Methods of occlusion

Atos
FreeHands
MY NOSE
IS JUST AN
ORNAMENT
PLEASE
APPLY
OXYGEN
TO STOMA
THAT’S THE LITTLE
HOLE IN MY NECK!
Rescue Breathing Summary Video:

http://www.youtube.com/watch?v=YE-n8cgl77Q

(on YouTube, search Rescue Breathing for Laryngectomees and Neck Breathers)
EMERGENCY
LARYNGECTOMEE
Total neck breather—no vocal cords
IF I HAVE STOPPED BREATHING
1. I breathe ONLY through an opening in my neck, NOT through my nose or mouth.
2. Remove anything that covers the opening in my neck.
   Expose my entire neck.
3. Keep the neck opening clear and protected from liquids.
4. RESUSCITATE WITH AIR OR OXYGEN TO NECK OPENING OR USE MOUTH-TO-NECK BREATHING.

CAUTION
I may speak using a tunnel between my airway (trachea) and food pipe (esophagus). A Silicone tube prosthesis keeps the tunnel open and prevents choking/aspiration.
THE PROSTHESIS SHOULD BE LEFT IN PLACE.

Prosthesis may be here
or here

Trachea
Esophagus

_____ I do _____ I do not use a prosthesis
(See other side)

Luminaud Inc.
860 Tyler Blvd.
Akron OH 44320
Phone: 800-233-3400
Fax: 440-233-2259
email: info@luminaud.com
website: www.luminaud.com

BREATHE ONLY THRU STOMA
Non-Lary: “Can’t you just plug that hole so you can go swimming?”

Lary: “Yeah, I can plug the hole, but then I’d be a floater, not a swimmer!”

Avoid water activities.
(unless of course...)
Adjustments to showering
Medic Alert bracelet strongly recommended!

- Inform medical personnel of laryngectomee status
  - Clarify in EMR
- Call local 911/EMS station
  - Neck Breather
  - Do not remove TEP
- 1 beep = yes
- 2 beeps = no
- Get creative!
Emergency: What if the prosthesis dislodges?

Tape in place until new TEP can be fitted

(minimum 14 Fr)
At the Hospital: Typical length of stay is 4-10 days

- Laryngectomee Needs Chart
- White board/pen/paper
- A bell, noisemaker
- Telephone protocol
  - Ex. Once for ‘yes’, twice for ‘no’
Laryngectomy Needs Chart

CALL NURSE
PAIN
CONSTIPATION
IRRIGATE
CLEAN STOMA
BATHROOM
CHANGE BED
DRY MOUTH
HUNGRY
IN / OUT BED
TISSUE

NAUSEOUS
MEDICATION
DIARRHEA
SUCTION
BATH
I AM COLD / HOT
BED PAN
WATER
JUICE
ADJUST BED
WASHCLOTH

MIRROR
CLOTHES
PAPER & PEN
BOOK / MAGAZINE
RADIO

COMB / BRUSH
EYEGLASSES
WHAT TIME IS IT?
LIGHT ON / OFF
TV ON / OFF

A B C D E F G
H I J K L M
N O P Q R S T
U V W X Y Z

0 1 2 3 4
5 6 7 8 9
10 20 30 40 50 100
Go Digital!

Apps
Talk Tablet
NeoPaul
Verbally
EZ SpeechPRO
iComm

From a blog by a professional tutor: http://speech-language-pathology-audiology.advanceweb.com/Features/Articles/Apps-for-Laryngectomy-Patients.aspx
Whozits, Whatsits and Thing-a-ma-bobs!

- Puffer
- Blower
- Blowhole
- Trumpet
- Traches
- Flapper
- Squeaker
- Speech valve
- Button
Pulmonary Consequences of TL

- 6-12 months post-op
  - Increased mucous
  - Involuntary cough
- Social issues
- Sleep disturbances
- Decreased QOL
Pulmonary Rehabilitation

• External Humidification Systems
  – Increase tracheal temperatures
  – Increase humidity in trachea
• Reliance on trach mask
• Often displaced
• Saturates clothing
Heat Moisture Exchangers (HMEs)

- Humidify, warms, filters
- Normal relative temperature/humidity
  - 32 degrees, 99%
- TL relative temperature/humidity
  - No HME= 22 degrees, 40%
  - With HME= 28 degrees, 50%
- Mucociliary transport
HME Increases Resistance

• Positive pressure during exhalation reduces risk of alveolar collapse (Palav et al, 2011)
  – Improved ventilation
Additional Benefits

• Directly over stoma
• Increased mobility
• Can be accessorized!
Randomized Controlled Trial

**Methods**

- External humidification vs HMEs immediately post op
- 53 patients randomized to 2 groups
- Tracked compliance, coughing events, sleep disturbances, pt/RN satisfaction, nursing time, cost effectiveness

**Results**

- 87% vs 12% compliance
- Fewer pulmonary complaints, better sleep
- More mobile
- Less nursing time
- Cost effective

Pilot at UWHC (Aug/Sept 2013)

Chain of Command

- Voice & Swallow Clinic Director
- ENT office manager
- ENT chair and surgeons
- Unit nurse managers
- Unit RTs
- Hospital new product committee
- OR product committee
It’s a Go! Now what?

• Specialized laryngectomy pulmonary kits from vendor
  – Lary tube and cleaning brushes, HMEs, neck straps, shower aid
• Unit RN code and stock (CS/OR not options)
• Ongoing training/inservices for RNs, RTs, residents
Outcomes

• Majority of patients returned to clinic with HME in place

• Barriers
  – necrotic flap with readmission (tube thrown away)
  – increased respiratory needs (Shiley trach needed)
  – fistula/wound care, unable to have neck strap
Current Protocol

• ~POD #3
  – Electrolarynx training (Telecommunications Equipment Program-TEPP)
  – Trach change to laryngectomy tube (10/55)
  – HME/lary tube training
    • Patient involvement
  – Insurance/laryngectomy supplies ordering
Outpatient Follow Up

- **One week post op visit**
  - Continue EL training
  - Swallowing education
    - Multiple swallows, alternate, nasal regurgitation
  - Laryngectomy supplies ordering
    - HME outcomes
  - Time-line for tracheoesophageal voice prosthesis
    - 6 weeks if no complications with healing and no plan for XRT
Office based TEP

- Cricothyrotomy kit and endoscopy
- 12 Fr catheter inserted
- Patient follows up 24-48 hours post for prosthesis placement with SLP
- 3-4 visits in first month to monitor of changes in size
TEP Lifespan

• On average 3-6 months, change if:
  – Leakage
  – Loss of voice/effortful voice
  – After six months even if no problems have occurred secondary to candida growth and related tissue changes.
Trouble Shooting

• No voice or decreased quality following placement of TEP
  – Clean device with a brush and/or flush and reattempt voicing; gel cap may not have dissolved completely.

• Leakage through following placement.
  – Check to make sure the one-way valve is closed
Leakage Through

- Clean prosthesis
- Increased resistance prosthesis
- Prosthesis embedded with silver oxide
- Plug insert
- Candida management
  - Oral care
  - Nystatin
  - Minimize sugar/alcohol intake
Leakage Around

- Extra flange
- Large tracheal/esophageal flanges
- Injections
- Place catheter
- Swallow study
- GERD precautions
- Granulation tissue removal
- Reduce air pressure with easy onset voicing
- Refer to MD
Hypertonic/Hypotonic Voice

- Dilation
- Botox, myotomy
- Increase prosthesis diameter
- Different prosthesis type or length if too short
- Migration of tract, repuncture
- Manual pressure, pressure bands
Gastric Filling

- Increased resistance prosthesis
- Botox
- Dilation
- Easy onset voicing
When there’s more than 2 holes...

- Fistula formation
  - periostomal vs. tracheal

- Etiologies
  - Necrosis
  - dehiscence of party wall
  - failed reconstruction

- May need to suspend oral diet and/or voicing
OUT OF STOCK
Case # 1

- 2007
  - (Jan) 16 Fr 18mm Duckbill
  - (Feb) 16 Fr 14 mm NID (expected downsize)
  - (Feb) Effortful voice w/open tract
    - 20 Fr, 10 mm; normal swallow study; easy onset
  - (Apr/May) VFSS to mark PE segment for botox
  - (June) Early leaking through, significant yeast; excellent voice
    - Nystatin, 8mm 22.5 Fr Provox 2
Case # 1

2008

- Several routine changes
- (July) “Severe” difficulty swallowing
  - Alternate solids/liquids
  - Soft foods
  - Multiple swallows per bolus
Case # 1 VFSS
Case # 1

2009
- (Apr) Back up of solids into throat
  - Normal EGD, normal VFSS

2010
- (Apr) Prosthesis long in tract
  - 6 mm 22.5 Fr Provox 2
- (July) Unable to voice
  - Repunctured
  - 16 mm NID, 12.5 mm Provox 2, 8 mm Provox 2
Case # 1

2011

- (May) Leakage through, extra length, weight loss, food sticking
  - 6 mm Provox 2
- (Sept) “Too snug, small folds of tissue along outer edge”
  - 8 mm Provox 2
Case # 1

2012

- Standard changes
- (May) Complaints of air insufflation
  - 20 Fr 8 mm Increased resistance, leak around
  - 8mm Provox 2
- (Nov) Inpatient for ACDF, leakage AROUND
  - Extra flange/washer
- (Dec) Leakage around
  - Tried large TE flange, 20 Fr 8 mm, leak around
  - “Snugged up” with 20 Fr 6 mm
Case # 1

2013

- (March) Leakage around
  - 6 mm 20 Fr, extra flange
- (July) Inpatient, unable to voice
  - Voicing returned after cleaning
- (Aug) Leaking through
  - LEF 6 mm 20 Fr (extra flange not available)
- (Aug) Leaking through
  - Vega 6 mm 22.5 Fr (stock limitations)
Case # 1

2014

- (March) Leaking through
  - 6 mm 20 Fr Vega (policy change)
  - Narrowing of PE segment on VFSS, decreased BOT

- (Aug) Leaking through
  - Snug fit and granulation tissue

- (Oct) Significant leaking several days
  - No prosthesis in place, absent on CXR
  - Dilate up, placed 6 mm 20 Fr (Vega/LF failed to reach opening in the esophagus)
Case #1 Last VFSS
CASE #2

- 72 yr old female
- Pre-morbid CVA x 2 persistent aphasia and dysarthria
- T4NOMO SCCA of supraglottic larynx
- Unknown if any pre-operative counseling
- Some AL device training but mostly writing to communicate. SLP close to her home was not trained in voice restoration
CASE #2

November 2007
- TL & bilateral modified radical neck dissection

Feb 2008
- TE puncture and stomaplasty
- 2 days later: 1st TEP
  - InHealth LP 16 Fr, 18mm
Case #2

7 days later-Pt wanted stronger voice*; also struggling with HME use
  – Dilated up to 20 Fr, 14mm
  – Trialed foam covers

March 2008
  ➢ Leakage & wanted HME’s again.
    ➢ Rule of Thumb: 6 visits
    ➢ InHealth 20Fr, 10mm
Case #2

2008

- (April) Leaking through
  - InHealth 20 Fr, 10mm

- (August) Leaking through, too long
  - InHealth 20 Fr, 8mm

- (Sept) Leakage; Granulation (mild) at TEP site
  - InHealth 20 Fr, 8mm

- (Oct) Leaking through
  - Switched to Provox II (22.5Fr), 8mm
Case #2

2009

- (Jan) Leaking through
  - Provox2, 8mm*

- (May) Leaking through, possible TEP change at outside facility

- (June) Leakage through
  - Returned to InHealth 20 Fr, 8mm

- (July) Leaking through per pt, but no during water test
  - Removed TEP, cleaned, re-inserted; Education for Candida and use of TE plug

- (2 weeks later) Leaking through confirmed, yet no visible Candida*
  - InHealth 20Fr, 8mm

- (Sept) Leaking through
  - InHealth 20Fr, 8mm

- Pt was away from UW for nearly 13 months then returned...(with Provox Vega 20Fr, 8mm)
Case #2

2011

- (March) Leaking through
  - Provox Vega 20 Fr, 8mm
- (Sept) Leakage through
  - Provox Vega 20 Fr, 8mm
- (Dec) Leakage through and mild AROUND
  - Changed to Provox Vega 22.5, 6mm*
Case #2

2012

- (April) Leaking through
  - Provox Vega 22.5, 6mm
- (Sept) Leaking through
  - Provox Vega 22.5, 6mm
- (Dec) Leaking through
  - Provox Vega 22.5, 6mm
Case #2

2013
- (March) Tracheitis, tract length increase 12.5
  - Provox Vega 22.5, 12.5mm
- (April) Pistoning
  - Provox Vega 22.5, 8mm
- (July) Leaking through
  - Provox Vega 22.5, 6mm
- (July) Leaking through, possible reflux component
  - Provox2, 6mm*
- (Sept) Significant Leaking through, edema of TE tract; apparent well managed Candida and reflux
  - Provox2, 8mm
- (Sept) TEP too snug
  - Provox2, 12.5mm
- (Oct) Mild leakage through
  - Provox Vega 22.5, 10mm
- (Nov & Dec) Leakage through
Case #2

2014

- Jan – Present: 9 TEP changes*
  - Currently in Provox2, 8mm
  - Had VFSS early Nov, unremarkable
CASE #3

• Laryngeal crush injury following MVA with intractable aspiration
• Total laryngectomy with difficulty voicing due to PE spasm and mild dysphagia
• Botox in fluoroscopy every 6 months
PE Segment Spasm
Acknowledgements

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• Dr. Susan Thibeault, Director of the Voice and Swallowing Clinics
THANK YOU!

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