Approach to Dysphonia – The Role of Stroboscopy

- History
  - Onset, duration, severity, exacerbating factors
  - Vocal effort, vocal projection, odynophonia
  - Social – impact and risk factors
  - Swallowing and airway
- Physical
  - Visual: Laryngoscopy, with/without stroboscopy

Stroboscopy should often times be confirmatory, rather than revelatory, regarding etiology of dysphonia.

Normal Voice - Physiology

- Closure
- Symmetry
- Pliability

Dysphonia = Change in one or more of these qualities
* Each defect causes different changes

In my practice....

• 29.0% inflammatory
• 19.0% paralysis
• 16.5% phonotrauma
• 11.5% functional
  • 9.8% post-traumatic
  • 7.1% other neurologic
  • 4.6% neoplasm
  • 2.5% stenosis/other

Stroboscopy Analysis

With this background, consider:

– TVC motion
– TVC closure
– Mucosal lesions
– Supraglottic compression
– Secretions

– Vibration
  • Deep mucosal wave amplitude
  • Superficial pliability
  • Phase symmetry
– Posterior glottic edema / erythema

The study of vibration is what separates stroboscopy from laryngoscopy

Stroboscopy Analysis – Motion

• Immobility ≠ paralysis
• "Motion impairment" is vague
• Describe degree of motion
  – If immobile, how far off of midline?
  – If partially mobile, what is degree of motion?
  – Beware of ‘passive’ motion, as it may not be purposeful

Stroboscopy Analysis – Closure

• Complete – straightforward
  • In-between
    – "Short closed-phase quotient"
    – Complete at low-pitch, but not at high pitch
    – Pathologic? Or part of phonatory set-up?
• Incomplete
  – Pattern: hourglass, spindle, etc.
  – Severity – estimate the gap
Stroboscopy Analysis – Vibration

- Mucosal wave amplitude
  - Deep vibration
- Superficial pliability
  - Does the medial edge get deformed?
  - Analogy: ripples on a pond
- Clinically: is there SLP deep to a lesion?

Stroboscopy Analysis – Supraglottic Compression

- False vocal fold
- Anterior-posterior
- Task dependent?
- Related to breath support?
- Correctable? Try therapeutic maneuvers with scope in place

Stroboscopy Analysis – Lesions

- Nomenclature isn’t standardized
- Nodules, polyps, cysts
  - Is operative recognition necessary?
  - “Podules”? “Nolyps”?
- “I know it when I see it” (Justice Potter Stewart, Jacobellis v. Ohio, 1964)
- SLP approach – descriptive, not diagnostic; “excrescence”
Clinical Challenges

- Equipment issues
  - Scope
- Exam issues
  - Gag, focus, tracking
- Patient/lesion issues
  - Gag, nature of dysphonia

**Equipment – Rigid vs Flex**

- **Rigid**
  - Good anatomic detail
  - Limited to "eee"
  - Not always well tolerated, especially if there is hyperfunction
  - Phonotrauma
  - Injection: paralysis, paresis, presbylarynx
- **Flex**
  - Less illumination, magnification
  - Reduced anatomic detail (unless you can get close)
  - Well-tolerated
  - Multiple voice tasks
  - Functional
  - Neurologic

**Equipment – Flexible Fiberoptic vs Distal Chip**

**Exam Quality – Focus**
Exam Quality – Tracking

Patient Factors – Hemorrhage

Patient Factors – Limited View of TVC

Patient Factors – Sulcus Vocalis
- Difficult to recognize
  - 100 pts: rigid exam vs OR findings
  - 16 new findings in 9 pts
  - 15/16 were sulcus
- Difficult to repair

The Biggest Challenge?

Pattern Recognition
Cases

• Stroboscopy analysis

Case 1

Case 2

Case 3

Nodules, Polyps, and Cysts

• Benign phonotraumatic lesions
• Risk factor – increased vocal cord use
  – Singers, teachers, cheerleaders, etc.
  – “Not a disease of wallflowers”

Nodules, Polyps, and Cysts

• Decreased pliability
  – Difficulty with high, soft notes
  – Increased effort
  – Decreased vocal endurance
  – Decreased range
• Possible asymmetry
  – Diplophonia
Nodules, Polyps, Cysts

- Diagnosis is by videostrobolaryngoscopy
  - Note decreased pliability in region of fibrovascular lesions

Nodules, Polyps, and Cysts

- Voice therapy
  - Adjust vocal behaviors
  - Prevent repeat abuse

- Phonomicrosurgery
  - Best exposure possible
  - Save superficial lamina propria
  - Alter the ratio of stiff/pliable

Phonomicrosurgery

- Specialized
- Goal = improved voice
- Indicated if unable to meet vocal obligations
- Outpatient
- General anesthesia

Vascular Malformations

- Benign phonotraumatic lesion
  - Similar risk factors as other phonotraumatic lesions
- Can increase risk for vocal fold hemorrhage
  - Acute voice loss, possible odynophonia
  - Slow recovery – ~1 week
  - Increased risk for long-term scar with repeated events
- May also lead to edema, dilation with use
  - Increased effort

Vascular Malformation

- Treat with pulsed photoangiolyis
- 532nm Pulsed KTP laser selects oxyhemoglobin
  - Oxygenation absorption curve
  - PDL – 585 nm
Neoplasms – Leukoplakia

- Leukoplakia is the visual analog of dysplasia
  - Hyperkeratosis and parakeratosis
  - Pre-malignant lesions
  - Multi-step theory of carcinogenesis
  - Generally seen in smokers
  - Possible in non-smokers
  - Alcohol is a synergistic risk factor

- Voice varies from no change at all (superior lesion) to moderately hoarse (medial lesion)
  - Progressive dysphonia

Leukoplakia

- Old paradigm: follow them in office because biopsy would lead to scarring and worse voice

- New paradigm: pulsed KTP laser treatment
  - Neoplasms require angiogenesis for growth
  - No blood supply \(\rightarrow\) involution
  - Done first in OR for biopsy purposes
  - Followed with office-based laser as necessary

Laryngeal Cancer

- Estimated 120,000 new cases/year
  - Men > Women
  - Smoking, EtOH risk factors

- >95% squamous cell carcinoma
  - ¾ patients present early because of hoarseness
    - No vocal cord fixation
    - No lymph node involvement
    - No extension outside larynx

- ? Reflux as risk factor?
Laryngeal Cancer

- Larynx cancer – one of the most common sites for head and neck malignancy (~20-30%)
- Presentation:
  - Older patient, with smoking (and drinking) history
  - Hoarse for long time, without intervals of normal voice
  - Dysphagia, odynophagia, otalgia, hemoptysis
  - Lymph node metastases – only in advanced disease

Squamous Cell Carcinoma

- Early cancers (T1, T2) – transoral laser surgery vs. radiotherapy
- Advanced cancers (T3, T4) – transcervical surgery, chemoradiation

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Recurrent Respiratory Papilloma

- Benign growth, caused by human papillomavirus
- Adults and children affected
- Possible risk of malignant degeneration – rare
- Voice quality varies with degree and location of disease
  - Hoarse, breathy, strained, aphonie, etc.
  - Dysphonia generally progressive until RRP treated

Recurrent Respiratory Papilloma

- Diagnosis is visual and pathologic
  - Once diagnosis is made, recurrence diagnosed by history
- Therapy – surgical debridement
  - Cold instrument, CO2 laser, soft-tissue shaver
  - Pulsed KTP laser → preserve pliability
  - Adjuvant therapy: cidofovir, indole-3-carbinol, etc.
  - Multiple surgeries are expected
Recurrent Respiratory Papilloma

Vocal Cord Paralysis

• Symptoms relate to glottic insufficiency
  – Breathy voice
  – Diminished projection
  – Increased effort
  – Higher pitch

• Causes: surgical trauma, neoplasm, CNS injury, idiopathic (viral neuropathy?)

Case 7

Vocal Cord Paralysis

• Work-up
  – If history does not provide a clear etiology, then CT scan from skull base to thoracic inlet
    • If this is negative and paralysis persists, consider repeat imaging in ~6 months
  – Assess swallowing – aspiration risk exists
  – Assess voice

Case 8

Vocal Cord Paralysis

• Observation
• Injection medialization
  – Office vs. OR
  – Temporary vs. permanent
• Laryngoplastic phonosurgery
  – Permanent procedure
  – Medialization laryngoplasty
  – Adduction arytenopexy
  – Cricothyroid subluxation

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Muscle Tension Dysphonia

- Odynophonia is the hallmark symptom
- Tenderness of hyoid musculature is occasional sign
- Generally occurs in someone who “forces speech” in setting of inflammation
- Short-term compensation becomes maladaptive
- Conversion dysphonia – a psychogenic voice disorder, closely related to MTD
- Treatment is voice therapy

Infectious Laryngitis

- Most common cause of hoarseness, and one that I rarely see → true incidence is unknown
- Viral URI (occasionally bacterial)
  - Rhinovirus, Parainfluenza, RSV, Adenovirus, etc.
- Generally self-limited to 7-10 days
- Vocal cord inflammation → decreased vibration, decreased sound quality, and increased effort of phonation (unable to speak softly)

Case 9

- Harsh whisper, sometimes painful
- Laryngoscopy:
  - Erythematous TVC
  - Thick secretions
  - Decreased vibration
- Treatment
  - Hydration, humidification, counseling re: voice use
  - Antibiotics prn for persistent symptoms
  - Anti-reflux precautions
Concluding Case – Case 10

Recurrent Vocal Cord Hemorrhage

- Related to vascular malformations
- Also related to degree of voice use/abuse
- Shear stress of vocal fold vibration
- Symptoms: acute vocal deterioration, odynophonia
- Diagnosis: exam revealing hemorrhage
- Treatment:
  - Acute – voice rest
  - Chronic – KTP laser to address microcirculation