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# Medical and Surgical Management of Voice Disorders

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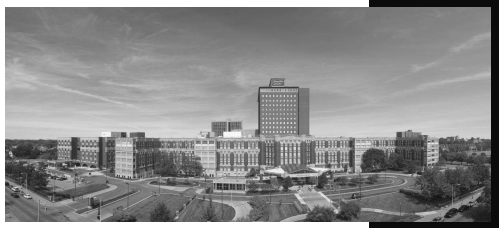

## Collaborators

Meira Abidov, MS, CCC-SLP
- Preoperative therapy

Anjli Lodhavia, MS, CCC-SLP
- Postoperative therapy

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# Primary Objectives

Focus: Vocal Fold Mucosal Conditions

- Identify voice conditions that may require medical/surgical intervention
- Describe the common types of phonosurgery
- Identify patients that may benefit from surgery to help their voice
- Understand expectations after phonosurgery and how voice therapy can help with recovery



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# Plan

- Categories of Voice Disorders
- Selected conditions
  - Primary medical/surgical
  - Collaborative management
- Conceptual approach to treatment
  - Basic principles of phonosurgery
  - Perioperative voice therapy
- Case discussion/questions

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# Categories of voice disorders

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## Mucosal and Structural Voice Disorders

- Inflammatory
  - Autoimmune/systemic disease
  - Laryngitis
- Phonotraumatic and subepithelial

*(still inflammatory, different etiology)*

  - Nodules, polyps, fibrous lesions, pseudocysts
  - Cysts
  - Scar/sulcus
  - Contact ulcer/granuloma
  - Hemorrhage
- Other trauma
  - Iatrogenic (usually intubation)
  - External trauma
- Epithelial/neoplastic pathology
  - Benign tumors (primarily papilloma)
  - Leukoplakia
  - Dysplasia
  - Cancer
- Presbylarynx
  - Treatment more in common with other conditions

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## Neurological and Functional Voice Disorders

### Hypofunction

- Vocal fold paralysis/paresis
- Presbyphonia
- Parkinson's disease
- Neuromuscular disorders

### Hyperfunction

- Dystonia (ie, spasmodic dysphonia)
- Tremor
- Spasticity
- Myoclonus

- Muscle tension dysphonia

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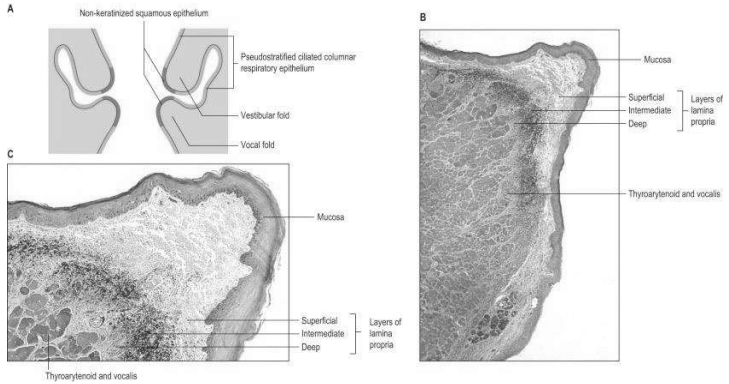
## Mucosa

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## Body-Cover Model

- Superficial lamina propria "decouples" epithelium from ligament
- Allows vibration of epithelium/lamina propria over the "body" (muscle +/- ligament

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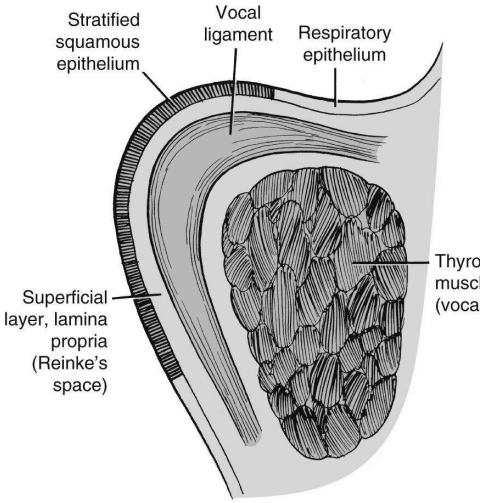




# Primary Medical Conditions

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## Primary Medical Conditions

- Laryngitis
  - Infectious
  - Non-infectious
    - Ulcerative
    - Systemic disease
- Neoplasia/dysplasia
  - Recurrent respiratory papillomatosis
  - Leukoplakia
  - Glottic cancer
- General role of SLP
  - Education re: vocal health
  - Minimize side effects/complications of condition
  - Rehabilitation after treatment

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# Laryngitis

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- **Definition**: inflammation of the larynx

# Laryngitis – Types

## Infectious

- Viral
  - Typically acute
- Bacterial
  - May be acute or chronic
- Fungal
  - May be acute or chronic

## Noninfectious

- Phonotraumatic
- Irritants
  - Smoking
  - Reflux
- Due to systemic disease
  - Sarcoidosis, GPA, lupus, others
- Iatrogenic
  - Radiation, chemotherapy
  - Medication side effects

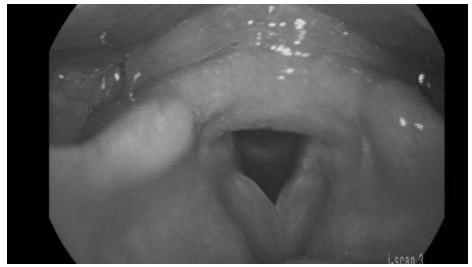


# Acute laryngitis

## Description

- Typically rhinovirus (common cold)
- Associated with other URI symptoms
- Usually lasts 5-7 days
  - Suspect other cause if > 14 days
- Self-limited

## Example – Me





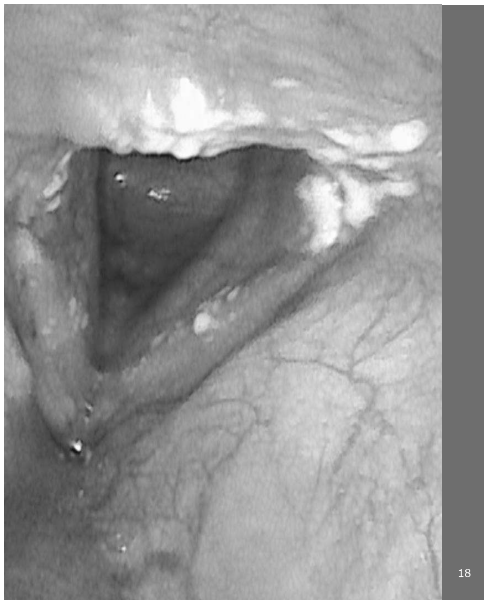
# Management of Acute Viral Laryngitis

- Tissue is more fragile
- Higher risk of phonotraumatic injury
- If it lasts more than 14 days, consider other etiologies
  - Clinical Practice Guideline: laryngoscopy MAY be performed at any time, but SHOULD be performed if > 4 weeks or if suspicious for serious conditions
- Supportive care (OTC meds, rest, hydration)
- Steam inhalation/saline nebs
- Voice rest
- Short course oral steroids
  - Larynx should be evaluated prior
  - May reduce symptoms, particularly if voice use cannot be avoided



# Fungal laryngitis

- Causes hoarseness, but not usually pain
- Associated with
  - Inhaled steroids
  - Antibiotic use
  - Immunosuppression (incl diabetes)
- Requires systemic treatment, usually 2 weeks fluconazole, sometimes more



# Bacterial laryngitis

- Lasts longer than viral
- Associated with thick, purulent, and/or crusted mucus
- *Haemophilus spp, S. aureus,* sometimes Streptococcus
  - Antibiotics – typically amox/clav; TMP/SMX if MRSA suspected
  - Often longer treatment than typical pharyngitis



# Reflux Laryngitis

- Laryngopharyngeal reflux, gastroesophageal reflux disease, and reflux laryngitis are NOT synonyms
- LPR – frequent cause of globus, throat clearing, postnasal drip sensation, dysphagia
  - NOT a frequent sole cause of dysphonia
- It is "real," but probably not as common as it seems
- **Important point:**
  - If a patient with dysphonia is given a diagnosis of LPR and nothing else, you should question it!
    - Did they get stroboscopy?
    - Did the physician/APP think there might be something else going on?
    - What is plan for follow up?



# Reflux as a cofactor

- Pepsin weakens cell-cell adhesion
- Inflammation alters tissue quality, vibratory mechanics

- Above may lead to more susceptible tissue and increased phonotrauma, leading to more vocal strain

**My Takeaway Points**

- Low risk for short term treatment while underlying cause is resolving
- Highest yield situations:
  - Contact ulcer/granuloma
  - Ulcerative laryngitis
  - Post-op



# Reflux management

## Workup – symptom driven

- Diagnosis of exclusion
- Laryngoscopy/stroboscopy
  - Edema/erythema, but can't be sure of cause
- Esophagram
- EGD
- pH testing
- Empiric treatment

## Treatment Options

- Diet
- Behavioral (timing of eating, position, etc.)
- Proton pump inhibitors (omeprazole, etc.)
- Histamine-2 receptor blockers (famotidine)
- Alginates
- Antacids
- Antireflux surgery (general/thoracic surg)

# Benign Midmembranous Vocal Fold Lesions

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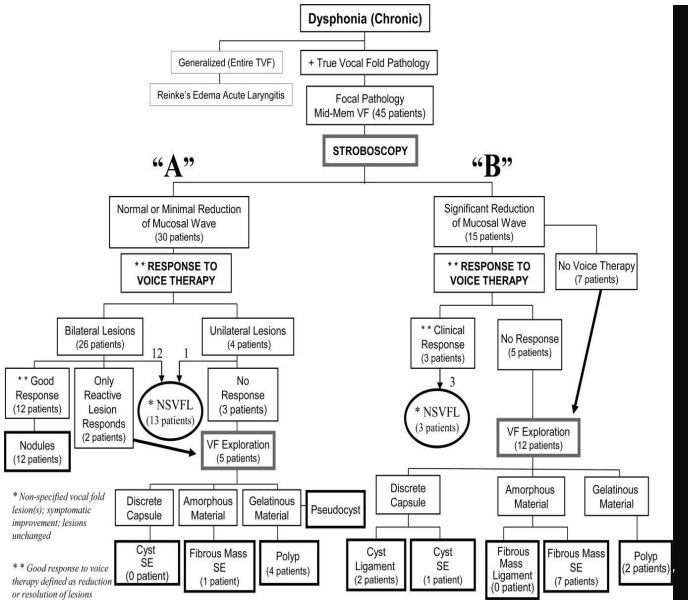
## Nomenclature

- Consensus based on:
  - Stroboscopy (mucosal wave reduction)
  - Voice therapy response
  - Operative findings

Rosen CA, Gartner-Schmidt J, Hathaway Bet al. A nomenclature paradigm for benign midmembranous vocal fold lesions. Laryngoscope 2012; 122:1335-1341.




## Benign Midmembranous Vocal Fold Lesion Nomenclature

| Type | Definition |
|---|---|
| **Vocal fold nodule** | Bilateral, fairly symmetric, normal or mild impairment of mucosal wave, resolve (complete or nearly complete) with voice therapy. |
| **Vocal fold polyp** | Unilateral or bilateral, exophytic, gelatinous material that is unorganized in the SE space. |
| **Vocal fold cyst, SE or lig** | Encapsulated lesion within the SE or lig location, often associated with reduced mucosal wave, does not resolve with voice therapy. |
| **Fibrous mass, SE or lig** | Amorphous fibrous material within the SE or lig location, often associated with reduced mucosal wave, does not resolve with voice therapy. |
| **Reactive vocal fold lesion** | Contralateral lesion (SE) to a fibrous mass, cyst, or polyp. Will often resolved or get smaller with voice therapy. |
| **Pseudocyst** | Unilateral or bilateral superficial lesion associated with glottal incompetence (e.g., vocal fold scar, vocal fold paresis, vocal fold paralysis). High likelihood of recurrence following surgical removal if associated glottal incompetence is not addressed. |
| **Nonspecific vocal fold lesion** | Persistent unilateral or bilateral lesion following voice therapy. Lesion is not treated with surgery given the improved clinical voice function that the patient experiences from voice therapy. |

lig = ligamentous; SE = subepithelial.

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Rosen CA, Gartner-Schmidt J, Hathaway Bet al. A nomenclature paradigm for benign midmembranous vocal fold lesions. Laryngoscope 2012; 122:1335-1341.



## Vocal Fold Granuloma/Contact Ulcers

- Location
  - Usually occur on the arytenoid
    - Vocal process
    - Medial arytenoid mucosa (more superiorly)
- Etiology
  - Intubation
    - Usually followed by phonotrauma
  - Phonotrauma – think SECONDARY phonotrauma
    - Chronic hyperfunction
    - Throat clearing/coughing
- These should be considered wounds
- Contrast to polyps: no epithelium for granuloma/ulcer

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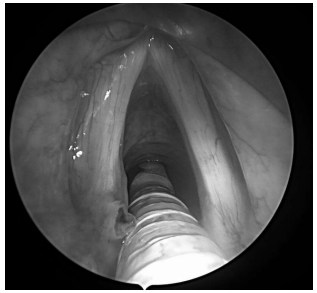
# Surgery – excision, steroid injection, augmentation

Initial view

After excision, before augmentation



After augmentation

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# Post-op care – aimed at reducing impact and inflammation

**Medical**

- Acid suppression (PPI)
- Inhaled steroid

**Behavioral**

- Limited voice use
- Low acid diet

**Therapy**

- Easy onset
- Resonant voice

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# Miscellaneous Benign Lesions

- Sulcus
- Scar

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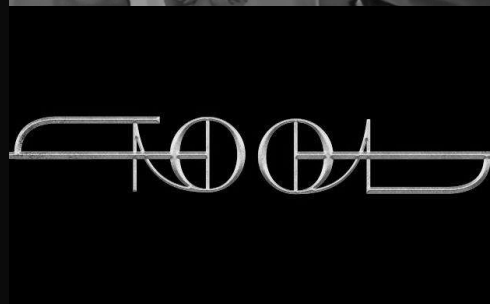

# Management Tools: Conceptual Approach

- Reassurance
- Voice therapy
  - Indirect (e.g., vocal "hygiene" education)
  - Direct (exercises and techniques)
- **Medications**
- **"Clinic" procedures**
- **Operation** (as in the picture)
- Other medical specialties PRN

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## Medications

- Antimicrobials for infection
  - Usually empiric; culture directed if refractory or more long-term treatment is needed
  - NOT based only on presence of hoarseness without other indication of bacterial or fungal infection
- Steroids for inflammation
  - Acute laryngitis – especially when voice rest isn't an option
  - Phonotraumatic lesions (Amin, 2019)
    - Oral no better than placebo
    - Voice therapy did improve VHI-10 scores regardless of steroid vs. placebo
- Acid suppression (discussed earlier in talk)
- Treatment for systemic conditions as appropriate

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Amin MR, Achlatis S, Gherson S et al. The Role of Oral Steroids in the Treatment of Phonotraumatic Vocal Fold Lesions in Women. Otolaryngol Head Neck Surg 2019; 160:512-518.



# Surgical/Procedural Management

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## Surgical Approach: Suspension Direct Microlaryngoscopy

- Terminology
  - Direct laryngoscopy: exposure of the larynx with tubular metal laryngoscope to allow direct line of site view of the larynx
  - Suspension: use of laryngoscope holder to maintain placement
  - "micro": use of a microscope or magnified telescope
- Basic information:
  - General anesthesia with small breathing tube or other strategy to allow working room
  - Outpatient procedure (exception in some cancer and airway disorders; comorbid conditions)
  - All done through mouth – no external incisions
  - Use long microinstruments, sometimes laser to perform operation

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## Surgical expectations

### Routine

- Mild sore throat
- Mild taste disturbance
- Early voice fluctuations
- Post-op restrictions on voice, other activity
- No diet restrictions

### Risks

- Injury to lips, tongue, teeth, throat tissues
- Numbness or weakness of tongue
- Unsatisfactory outcome
  - Interaction with patient expectations
    - Worse voice – very rare
    - Inadequate improvement – more subjective, also unusual, but more likely than worsening
- Need for future procedures
- General anesthetic risks

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# Setup for Microlaryngeal Surgery

Sandhu GS, Nouraei SAR, eBook Academic Collection - North America. Laryngeal and tracheobronchial stenosis. San Diego, CA: Plural Publishing Inc.,,, 2016:xiv, 497 pages.

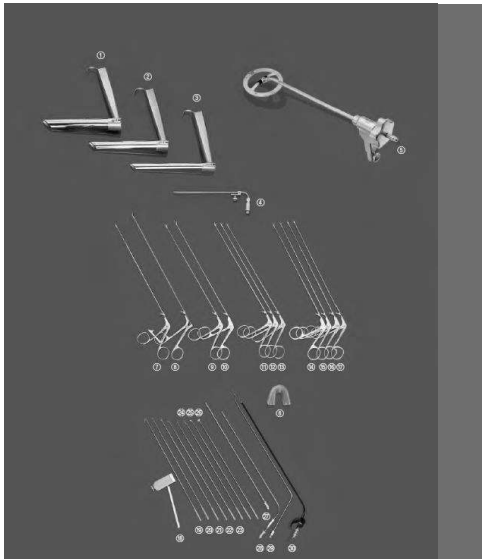
Simpson CB, Rosen CA. Operative techniques in laryngology. Berlin: Springer, 2008.



# Surgical Instrument Examples

- Laryngoscopes – different sizes/shapes
- Laryngoscope support
- Suctions
- Micro-instruments in different directions
  - Knives
  - Probes
  - Dissectors
  - Forceps/graspers
  - Scissors

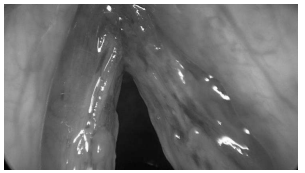


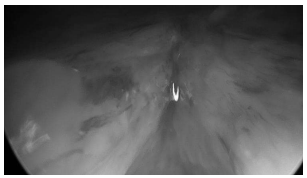




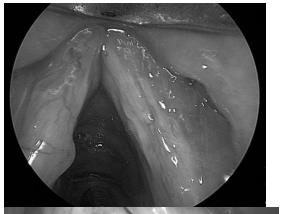
# Microlaryngoscopic "Surprises"

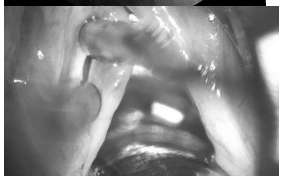
Carcinoma in situ



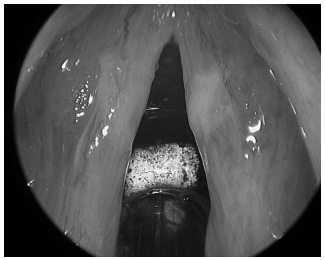


Sulcus/mucosal bridge
Chronic inflammation





Sulcus AND Papilloma



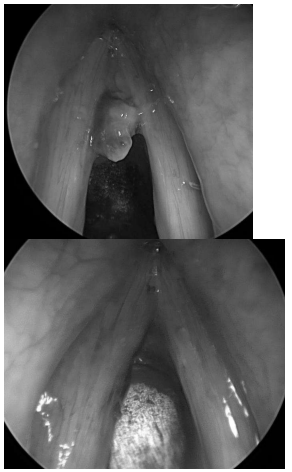




# Other Surgical Techniques

Epithelial Microflap

Simple Excision



# Awake "In Office" Procedures

- Topical anesthetic in airway
- Flexible distal chip scope, usually with channel for instruments
  - Also options for transcervical injections and special curved transoral instruments
- Laser with fiber to go through scope
- Adjuncts
  - Steroid injection
  - Augmentation injection (more for paralysis/atrophy)

- Advantages
  - Lower cost
  - Less time
    - Procedure and downtime
  - Less discomfort after
  - Lower medical risk

- Disadvantages
  - Less precision
  - Discomfort during
  - Delayed results
  - More likely to repeat
  - Lack of (or lower quality) specimen



# Awake Steroid Injection

## My Practice

- Scar
- Granuloma
- Unsatisfactory healing postop
- Disadvantage
  - lack of microlaryngoscopic assessment

## Lit Review

- Some problematic studies
  - Nomenclature inconsistency
  - 20 sessions therapy before intervention?!
- Low risk, minimal discomfort
- Risk of atrophy



# Awake Laser Treatment

- Typically an angiolytic laser (green or blue light)
  - Targets blood vessels rather than used for "cutting"
  - KTP is most common office laser now
- Usage:
  - Smaller disease burden
  - Repeated treatment
  - Patients wishing to avoid general anesthetic

- Common use (in my practice)
  - Papilloma
  - Leukoplakia/dysplasia
  - Reinke's edema
- Occasional
  - Scar
  - Granuloma
- Infrequent
  - Polyps, nodules



# Office KTP

- For Leukoplakia
- More "typical" approach compared to next slide



# Office KTP – For excision

- Large pedunculated polyp
- Simple excision in OR vs. office laser
- Laser used to cut rather than just treat indirectly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# Awake Laser – What's the evidence?

- Most studies – retrospective without comparison groups
  - Most do show improvement in outcomes
    - Lesion size
    - PROMs (usually VHI-10)
    - Perceptual (GRBAS) – 2 studies
    - Acoustic and aerodynamic measures – 1 study
  - Two comparative studies (Wang, 2015; Mizuta, 2015) showed equivalent outcomes to surgery for polyps
- Take home points
  - Office laser treatment is a valid option for many benign vocal fold lesions
  - Careful patient selection/counseling

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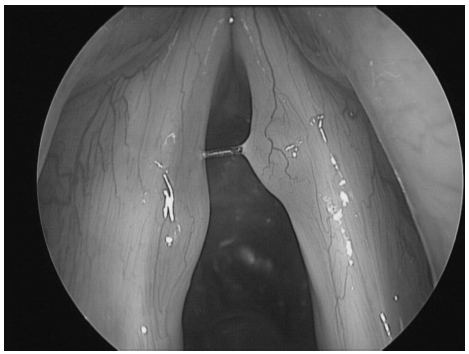
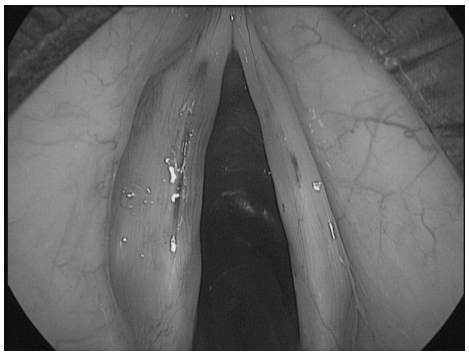
Shoffel-Havakuk H, Sadoughi B, Sulica L, Johns MM. In-office procedures for the treatment of benign vocal fold lesions in the awake patient: A contemporary review. The Laryngoscope 2019; 129:2131-2138.



# Surgery





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# Pre-Operative (Pre-Op) Voice Therapy

- Surgery:
  - Financial concerns
  - Disruptive to daily living
    - Having to take time off work for voice rest
    - Altering communication at home (talking less to children, family, etc.)
  - Carries own set of medical risks
  - Does not change the behavior that attributed to the lesion or dysphonia in the first place
  - At times, necessary initial step before behavioral therapy
    - Ex: Voice therapy will not be beneficial to someone if a large cyst is obstructing mucosal wave
- Pre-Op Voice Therapy
  - Patients who receive pre-op therapy have better outcomes than those who receive post-operative treatment only (Tang & Thibeault, 2017)
  - Compare this to physical therapy, which patients are more familiar with:
    - "If there was something wrong with your arm or leg, we'd send you to physical therapy before surgery."
  - Consensus among voice clinicians is that pre-op is the best time to align with patients on their vocal goals/expectations and educate them on necessary behavioral/lifestyle changes that will need to be made post-op

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# Goals of Pre-Operative Voice Therapy

- Education
  - Identify and address factors that likely contributed to development of dysphonia (repeated phonotraumatic behaviors, smoking, etc.) and discuss specific ways to prevent recurrence
    - "behavioural intervention requiring patients to commit to behaviour change," (White et al., 2021)
  - Review post-operative voice use allowances using detailed written timeline
    - Eliminate any confusion about how they should reintroduce phonation in a safe way AFTER surgery
    - Some patients are too scared to talk after surgery and will prolong voice rest, while others start voicing too early
- Preparation
  - Optimize respiration, phonation, and resonance through appropriate therapeutic techniques
    - Reduce severity of the lesion (size, surrounding edema, effect on mucosal wave)
    - Improve sound (and feel) of voice, quality of life



# Reminders: Pre-Operative Voice Therapy

- If lesion is present, patient may not be able to achieve improvement in vocal quality
  - Think: What is your goal for pre-op therapy in this case?
    - Pain management?
    - Post-op voice use allowance preparation?
    - Is there any chance we can prevent need for surgery? Some patients surprise us.
  - Think: How many sessions are needed to achieve that goal?
    - This may be less than the typical 4-6 sessions of voice therapy you would complete in a non-operative voice case
- Take pre-operative voice samples!
  - Patients often forget how far they have come
  - Comparing audio examples of pre- and post-operative voice can help build patients' confidence



# General Guidelines for Post-operative Therapy

- Therapy should consist of direct and indirect intervention (Gartner-Schmidt et al., 2013)
  - Semi-occluded vocal tract exercises using anatomical or external vehicles
- Therapy should be functional and maximize engagement and adherence (White et al., 2022)
- Instructions should be provided both verbally and in writing (White et al., 2021)
- Short period of absolute voice rest should be followed by relative voice rest
  - Research shows statistically significant improvement in acoustic, perceptual and patient-reported outcomes following 3 days of complete voice rest vs. 7 days of voice rest (Kaneko et al., 2017)
  - Modal length of 7 days, ranges in literature from 2-21 days (White et al., 2021)
- Number of voice therapy sessions should be determined based on individual (White et al., 2022)
  - Overall trend is 2-4 visits



# Goals for Post-Operative Voice Therapy

- Improve the voice and quality of life of individuals who have undergone phonosurgery (White et al., 2021)
- Prevent recurrence of lesion
- ***Adapt to changes*** in anatomy
- ***Rebalance*** subsystems of voice production
  - Review techniques from pre-op care or introduce them to pt if no pre-op involvement
- Monitor adherence to post-operative voice recommendations
- Obtain patient-reported perceptual measures, clinician-reported perceptual measures, acoustic measures, and audio samples
- Review preoperative and postoperative imaging