BENIGN VOCAL CHORD LESIONS
Normal voice requires laryngeal function to be coordinated, efficient, and physiologically stable.

Benign lesions of the vocal folds can cause imbalances in this system.
HISTOLOGY

- Epithelium (mucosa)
- Basal lamina
- Superficial layer of lamina propria
- Intermediate layer of lamina propria
- Deep layer of lamina propria
- Vocalis muscle (thyroarytenoid muscle)
**HISTOLOGY**

**COVER**

- **Epithelium**
  
  - Anterior glottis → stratified squamous
  
  - Posterior glottis → pseudostratified ciliated

- **Basal lamina → physical support**
  
  - Lamina lucida
  
  - Lamina densa

- **Superficial layer of lamina propria**
  
  - Reinke’s space (potential space) → Reinke’s edema
  
  - Fibrous components + extracellular matrix
HISTOLOGY

TRANSITION

- Intermediate layer of the lamina propria
  - Elastic fibers
- Deep layer of the lamina propria
  - Collagenous fibers

BODY

- The vocalis muscle
  (medial portion of the thyroarytenoid muscle)
Anatomy

- Mucosa and vocal ligament extend over the vocal process
  - Cartilaginous (aphonatory)
    - Posterior one-third
  - Membranous (phonatory)
    - Anterior two-thirds

- Important anatomical feature
  - Most benign lesions affect the membranous portion
BENIGN VOCAL CHORD LESIONS

- **NON-NEOPLASTIC**
  - Vocal nodules
  - Vocal Polyp
  - Vocal Cyst
  - Reinke’s edema
  - Granuloma
  - Leukoplakia
  - Intracordial scars

- **NEOPLASTIC**
  - Papilloma
Benign Non-neoplastic vocal chord lesions

- Majority of vocal fold lesions

**Causes**

- Vibratory injury

- Multifactorial
  - *Extroverts, talkativeness*
  - *Occupation*
  - *Smoking, acid reflux, allergy and infection*
VOCAL CHORD NODULES

- Most common benign lesion of the v.c.
- Children and adult females
- Clinical presentation: hoarseness of variable duration, can have different degrees of breathiness and vocal breaks
- Risk factors: Voice misuse or abuse (professional singers, teachers, other occupations with high voice demands)
VOCAL CHORD NODULES

- **BILATERAL**
  - Junction of the *anterior to middle membranous portion* of vocal fold (point of the maximal shearing and collision forces)

- Vary in size, symmetry, contour, and color.

- **Pathological sequence**
  - Forceful or prolonged vibration at the *membranous portion*
  - Edema and congestion
  - Long-term vocal abuse leads to hyalinization of the SLP
VOCAL CHORD NODULES

- Videostroboscopy
  - Hourglass appearance
  - Relatively symmetrical mucosal wave

- Management
  - Voice therapy (*6 months*)
    - Primary treatment
    - Optimize laryngeal environment
    - Phonotraumatic behaviors, guidelines for voice use, optimizing hydration
  - Medical
    - Reflux, smoking
  - Surgical (infrequent)
VOCAL POLYPS

- Unilateral lesions
  - Broad based or pedunculated
- Often in males

- Red, white, or translucent lesions at anterior/middle third along the free edge

- Causes: Vocal abuse or anticoagulant use

- Two types
  - Hemorrhagic – abrupt onset – extreme vocal effort
  - Nonhemorrhagic (pseudocyst) – outpouchings of inflamed SLP
**VOCAL POLYPS**

- **Pathophysiology**
  - Shearing forces
  - Capillary rupture and focal accumulation of blood or hematoma
  - Inflammatory cells infiltrate
  - New matrix

- **Videostroboscopy**
  - Usually have intact mucosal waves
  - Phase asymmetry with impaired glottic closure

- Fatigue, voice breaks, decreased vocal power.
VOCAL POLYPS

- Management based on polyp size
  - Conservative management for small polyps

- Management
  - Medical
    - Discontinue anticoagulants
    - Reflux treatment
  - Voice therapy
    - Small polyps
  - Surgical

Fig. 3.6.3
Vocal polyps move in and out during respiration.
(a) Inspiration, (b) expiration (courtesy of Dr. Yılmaz)

Fig. 3.6.4
(a) Right vocal cord polyp a few millimeters behind the anterior commissure. (b) After excision. Mucosa was preserved as much as possible and anterior commissure was not touched.

Fig. 3.6.5
(a–c) Vocal cord polyps are usually single lesions which can occur anywhere on the vocal cord. The treatment is microlaryngoscopic removal of the polyps.
VOCAL CHORD CYST

- Unilateral but can be bilateral
- Women > men.
- Sac like structure within the lamina propria, yellow or white in color, distinct and defined border

- Two subtypes
  - Epidermoid +++
    - Stratified squamous epithelium
  - Mucous retention
    - Cylindrical epithelium
**VOCAL CHORD CYST**

Symptoms: vocal strain, diplophonia

### PATHOGENESIS

- **Epidermoid vocal chord cyst**
  - Epithelial cells buried congenitally
  - Healing mucosa – vocal abuse

- **Mucous retention cyst**
  - Obstruction of a glandular duct ----> Upper respiratory infection, voice overuse and acid reflux.
VOCAL CHORD CYST

- Videostroboscopy
  - Asymmetrical mucosal wave
  - Decreased on side of lesion
  - Glottic closure depends on the size of the cyst

- Management
  - **Surgical – mainstay of treatment**
  - Supportive measures (hydration, reflux)
  - Voice therapy
    - Limited role
    - Epidermoid type
- **Response to unilateral vocal chord lesion**

- **Reactive callus with vocal chord hyperplasia**

- **Can be confused with vocal nodules**
REACTIVE LESIONS

- Videostroboscopy
  - Hourglass appearance
  - *Wave asymmetry unlike vocal nodules*

- Management
  - Treat primary lesion
  - Conservative management
REINKE’S EDEMA

- Polypoid corditis, Reinke’s edema or smoker’s polyps
  - Bilateral diffuse polyposis

- Causes: Chronic irritant exposure

- RF: middle aged, talkative women with a long-term history of smoking

- Clinical presentation:
  - Lower pitch (masculine range)

- Fibroscopy: Outpouchings of the membranous vocal chord
  - Water balloon appearance
REINKE’S EDEMA

- Excessive accumulation of edema
- Alterations in the walls of blood vessels
- Thickening of the epithelial basement membrane
- Connective tissue proliferation --> irreversible lesion
REINKE’S EDEMA

- Videostroboscopy
  - Decreased mucosal wave
  - Phase asymmetry due to ball-valving and asymmetric edema
REINKE’S EDEMA

Management

- Medical - **SMOKING CESSATION**
- Voice therapy
  - May help introduce optimal vocal behavior
  - *Reduce size of the polyp and improve vocal functioning*

- Surgery necessary when the voice remains unacceptable to the patient
- **Risk of malignance**: 1.7% patients with potentially malignant lesions (atypical hyperplasia, and IEN I and II)
**VOCAL GRANULOMA**

- Primarily in men
- Posterior one-third or *cartilaginous glottis*
- Clinical presentation: Speech may be normal
- Causes: Vocal chord trauma
  - Associated with acid reflux, chronic cough, throat clearing and intubation
- Pathophysiology
  - Traumatic areas $\rightarrow$ ulceration $\rightarrow$ granuloma.
VOCAL GRANULOMA

- Videostroboscopy
  - Mucosal wave present
  - Location in cartilaginous posterior vocal chord
  - Large lesions can affect closure

- Management
  - Treat underlying cause of irritation
  - Medical
    - Anti-reflux regimen
      - Spontaneously resolve over 3-6 months
  - Voice therapy
  - Surgical
    - Recurrence is common
    - Reserved for lesions
      - Enlarging
      - Affecting the voice
      - Suspicion for malignancy
**CAPILLARY ECTASIA**

- **RF:** Female singers
  - Clinical presentation: Hoarseness after short periods of singing

- **NSF:** Abnormal dilation of capillaries, can also present as clusters

- **Pathophysiology**
  - Vibratory microtrauma lead to capillary angiogenesis in the superficial lamina propria.

**Predisposes to:**
- Increased vulnerability to mucosal swelling
- Vocal fold hemorrhage
- Hemorrhagic polyp formation
CAPILLARY ECTASIA

Management
- Medical
  - Discontinue anticoagulants
  - Acid reflux

- Voice therapy – behavioral changes for voice abusers

Surgical
- Patients who fail conservative management
- Spot coagulation is an excellent option
  - CO2 laser - scarring
  - KTP (532nm) laser
    - Angiolytic
    - Selectively ablate vessels
INTRACORDAL SCARRING

- **CP:** Aphonia to relatively normal speaking voice

- **NSF:** Scarred, stiff vocal fold cover

- **Causes:**
  - Inflammation, vocal trauma, vocal chord hemorrhage
  - Scarring of the SLP or Reinke’s space
  - Surgery involving lamina propria and repeated epithelial procedure

- **Pathophysiology**
  - Scaring adheres the mucosa to the underlying vocal ligament, disrupting the ability of the mucosa to oscillate freely
INTRACORDAL SCARRING

- Videostroboscopy
  - Markedly *reduced or absent mucosal wave* usually asymmetric
  - Often effects closure phase

- Management
  - Medical
    - General medical issues that affect voice should be optimized
  - Voice therapy
    - Voice building approach
      - Strengthen the muscles involved in phonation
  - Surgical
    - *Incision with elevation of mucosa above scar with early voice therapy*
  - Prevention
    - Precise surgical technique
    - Early treatment of vocal trauma
LEUKOPLAKIA

- White hyperkeratotic plaque which represents a change in the epithelium
  - 10.2 per 100,000 (Males)
  - 2.1 per 100,000 (Females)

- Pathophysiology unknown
  - Chronic irritation – smoking

- 3 stages
  - No dysplasia -> mild to moderate dysplasia -> severe dysplasia

- 8-14% chance of malignant transformation
LEUKOPLAKIA

- Videostroboscopy
  - Normal to sluggish mucosal wave
  - Can vary in severity but a mucosal wave should be present

- Management
  - Surgical
  - Tissue diagnosis is necessary to rule out malignancy
  - Excision or laser
VOCAL CHORD PAPILLOMA – Neoplastic lesion

- Most common benign neoplasm (84%)

- Prevalence Rate
  - 4.3 per 100,000 children
  - 1.8 per 100,000 adults

- HPV (strains 6 and 11 most common)
  - Type 11 associated with more aggressive disease

- HPV types 16 and 18 higher risk of malignant transformation
VOCAL CHORD PAPILLOMA

- Two types
  - **Juvenile**: More aggressive and bulky, exuberant tissues resembling “clusters of grapes”. Recurrent
  - **Adult-onset**: More localized, usually less aggressive, less exophytic with a velvety appearance and little projection from the surface of the vocal chord.
VOCAL CHORD PAPILLOMA

- Videostroboscopy
  - Mass effect with decreased mucosal wave

- Management
  - Surgery
    - CO2 laser
      - Most widely accepted
      - Risk – scarring
    - Pulse Dye and KTP
    - Microdebrider
      - Bulky lesions
  - Adjuvant treatment
    - Interferon
    - Cidofovir (antiviral)
    - Bevacizumab
  - Vaccine (Gardasil)
    - Incidence of RRP
    - Herd immunity


