Benign Laryngeal Lesions
Factors contributing to vocal fold lesions

- voice overuse or misuse
- smoking
- etoh
- Laryngopharyngeal reflux
History

- medical conditions
  - AR, GERD, asthma, bronchitis, sinusitis
- medications
- Environmental exposure: smoke, allergens, particulates (dust)
LPR

- baseline inflammation predisposes VF to other stresses
- 78% w/ nodules had LPR
Allergy

- pts treated for AR had better outcome for treatment of laryngitis
- hypersensitivity makes laryngeal mucosa more susceptible to stress
Pathophysiology

- mech stress least at midpoint of membranous VF during phonation
- during hyperfunctioning dysphonia increased stress at midpoint
- increased stiffness in body of VF at midpoint results in higher shearing stresses, worse if nodule or mass present
- mass adds wt to VF decreasing vibratory qualities and frequency on stroboscopy
Pathophysiology

- decrease in pitch range and impaired closure leads to breathy voice and fatigue.
- Asymmetry adds grainy quality to voice
- once initiated, can cause compensatory muscle tension to reduce air flow through glottis
Anatomy of vocal fold

- Epithelium
- Lamina propria (superficial layer)
- Vocalis muscle
- Elastic conus (deep layer of lamina propria)

1 mm
Nodules
Nodules

- bilateral symmetric epithelial swelling of ant/mid third of TVF
- More prevalent in children, adolescents, females
  - softer intensity of voice causes hyperfunction
- Result of abuse or misuse
Nodule formation

- junction of anterior to middle VF experience maximal shearing and collision forces.
- vascular congestion and edema
- hyalinization of Reinke space and thickening of epithelium with epithelial hyperplasia
- nodules are acellular with thick epithelium over matrix of abundant fibrin and organized collagen IV in BM
Symptoms

- decreased amplitude mucosal wave
- **Symmetric** mucosal wave
- decreased closure: hourglass-shape glottal closure
- chronic hoarseness
- singers: frequent voice breaks, breathiness, vocal fatigue
Treatment of Nodules

- conservative voice use
- speech therapy to address technique
- Microsurgery when speech tx and other contributing factors optimized
Vocal fold polyps
Polyps

- **Unilateral**
- Broad-based vs. Pedunculated
- Formed by capillary break in Reinke space with leakage of blood resulting in local edema and organization with hyalinized stroma
- Hemorrhagic (feeding vessel) vs. nonhemorrhagic (pseudocyst)
Vocal fold polyps
Effect of polyps on mucosal wave

- Asymmetric mass produces more chaotic vibrations and aperiodic mucosal waves
- Larger polyps cause decreased wave amplitude
- Excessive air egress during phonation
- Fatigue
- Frequent voice breaks
- Decreased vocal power
Treatment

- Conservative for small polyps
- Microsurgery mainstay of therapy
- Hemorrhagic polyps
  - Pulsed-dye lasers absorbed by hemoglobin (585 nm)
  - Lasers more effective for smaller polyps
Vocal fold cysts
Vocal fold cysts

- Subepidermal epithelial-lined sacs within lamina propria
- Mucus retention cysts
- Epidermoid cysts congenital cell rests in the subepithelium of 4th and 6th branchial arch or healing injured mucosa burying epithelium
Vocal fold cysts

- Ruptured cyst may result in LP scarring or in a sulcus
- May cause reactive lesion on contralateral VF
- Size may vary with menstrual cycle
  - Caution when operating on premenstrual females
Strobolaryngoscopy

- Asymmetric vocal fold
- Decreased or absent mucosal wave on cyst side
- Diplophonia
- Glottic closure depends on cyst size and reactive lesion on contralateral side
- Mucosal wave
  - present in 80% of polyps BUT
  - absent in almost 100% of cysts
Treatment of cysts

• Does not resolve with conservative management

• Surgery
  – Dissection in submucosal plane with complete cyst removal
  – Prolonged mucosal wave recovery
  – Discuss risks with pt
Reactive Lesions
Reactive lesions

- Reaction to unilateral VF lesion
- Contralateral VF reactive callus with epithelial hyperplasia
- Bilateral like nodules
- Strobe: asymmetry not seen in nodules
- Tx: treatment of primary lesion, may resolve with conservative management
Intracordal Scarring

- Scarring in Reinke space after repeated inflammation, trauma or vocal hemorrhage
- Subepithelial scar
  - Disorganized collagen
  - Loss of ECM
  - Distinguish from epithelial scarring or vocal sulcus
- VF appears stiff, white or opaque
- Hoarseness, vocal fatigue, breathiness, loss of projection
Sulcus Vocalis

[Image of a medical illustration and a clinical photograph]
Causes of Intracordial scarring

- Cysts predispose to scar formation (ruptured, epidermoid origin)
- Trauma
  - Vocal fold surgery involving lamina propria
  - Repeated epithelial procedures
  - Biopsy, stripping
  - Inhalational
  - Intubation
- CO2 laser
- Radiation
- Rheumatologic disease
• **Stroboscopy**
  - Markedly reduced or absent mucosal wave
  - Asymmetry affects phase closure
Treatment of vocal scar

- Microflap to remove cyst elements and adynamic fibrous components
- Medialization thyroplasty for glottic gaps
- Replacement soft tissue (Fillers)
  - Collagen
  - Fat
  - Hyaluronic acid
Reinke Edema
Reinke edema

- polypoid corditis
- proliferation of superficial lamina propria
- chronic irritant exposure
  - Smoke, LPR, occupational exposures
- water-balloon outpouching from membranous VF
- ball-valving effect
Treatment

- **Surgery**
  - Airway compromise
  - Preserve some superficial lamina propria and overlying epithelium to preserve mucosal wave
- **Stage for bilateral disease to prevent anterior web**
- **Remove irritants and treat LPR**
Feeding varices and hemorrhage

- Aberrant microvessels in superficial lamina propria
- Result of shearing forces and trauma
- Predispose to formation of polyps and hemorrhage
• Treatment
  – Microdissection and CO2 laser
    • Risks of scarring and sulcus
  – Pulsed lasers (KTP, 585nm PDL)
    • No adverse scarring or reduction in mucosal wave
Vocal Process Granuloma
Granulomas

- Response to trauma
- LPR, throat clearing, chronic cough
- Intubation
- Compensatory forceful glottic closure
  - VF paresis
  - Presbylarynges
- Does not affect mucosal wave or phase closure
Treatment

• LPR treatment
• Speech therapy
• Botox to thyroarytenoid muscle
• Surgery
  – Compromise voice, breathing or swallowing
  – Suspicion for malignancy
  – High recurrence rate
Papillomas
Papillomas

- HPV (Strain 6 and 11 most common)
- 2% malignant transformation (HPV 16 and 18)
- 10% rate of spread to other sites (trachea, supraglottis, NP)
- Most commonly found at columnar and squamous junction
- Host immune recognition
  - HPV 11 growth more aggressive during pregnancy
  - 40% HPV+ larynx without RRP
Treatment

- CO2 laser
  - Controversy: depth risks scarring and implantation of HPV
  - Avoided in most centers
- Microshaver
- Cidofovir injection (adjuvant tx)
- Vaccine
Cidofovir

- Acyclic nucleoside phosphonate
- Once phosphorylated, resembles nucleotide
- Incorporated into DNA, halting DNA synthesis
- ANP’s have greater affinity for viral DNA polymerase and reverse transcriptase than host DNA polymerase
- Off-label use

Fig. 1  Intracellular phosphorylation of cidofovir.
# Cidofovir studies limited

## Table 1  Summary of published clinical observations on cidofovir effectiveness

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<th>Reference</th>
<th>Total cases</th>
<th>Total response</th>
<th>Partial response</th>
<th>No response (or progression)</th>
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<td><strong>Total</strong></td>
<td><strong>142</strong></td>
<td><strong>85 (60%)</strong></td>
<td><strong>41 (29%)</strong></td>
<td><strong>11 (7.5%)</strong></td>
<td><strong>5 (3.5%)</strong></td>
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</table>

a, b = relapsed after initial response. c = one patient still undergoing treatment.
Leukoplakia

- Spectrum of change in epithelium
- Hyperkeratosis → Dysplasia (mild, moderate) → CIS/ severe dysplasia
- Pattern of growth
  - Superficial, broad
  - Verrucous, exophytic with surrounding erythema
- Appearance does not correlate with degree of dysplasia
- 8% to 14% rate of malignant transformation
Treatments

- CO2 laser
- PDL
- microflap excision
- Preservation of normal mucosal wave for mild dysplasia
- More aggressive excision with increasing dysplasia
Fungal Laryngitis

- Disease of both immunocompromised and immunocompetent hosts
- May mimick leukoplakia or malignancy
  - White or gray pseudomembrane on mucosa
  - Mucosal erythema and edema (focal or diffuse) surrounding white plaques
  - Mucosal ulcerations
  - Contact bleeding
Fungal laryngitis
Risk factors

- Risk factors: LPR, smoking, inhaled steroids, prolonged antibiotic use, XRT
- DM, immunosuppressants, CA, nutritional deficits
- Compromise mucosal barrier
Diagnosis

- Suspicion and response to empiric therapy
- Any question can culture by laryngeal brushing or biopsy
- Dysphagia may also have esophageal involvement → TNE
• Candida species most commonly cultured
• Blastomyces (Eastern US and Midwest)
• Histoplasma (Ohio and Mississippi River Valleys)
• Coccidioides (Southwestern US)
• Bacterial superinfection
  – Honey-colored crusts
Treatment of fungal laryngitis

- Fluconazole x 3wks
- Nystatin swish and swallow (100,000 units/ml, 10ml tid)
- Prevention
  - spacers for inhaled steroids
  - oral rinse, gargle with water after use