The Adolescent Male Voice in the Choral Classroom

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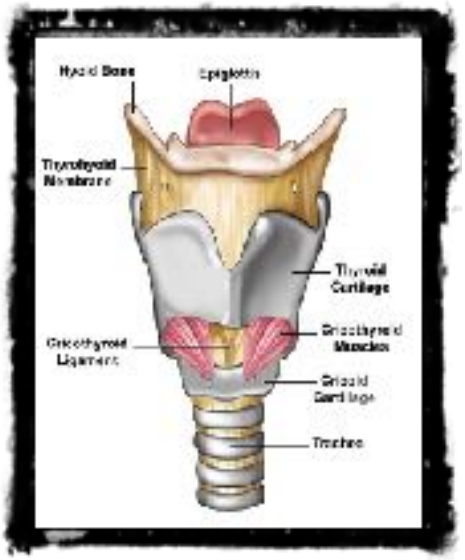
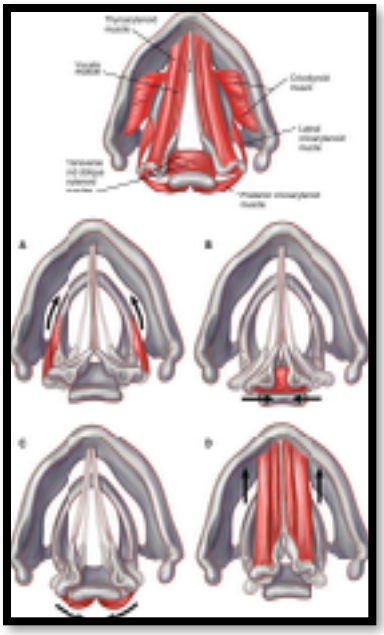
Three Physiological Regions of Foci in voice production and how they grow during Adolescence



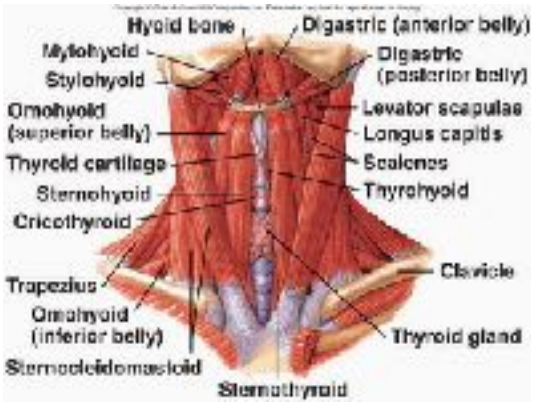
- The Respiratory System (Region One):
  - Region Location: Lower Abdominals – Subglottis
  - Lungs grow and breath capacity increases
  - Abdominal muscles strengthen and develop
- The Vocal Folds/Vocal Cords (Region Two):
  - Region Location: The Glottis
  - Larynx grows in 360 degrees
  - Vocal folds thicken considerably in boys
  - Vocal folds lengthen significantly more in boys
- The Vocal Tract (Region Three):
  - Region Location: Base of the epiglottis – the Lips
  - All elements of vocal tract grow at different rates
  - Larynx ------->Posture muscles of neck/shoulders
  - Pharynx (Throat)----------> Soft palate & throat
  - Mouth ----------> tongue

Structures of the Larynx (Region 2)

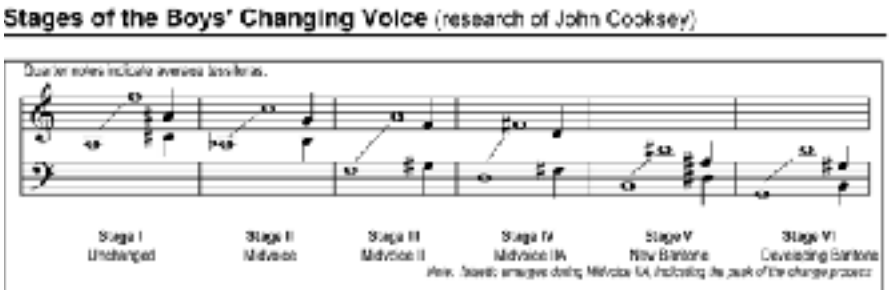


- Hyoid bone acts as suspension system
  - Tongue connects to hyoid bone
  - Hyoid bone hinges upward when swallowing
- Thyroid cartilage - largest structure which houses vocal folds (shield like)
- Cricoid cartilage - below thyroid and acts as an anchor with hyoid bone
- Cricothyroid pulls and tips thyroid in order to lengthen vocal folds and raise pitch
- Boys' larynx grows more anterior to posterior than girl's to account for more length and thickness of vocal folds (Adam's Apple)
- Arytenoid cartilages - pyramid structures at the back of larynx that rotate to bring vocal folds together
- A - Lateral cricoarytenoids bring folds together (with interarytenoids)
- B - Interarytenoids - bring two arytenoids together to close rear portion of the glottis (weakness is cause of mutational chink in girls)
- C - Posterior cricoarytenoid opens vocal folds
- D - Thyroarytenoid (scientific name for part of the vocal folds) muscle also lowers pitch by thickening vocal folds (less involved than cricothyroids)

- Unchanged voices avg of 2mm of vibrational length. Adult females avg 10mm and male avg 16mm vibrational length
- Raising/jutting chin pulls vocal tract and raises larynx
- Pulling head back depresses larynx
- Tongue tension can raise larynx
- Pulling tongue back can depress larynx and create false, dark tone
- Turning head in order to see conductor can tense



muscles and pull vocal tract
- Sing [a] while rotating head and neck, then raise, lower, and jut chin



- Tongue rolls & lip buzzes

http://www.nydailynews.com/life-style/health/texting-puts-pounds-pressure-spine-study-article-1.2013885 (August 2016)
- Boys Voices progress through above stages
- Some pass quickly through a stage, some linger
- Can take one to two years to complete (avg 14 months)
- Speaking fundamental frequency lies approx m3 above lowest singing range
- Lower range tends to be more stable while upper range fluctuates dramatically

Ear growth and brain development create aural issues
- Volume of middle ear continues to grow through teenage years
- Ear canal growth is slow and steady until the onset of puberty
- Ear becomes more finely tuned after age 12 and gains avg of 2-7kHz of functional resonance

- Brain development impacts interpretation of perceived sounds
- Students match pitch with acoustic instruments better than digital
- Students may aurally perceive an octave different than the one they can phonate
- Reinforcing different frequencies can help aural perception and pitch accuracy

What happens during a voice crack?
- Abrupt register transition
- Musculature can't maintain tension and force release
- Muscles reengage after register transition
- Similar to manual transmission
- Can actually be beneficial in learning where a voice's passaggio points are located

The Transgender Voice
- Anatomy/physiology during puberty is key
- Influx of testosterone causes vocal folds to lengthen and thicken considerably
- Addition of testosterone and other hormones post-puberty will lead to a thickening of the vocal folds, but not necessarily a significant lengthening
- Vocal tract will not grow, so resonance not same as adult male
- Male to female transgender can't significantly change range after puberty without surgery (risky) or therapy (primarily for speech)
  - Training the Transgender Singer: Finding the Voice Inside By Shelagh Davies posted to NATS.org on 1:45 PM, April 14, 2016 http://www.nats.org/cgi/page.cgi/_article.html/What_s_New/Training_the_Transgender_Singer_Finding_the_Voice_Inside
  - Shelagh Davies, Viktória G. Papp & Christella Antoni (2015) Voice and Communication Change for Gender Nonconforming Individuals: Giving Voice to the Person Inside, International Journal of Transgenderism, 16:3, 117-159, DOI: 10.1080/15532739.2015.1075931 http://dx.doi.org/10.1080/15532739.2015.1075931

Exercises & Techniques
- Guitar peg
- Find Speaking Fundamental Frequency (SFF)
- Play fundamental frequency in left hand
- Double melody/pitches to be matched an octave (or two) higher
- Chart vocal progress weekly or bi-weekly
- Keep them singing, but make music fit their voice not vice versa

Open Source larynx images found at: http://www.intechopen.com/books/innovative-rheumatology/laryngeal-manifestations-of-rheumatoid-arthritis (accessed 2017)