Voice Restoration in Presbyphonia

Strobe Rounds
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Disclaimers & Disclosures

• None
Agenda

Background

• Etiology
• Management Options
Background

- Structural changes of the larynx caused by aging
- US 2010 Census, age 65 and over population was 40.3M (13%)
- Incidence of vocal disorders in aging population: 12-35% 
- Lifetime prevalence of 47% for age $\geq 65$\textsuperscript{1}
  - 25% of pts $>65$y.o. w/ vocal complaint had presbyphonia\textsuperscript{2}

Background

- Quality of life affected
  - 13% noted QOL to be moderately to profoundly reduced related to dysphonia.3
    - Avoiding social events
    - Frustration and need to repeat oneself
    - Change in identity

Background

• Can guess age on basis of speech alone\textsuperscript{4,5}
• Character
  – Weak
  – Thin
  – Breathy
  – Reduced projection
  – Decreased range
  – Unsteadiness
  – Pitch change

4. Ryan et al. (1974)
5. Linville et al. (1985)
Background

- Speaking Fundamental Frequency decreases with maturity then rises
- VF vibrate more rapidly as age advances

6. Fig from Baken, et al. (2005)
Agenda

• Background

Etiology

• Management Options
Molecular Etiology

- Loss of vocal fold viscoelasticity
  - Collagen disorganisation
  - Less Hyaluronic acid and elastic fibers decrease
  - Decreased pliability and vibration

- Muscle atrophy
  - NMJ similar to denervated muscles
  - Reduction in axon terminal area and unoccupied postsynaptic Ach receptors

- Calcification of laryngeal cartilage
  - Limit ROM, altered resonance

Gross Etiology: laryngoscopy/stroboscopy

- Vocal fold atrophy and bowing
- Midline glottic gap and air escape
- Aperiodic / irregular vibration, increased amplitude, asymmetric wave
- Prominence of vocal processes
- Edema
Gross etiology: laryngoscopy

A. Normal laryngeal closure.

B. Glottal insufficiency secondary to presbylaryngis. Note the 3mm glottal gap at the point of vocal-process to vocal process contact.
Etiology

• Also multifactorial, outside larynx
  – Lungs
  – Kyphosis
  – CNS
  – Dental/mandibular
  – Dry mouth
Agenda

• Background
• Etiology

Management Options
Management Options

• Reassurance
• Voice therapy
• Medical optimization
• Surgical management
Management options: voice therapy

- 1\textsuperscript{st} line treatment
- Strengthening exercises for respiratory and phonatory control (Lee Silverman Voice Therapy)
  - Practice producing resonant tone
  - Emphasis on sustained high pitch and loud voice production
  - Vocal postures
  - Vocal function exercises
- Shown to lead to subjective improvement in QOL and perceived voice\textsuperscript{8}
- Less beneficial in severe cases (higher VF atrophy, larger glottic gaps, glottic closure pattern, burden of medical problems)\textsuperscript{9}

\textsuperscript{8} Berg, et al. (2008)
\textsuperscript{9} Mau, et al (2010)
Management options: injection laryngoplasty

• Goal to improve glottic closure
• Temporary effect
• Serve as a trial for a more permanent procedure
• May avoid general anesthesia
• Risk of Superficial injection, over-injection
Injection laryngoplasty

• Can be performed in-office as an awake procedure
  – Allow vocal titration, technically challenging
  – Anticoagulation is relative contraindication to office-based procedures

• Or in the OR, under general anaesthesia
  – More control
  – Does not allow for titration
In office injection laryngoplasty

Needle visible in airway via transnasal endo-scope

Radiesse website
In office injection laryngoplasty

Needle inserted at injection site

Radiesse website
OR injection laryngoplasty
OR injection laryngoplasty
Injection laryngoplasty

- **Materials/Fillers**
  - **Permanent/Long lasting**
    - Autologous fat – 1 to several years
    - Radiesse™ (calcium hydroxyapatite) – 12 months
    - Polydimethylsiloxane (PDMS or particulate silicone) – likely permanent, >10yrs
  - **Temporary**
    - Gelfoam™ (bovine gelatin) – 4-6 weeks
    - Collagen based products (Cymetra™, Zyplast™, Cosmoplast™) – 2-4 months
    - Hyaluronic acid (Restylane™, Hyalaform™) – 4-6, up to 12 months
    - Carboxymethylcellulose (Radiesse voice gel™) – 1-3 months
Bilateral Medialization thyroplasty

- Provides static medialization of the vocal folds
- Permanent but reversible
- OR – local anesthetic & conscious sedation
- Implant placed in paraglottic space while patient phonates
Bilateral Medialization thyroplasty
Medialization thyroplasty: risks

• Risk of implant extrusion, FB reaction
• Risk of airway obstruction
• Risk of hematoma
The Latest in Plastic Surgery: the 'Voice-Lift'

Voice lifts: something to shout about

Not so long ago surgery was the only way to repair a weak, quavery voice caused by age or illness. Now interest is growing in far less invasive 'voice lift' treatments.