Surgery for Benign Laryngeal Disease: When and How

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General Concepts - When

- Surgery should never be the initial treatment option
- Only when there is persistent troublesome dysphonia after completing work with a Speech-Language Pathologist (SLP) who has additional training in VOICE therapy methods
  - Not all SLP receive training in voice
- Dysphonia - Inability to meet vocal demands
  - Change in quality or fatigue

General Concepts - How

- Stripping is out
  - This includes grasping, pulling and cutting
- Micro-dissection is in
  - Cold knife
  - Laser – must used in pulsed technologies

General Concepts - Why

- Benign laryngeal disease results as a response to VOCAL TRAUMA
  - Nodules
  - Polyps
  - Cysts
- Develops within the superficial layer of the lamina propria
**WHY - Benign Laryngeal Lesions**

- Non-neoplastic
  - Nodules
  - Polyps
  - Cysts
  - Polypoid corditis

- Neoplastic
  - Papilloma

Traumatically induced
Virally induced

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**Body Cover Theory Vocal Fold Vibration**

- Advanced by

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**Laryngeal Function - Voice**

- Vocal fold adduction
- Vocal fold vibration
  - Myoelastic aerodynamic
  - Passive
  - Sound source

- Buzzing
  - Shaped into words with lips and tongue
Etiology of Benign Laryngeal Lesions

Vocal Trauma - Phonotrauma

- Vocal folds brought together for phonatory task with INEFFICIENT patterns
- Produces excessive compressive stress/shear on laryngeal mucosa
- Repetitive trauma → healing response

Exacerbated by inflammatory factors

Infection
Reflux

Response to Injury

- Vocal trauma
  - Inappropriate laryngeal closure with excess volume

INCREASED SHEAR

Reflux
Infection

Histologic Considerations

- Non-neoplastic benign laryngeal lesions arise in the cover

Cover is defined as
  - Epithelium
  - Superficial layer of the lamina propria

- Non-neoplastic lesions arise in the superficial lamina propria as a benign response to trauma

Effects of Laryngeal Lesions

- Cause dysphonia through disruption of laryngeal vibration
  - Alter cover viscosity
  - Interfere with Body-Cover relationship
  - Distort prephonatory glottic configuration
Alterations in Cover Viscosity

Nodules  Sessile Polyps  Sulcus Vocalis

Interfere with Body-Cover Relationship

Invasive Cancer  Squamous Inclusion Cyst  Mucous Retention Cyst

Distort Prephonatory Glottic Configuration

Intra-epithelial Neoplasia  Papilloma

OHNS Website: http://ohns.ucsf.edu
**Benign Pathologic Response**

**Non-neoplastic Lesions**
- Surgery is directed at the primary site of the lesion
- Normal surrounding structures are spared
  - Epithelium
  - Lamina Propria
- Microflap surgical techniques
- Excessive excision of superficial lamina propria will allow re-epithelialization directly over the deeper layers of the lamina propria
- Scar, tissue loss will lead to incomplete closure during phonation and dysphonia

**How NOT to Do Surgery**

**Vibration after Excess Removal of LP**
- **Vibration after EXCISIONAL technique**
- Tenor – developed vocal difficulties
  - Probably due to inefficient techniques
  - Underwent microflap EXCISION because the surgeon does not believe in MICROFLAP dissection
  - Has unreliable access to upper range

**Microphonosurgery and Voice Care: A Multidisciplinary Approach**

**When and How but there is still more WHY**

1. Most vocal fold lesions are created through inefficient voice use patterns
2. Initiation of efficient flow and resonant voice production techniques in speaking and singing often obviates the need for surgery
3. Optimum care is provided through a multidisciplinary approach based on:
   - Laryngeal anatomy, physiology and pathophysiology
   - Understanding the individuals vocal requirements
Source - Filter Theory of Sound Production

1. Power Supply
2. Vibratory Source
3. Resonating Cavity

Components of Voice Production

1. Changes in lung air pressure (Power Source)
   - Subglottic pressure
2. Changes the vibratory frequency of the larynx (Vibrator)
   - Stiffening the vocal folds
3. Altering the shape of the vocal tract (Resonator)
   - Length
   - Shape
   - Degree of mouth opening

Benign Pathologic Response

Stretch and Flow Phonation

- Goal: Increase airflow during phonation
  Minimize impact of vocal fold vibration

FEEL airflow during voice production
**Resonant Voice Techniques**

- **Goal:** Maximize oral/nasal resonance
  - Minimize impact of vocal fold vibration
  - (Prior to onset of phonation the vocal folds are about 1mm apart (Verdolini/Titze))

- **FEEL** consistent vibration/energy/buzz in front of face

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**When is Surgery Necessary?**

1. When the patient has maximized vocal improvement behaviorally

2. The lesion(s) is **CONTINUEING** to interfere with ability to meet vocal demands
   - Compromised quality
   - Decreased range
   - Vocal fatigue

**Concerned about malignant neoplasia**

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**Case Presentation**

- 36 year old female
  - Mother of 2 young children
  - Leads children's' choir at her church
  - Sings in her church choir and solos

- Voice changed after period of increased demand
  - Rough
  - Loss of upper range
  - [Cracking with pitch breaks](#)
Case Presentation

- Treatment Options?
  - What type of surgery?
  - What do cover in informed consent?  
    ➢ Can you guarantee that she will sing again?

Non-neoplastic Lesions

Surgery - When

- Only indicated after failure of improvements in speech mechanism to produced adequate vocal improvement
- Directed at the primary site of the lesion
- Normal surrounding structures are spared
  - Epithelium
  - Lamina Propria

Surgical Principles

- Use precision
- High magnification
- Remove only involved tissue
- Attempt to reconstruct vocal cover
  - MICROFLAP TECHNIQUES

Informed Consent

- Risk of loss of the public speaking voice
- Risk of loss of the singing voice
- Airway obstruction
  - Temporary
  - Tracheotomy
- 3 to 6 month rehabilitation period
Non-Powered

**Microlaryngeal Instrumentation**

Microflap Technique

Placement of Incision

- **Lateral**
  - Reduced or absent mucosal wave
  - Lesion adherent to underlying vocal ligament by palpation
  - Diffuse lesion with indiscreet borders by palpation

- **Medial**
  - Intact mucosal wave
  - Medial surface involvement
  - Easily separable from underlying vocal ligament by palpation

**Microflap Excision Techniques**

Named for the Position of the Incision on the Vocal Fold

- **Lateral**
  - Incision of the dorsolateral surface

- **Medial**
  - Incision on the medial edge surface

Case presentation

- 18 year old female (at presentation, 20 currently)
- Musical theater singer – known for high belt
- Voice change x1mos that began with a cold
- Cold resolved but voice complaints did not
- Diagnosed with ‘pre-nodules’ at age 10
  - started voice lessons
- **Primary complaints**
  - raspy speaking voice, diminished quality singing, reduced vocal range, difficulty in her mixed register
Case Presentation

- Initial treatment
  - Speech therapy for speaking voice
  - Continue with vocal training at school
  - Switch vocal training to SLP based with better appreciation for vocal anatomy and physiology
  - Able to perform limited roles in school productions and to progress through training but voice does not allow her full range and unimpeded progression

Microflap Excision Techniques

Named for the Position of the Incision on the Vocal Fold

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- Medial
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Case Presentation

- Surgical video

Post-operative voice rehabilitation

Return to Voicing
- One week of complete voice rest
- 3 weeks modified voice use
- Vocalizes introduced at 3-4 weeks

Therapy Regimen
- Weekly therapy for the first month
- Bimonthly for the 2\textsuperscript{nd} – 3\textsuperscript{rd} month
- Continued therapy as needed

Therapy is always customized to the patient
**Microflap Technique Required**

**Microflap Excision**

- [Movie: lateral microflap_0.wmv](#)

**Conclusions**

- Benign non-neoplastic laryngeal disease is a response to injury and arise in the SLLP
- Neoplastic lesions benign and malignant arise in the epithelium
- Treatment is directed at elimination of source of injury – vocal trauma
- Surgical intervention is improved by understanding laryngeal histology, physiology and pathophysiology
Conclusions

- Surgical therapy is a last resort option
- Microflap approaches allow maximal preservation of uninvolved tissue
  - Medial
  - Lateral

Thank You