Hoarseness and Voice Disorders

Mariah Samara, MD
Boston ENT Associates
Beth Israel Deaconess Hospital – Needham
Grand Rounds
December 3, 2014
Objectives

• Outline definition of hoarseness, anatomy and physiology of the voice
• Discuss benign and malignant vocal cord pathology
• Review other/systemic disorders affecting voice
• Examine treatment guidelines, workup of dysphonic patient
• Discuss evaluation and treatment by otolaryngology

• No disclosures
Introduction

• Normal voice requires laryngeal function to be coordinated, efficient, and physiologically stable

• Imbalances in this delicate system can affect voice quality

• Systemic disorders, benign and malignant lesions of the vocal folds can cause imbalances in this system
Hoarseness

• Considered a symptom of a disease
• Definitions
  • Change in quality of voice
  • Weak, strained, breathy, raspy
  • Changes in volume or pitch
  • Perception of change in voice
Prevalence

- Lifetime prevalence of 29.9%
- Point prevalence of 6.6% (adults < 65)
- More common in telemarketers, fitness instructors, teachers
- In older adults, point prevalence of 29%, lifetime 47%
- 7.2% of adults reported missing work for 1+ days in past year with voice problem
  - Higher incidence in teachers
- $2.5 billion lost revenue

Schwartz et al. Clinical practice guideline: Hoarseness (Dysphonia). Otolaryngology - Head and Neck Surgery 2009; 141:S1
Anatomy

- Laryngeal skeleton consists of nine cartilages
  - Main laryngeal structure formed by 3 unpaired cartilages
    - Thyroid, cricoid, and epiglottic
  - Remainder of the framework consist of paired cartilages
    - Arytenoid, corniculate, and cuneiform
  - Cricoarytenoid joint – multiaxial
    - Sliding, rocking, twisting
    - Primary moving structure of larynx
Anatomy

- **Intrinsic muscles**
  - Responsible for vocal fold motion
  - 3 types
    - Abductor, adductors, and tensors

- **Abductor**
  - Posterior cricoarytenoid
  - Sole abductor
  - Responsible for glottic airway
  - Innervation: recurrent laryngeal nerve
Anatomy

- **Adductors**
  - Lateral cricoarytenoid
  - Thyroarytenoid (lateral portion)
  - Interarytenoid (oblique and transverse)
  - Innervated by recurrent laryngeal nerve
Anatomy

• Tensors
  • Cricothyroid
    • Vertical, oblique bellies
    • Vocal tightening, lengthening
    • Innervated by superior laryngeal n
  • Thyroarytenoid (medial portion - vocalis)
    • Vocal shortening, thickening
Histology

- **Squamous epithelium – stratified, nonkeratinizing**
  - Unique to vocal cord; larynx otherwise covered by respiratory epithelium

- **Lamina propria – 3 layers**
  - Superficial – Loose fibrous matrix, gelatinous consistency; allows for mucosal wave
  - Intermediate – elastin
  - Deep – fibroblasts and collagen
  - Intermediate and deep layers together form vocal ligament

- **Thyroarytenoid muscle**

- **Body Cover concept**
  - Body – muscle and ligament
  - Cover – lamina propria and epithelium
  - Posterior 1/3 – cartilaginous/aphonatory
  - Anterior 2/3 – membranous/phonatory
Major Functions

• Airway protection
  • Most important

• Respiration
  • Gateway to airflow

• Phonation
  • Most complex, highly specialized function
Function

• The vocal cords at rest, forming a V-shaped space (the glottis), divided into the vibratory (membranous) and nonvibratory (cartilaginous) portions.

• The vocal cords are divided into anterior, mid, and posterior thirds. With regard to phonation, the vocal cords are divided into the upper vibratory lips (dotted line) and the lower vibratory lips (dashed lines)
Vibration

- Pitch of voice related to frequency of vocal fold vibration
  - Correlates with changes in vocal fold tension, subglottic pressure
- Frequency determined by mass, stiffness, viscosity of vocal folds
  - Fundamental frequency inversely proportional to mass
    - Cricothyroid contraction -> Thinning/stretching of vocal cords, decreased mass -> increased frequency
    - Thyroarytenoid contraction -> shortening/thickening of cords, increased mass -> decreased frequency
- Stiffness/tension
  - Affected by contractile forces of muscles and tissue characteristics of body/cover
- Viscosity
  - Increased viscosity requires greater subglottic pressure to maintain vibration
  - Hydration of vocal cords effect quality, ease of production
History

• Character of Hoarseness
  • Onset & Duration
  • Time course
  • Periodicity (AM vs PM)

• Contributing Factors
  • Recent URI, fever, sore throat
  • Cough, congestion, talkativeness
  • Abuse of voice, tobacco, EtOH
  • Comorbidities – DM, GERD, thyroid disease, neurologic disease
  • Recent surgery, trauma
  • Psychologic stressors
Physical Exam

• Assess quality of voice
  • Frequency
  • Volume
  • Nasality
  • Stridorous
  • Breathy
  • Harsh
  • Tremorous/strained
  • Arrest of phonation
  • Aphonic
Ancillary Workup

- Let H&P guide additional studies
- Suspect Autoimmune disease:
  - ANA, RA, ACEi, CRP, ESR, c-ANCA, p-ANCA
- Suspect Thyroid disease:
  - TSH, T3, free T4
- Suspect Infectious etiology:
  - FTA-ABS, CBC
Ancillary Workup

- Chest pathology
  - CXR
- CT
  - Cancer, persistent or recurrent pain/hoarseness, trauma, FB
- MRI
  - Neurologic workup, cranial neuropathies, evaluate skull base/brainstem
- MBS for concurrent dysphagia
What can go wrong?

• Mucosal/mechanical alterations
• Muscle weakness (presbyphonia)
• Nerve damage (vocal cord paralysis)
• Neurologic disorders
Differential

- Laryngopharyngeal reflux
- Autoimmune
  - RA, SLE, Wegner’s, Sarcoid
- Neurologic
  - Parkinson’s, GBS, Stroke, MS, Myasthenia Gravis
- Psychogenic
  - Functional Dysphonia
- Infectious
  - Viral, Papilloma, TB
Differential

• Iatrogenic
  • Medications
  • Post-intubation
  • Post-surgical (cardiac, neck surgery)
• Endocrine
  • Hypothyroid, laryngeal myxedema
• Toxins/trauma
  • Voice abuse/misuse, caustic ingestion, blunt/penetrating neck injury
Differential

- Vocal fold pathology - benign
  - Nodules
  - Cysts
  - Polyps
  - Varices
  - Granuloma
  - Papilloma
  - Laryngocele
  - Reinke’s edema
  - Granular cell tumor
Differential

- Vocal fold pathology – malignant
  - Leukoplakia
  - SCC
  - Nerve impingement from neck/chest tumor
Vocal Cord Nodules

- Found at the free edge of the anterior and mid-third of the vocal cord
- Localized swelling on the edge of the cord, grayish, translucent thickening
- Occur from overuse/misuse
  - Forceful or prolonged vibration at the membranous (vibratory) vocal cord
  - Edema, thickening leads to hyalinization, fibrosis of SLP
Vocal Cord Nodules

- Treatment
  - Voice therapy
    - primary treatment
    - Vocal hygiene
  - Medical
    - Anti-reflux, smoking cessation
  - Surgical
    - Refractory cases
Vocal Cord Cyst

- Found in lamina propria
- Epithelial lining covering cyst
- Results from overuse/misuse
- May cause reactive fibrosis of contralateral cord
- Treatment: modified voice use, steroids, anti-reflux
- Surgery often necessary
  - Preserve mucosal cover with minimal disruption of underlying tissue
Vocal Cord Polyp

- Typically unilateral
- Sessile or pedunculated
- Two primary types
  - Hemorrhagic – abrupt onset, occur with extreme vocal effort
  - Nonhemorrhagic – outpouchings of inflamed SLP
- May see reactive nodule on contralateral cord