



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

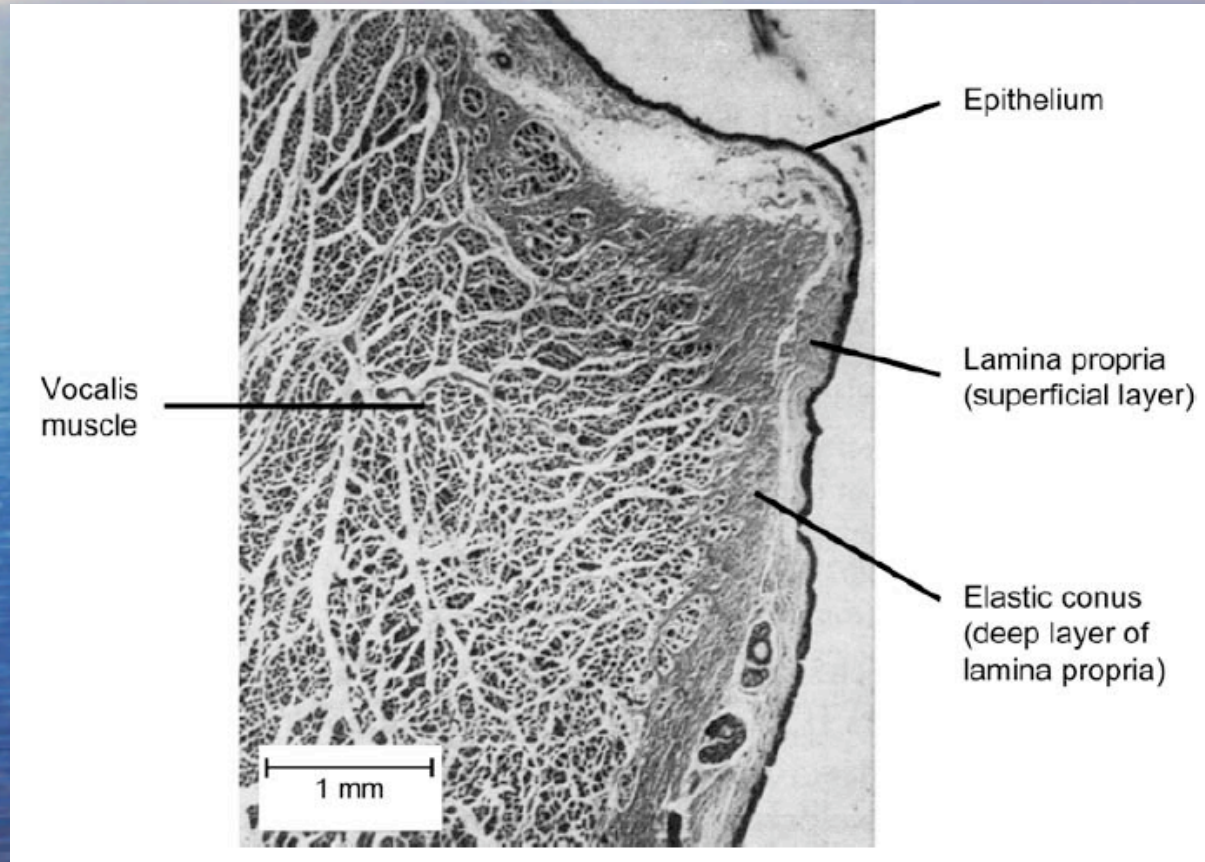
Pathophysiology

- 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

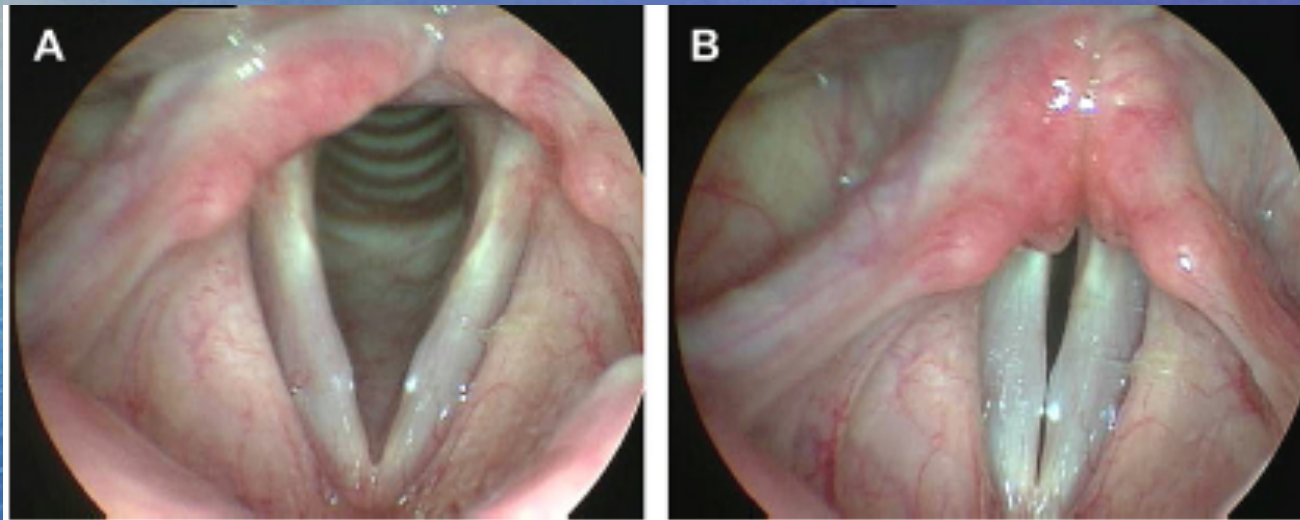
Pathophysiology

- 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



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

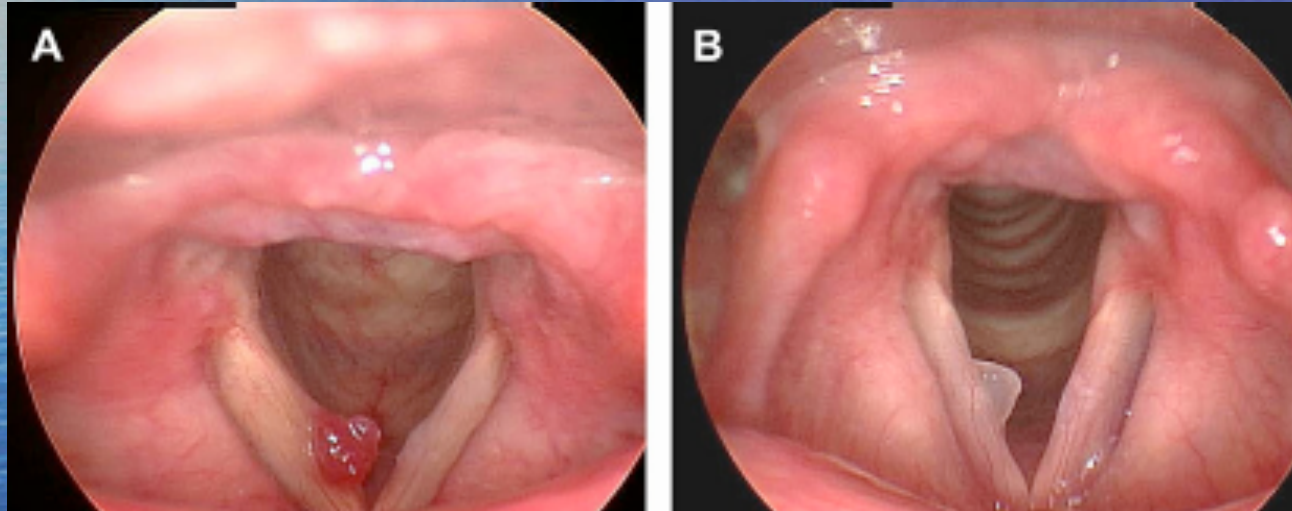
Symptoms

- 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

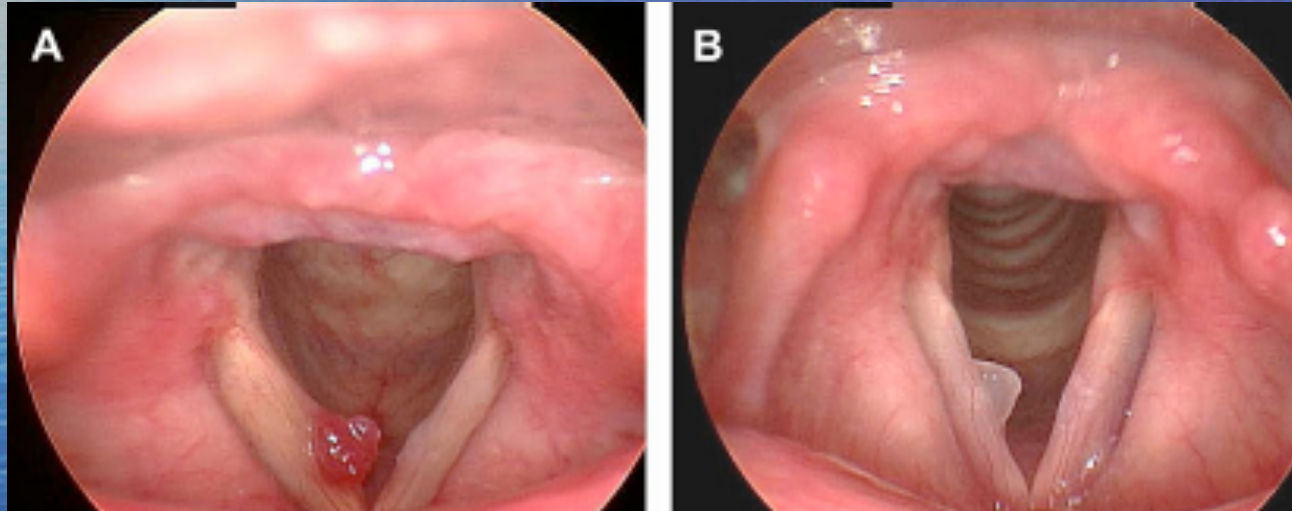
Vocal fold polyps



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



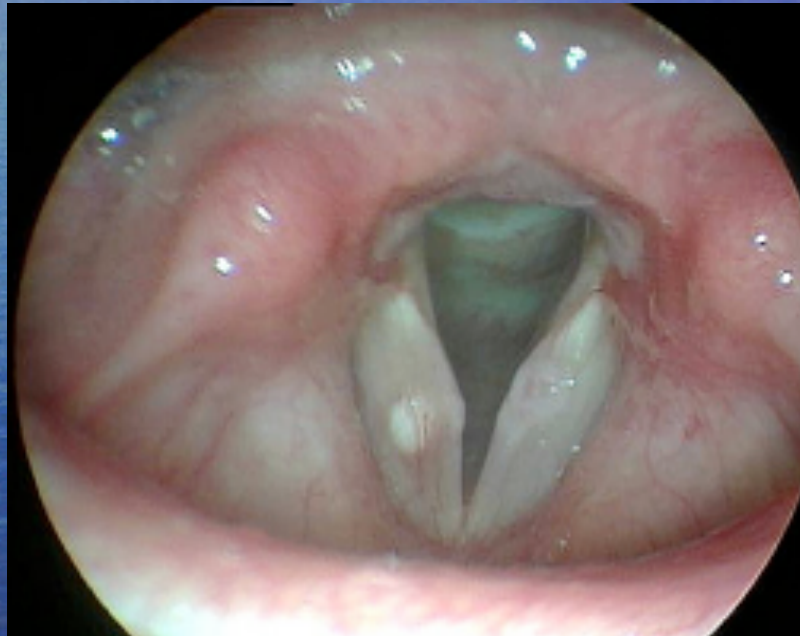
Effect of polyps on mucosal wave

- 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

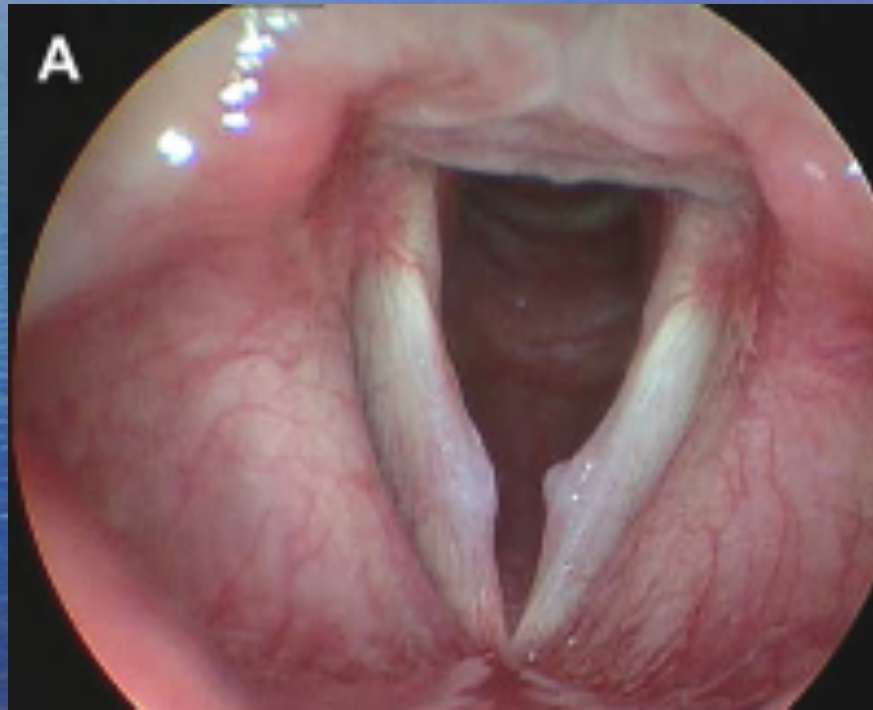
Strobolaryngoscopy

- 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

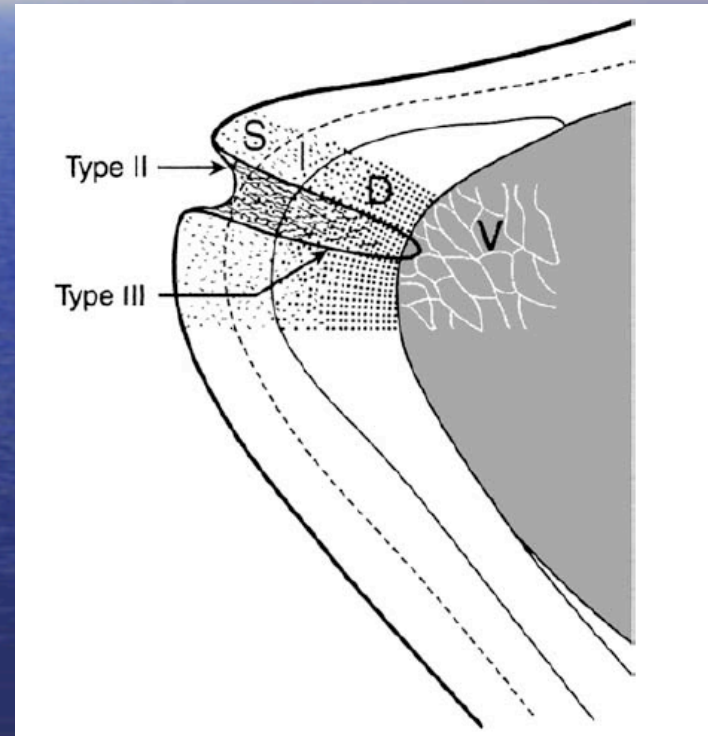
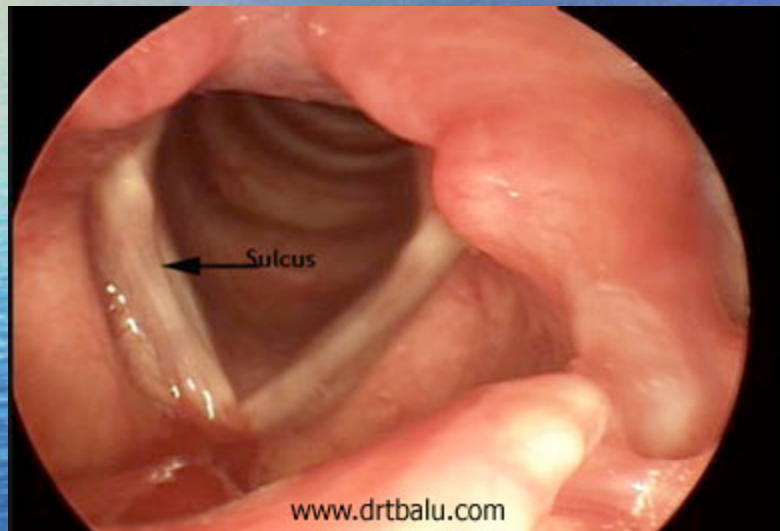
Before and After



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



Causes of Intracordal 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

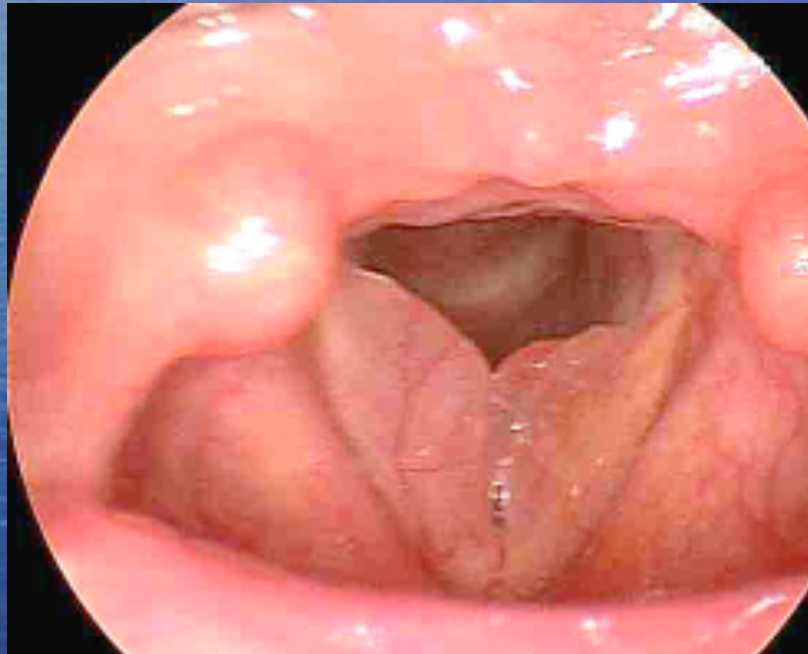
- Markedly reduced or absent mucosal wave
- Asymmetry affects phase closure



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

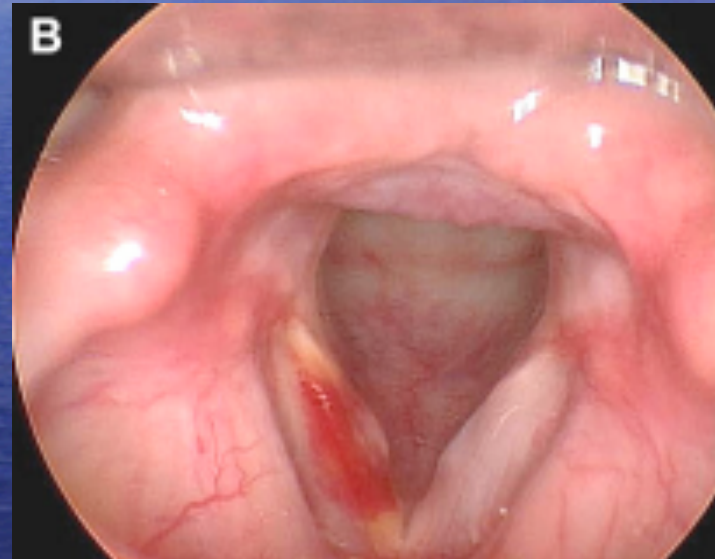


Reinke edema

- 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



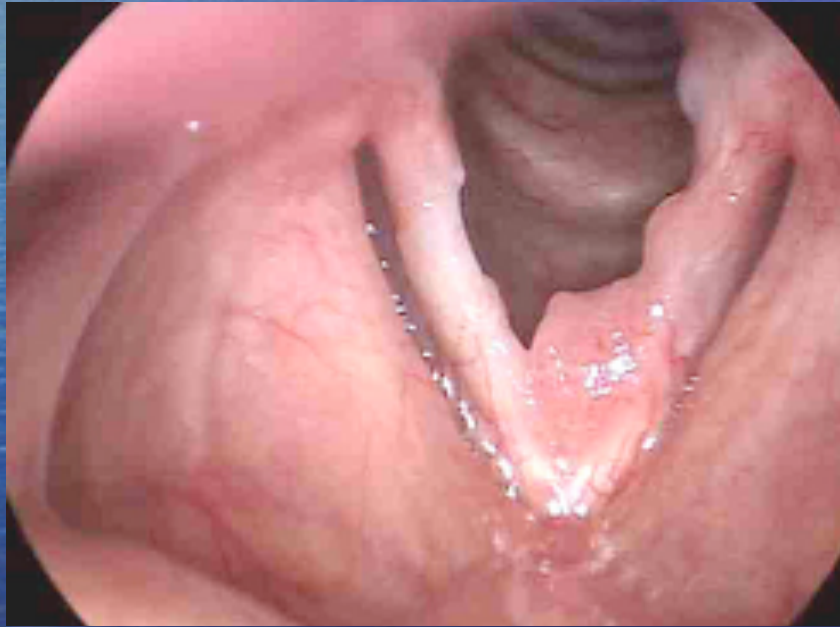
Granulomas

- 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

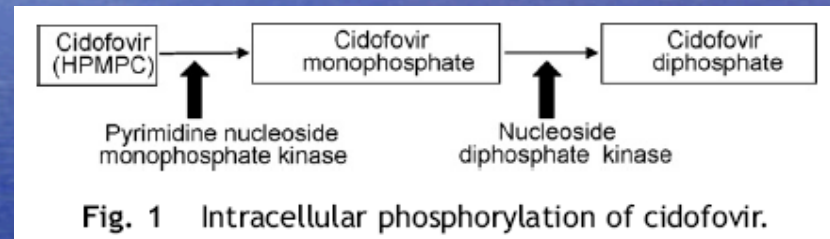
- HPV (Strain 6 and 11 most common)
- 2% malignant transformation (HPV 16 and 18)
- 10% rate of spread to other sites (trachea, supraglottis, NP)
- Most commonly found at columnar and squamous junction
- Host immune recognition
 - HPV 11 growth more aggressive during pregnancy
 - 40% HPV+ larynx without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



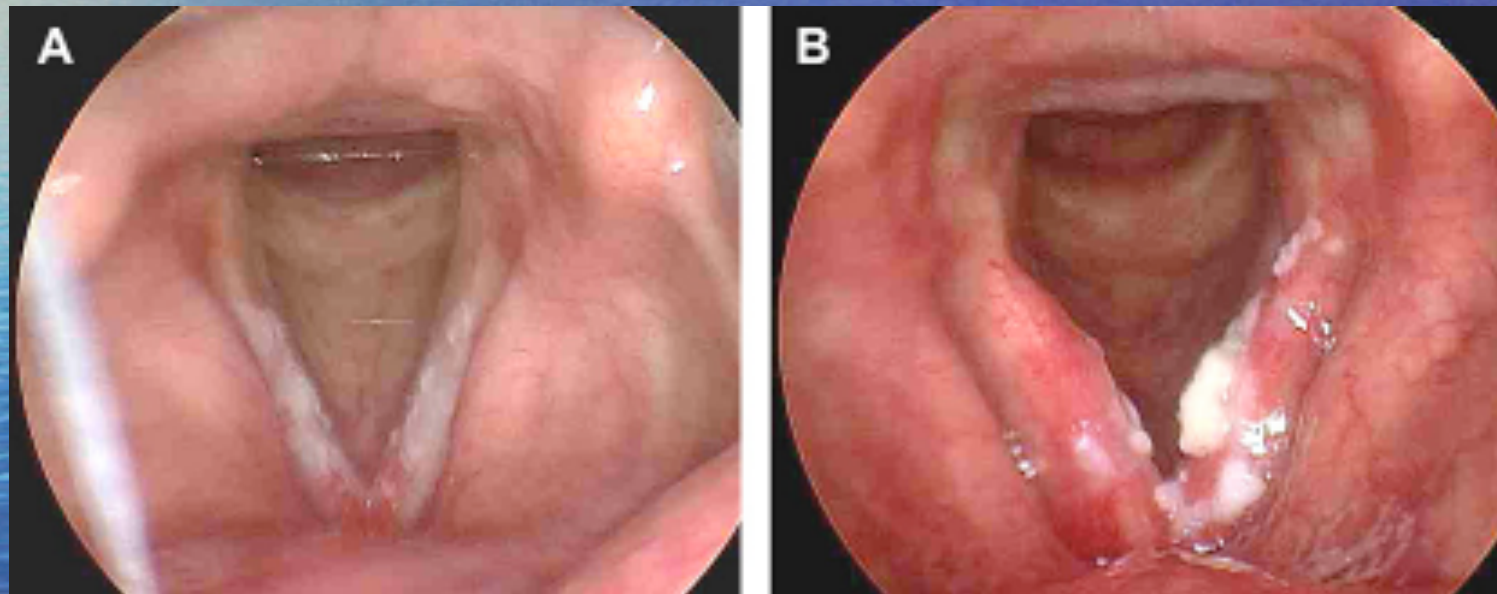
Cidofovir studies limited

Table 1 Summary of published clinical observations on cidofovir effectiveness

Reference	Total cases	Total response	Partial response	No response (or progression)	Missing data
Snoeck et al. [24]	17	14	1	1[a]	1
Peyton and Wiatrak [2]	11	3	2	6	0
Lee and Rosen [28]	16	10	2[b]	1	3
Mandell et al. [29]	4	4	0	0	0
Sheahan et al. [30]	4	1	2	1	0
Pontes et al. [31]	10	9	0	1	0
Dikkers [32]	9	7	2	0	0
Chhetri and Shapiro [33]	5	4	1	0	0
Pransky et al. [27]	11	5	5	1[c]	0
Milczuk [34]	4	0	4	0	0
Akst et al. [35]	11	6	5	0	0
Naiman et al. [36]	26	8	17	0	1
Bielamowicz et al. [26]	14	14	0	0	0
Total	142	85(60%)	41(29%)	11(7.5%)	5(3.5%)

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

Leukoplakia



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