

ANATOMY OF THE VOICE

“The physical working and structure of the vocal tract”

I. WHY DO THE VOCAL FOLDS VIBRATE?

It is the source of the vocal sounds, tiny puffs of air through a valve, similar to closed lips. The vocal chords do vibrate in different speeds and patterns.

II. HOW DO THE VOCAL CHORDS VIBRATE?

- A) Contraction of muscles
- B) Elasticity of the tissues
- C) Air Pressure (Bernouille effect)

III. THE WINDPIPE (Picture # 1)

- A) Cartilages
- B) Muscles

IV. THE CAST OF CHARACTERS

THE CARTILAGES (Picture #2)

The cartilages are the *framework* the *support* of the larynx.

A) CRICOID

1. The foundation, formed like a signet ring
2. Back part larger than the front
3. Suspended to/from the hyoid bone with interconnecting ligaments and membranes

B) THYROID

1. The largest cartilage, shape of a shield, placed above the cricoid
2. The protruding notch in the front “Adam’s apple”
3. Open in the backside. Four extensions “the superior horns”
 - The two top horns are attached to the hyoid bone with ligaments.
 - The lower ones are attached with synovial joints to the cricoid.
4. The amazing synovial joints make these cartilages move both backwards and forwards.

C) ARYTHENOID

1. Placed in the back of the cricoid.
2. The shape has three pointed tips
 - Muscular process in the back
 - Apex top
 - Vocal process in the front
3. Attached with synovial joints
4. Can pivot!!

D) EPIGLOTTIS

1. A cartilage that moves downward over the air tube when swallowing.
2. This cartilage prevent us from getting food into the air passage.
3. This cartilage has nothing to do with the vocal process.

V. THE INTRINSIC MUSCLES (Picture #1)

A) CRICO-THYROID

1. Between the cricoid and the thyroid cartilages.
2. Makes the thyroid cartilage move so that the vocal folds can stretch out (like a rubber band)

B) CRICO-ARYHENOID

1. Govern the glottis
2. Between the cricoid and arythenoid
3. Lateral and posterial
 - The lateral crico-arythenoids are ceiling the glottis but leaves an open space.
 - These muscles makes the arythenoid cartilage pivot.
 - The posterior crico-arythenoids are used for opening the glottis for heavy work(grunting)

C) INTER ARYTHENOID

1. Between the two arythenoids
2. Opens and closes the vocal folds partially. Leaves them open in the back.

***The inter-crico-arythenoid+lateral crico-arythenoid
must cooperate for clean vocal vibration!!!!***

D) THYRO-ARYTHENOID

1. INTERNAL – THE VOCAL FOLDS!!!!
2. External – between the vocalis muscle and the thyroid cartilage.

E) THE FALSE VOCAL FOLDS

Placed above the vocal folds, nothing to do with the vocal process.

VI. THE VOCALIS MUSCLE!! VOILA!! (Picture #3 & 4)

A) Vocalis muscle = the internal thyroid-arythenoid muscle.

B) Ligaments – conus elasticus

C) Covering – two layers

- Reinke's space
- Stratified squamous epithelium

VII. FIVE VOCAL FOLD CONTROLS

A) ADDUCTION

The closing of the vocal folds

- too little = a limp, breathy tone
- too much = tight, harsh squeezed

B) THICKNESS

Adjust the pitch and the vocal sound.

- thick = robust quality, low notes
- thin = flute like quality, high notes

C) LENGTH

Adjust the pitch and the vocal sound.

- high pure = longer
- slower, lower = shorter

D) TENSION

Appropriate tension creates a feeling of softness and easiness in the throat.

E) BREATH

A coordination of the muscular process through the Bernouilli effect.

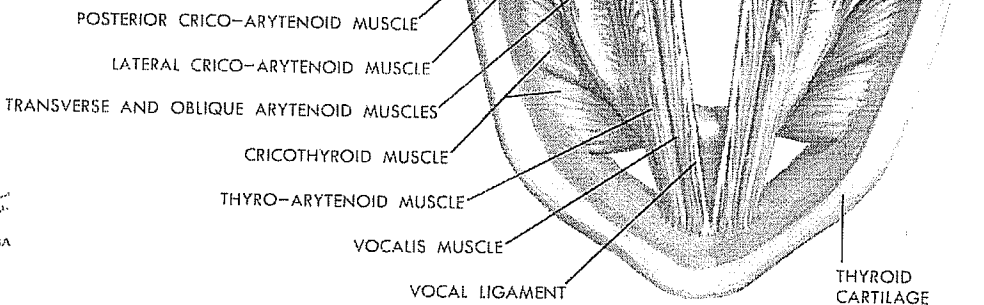
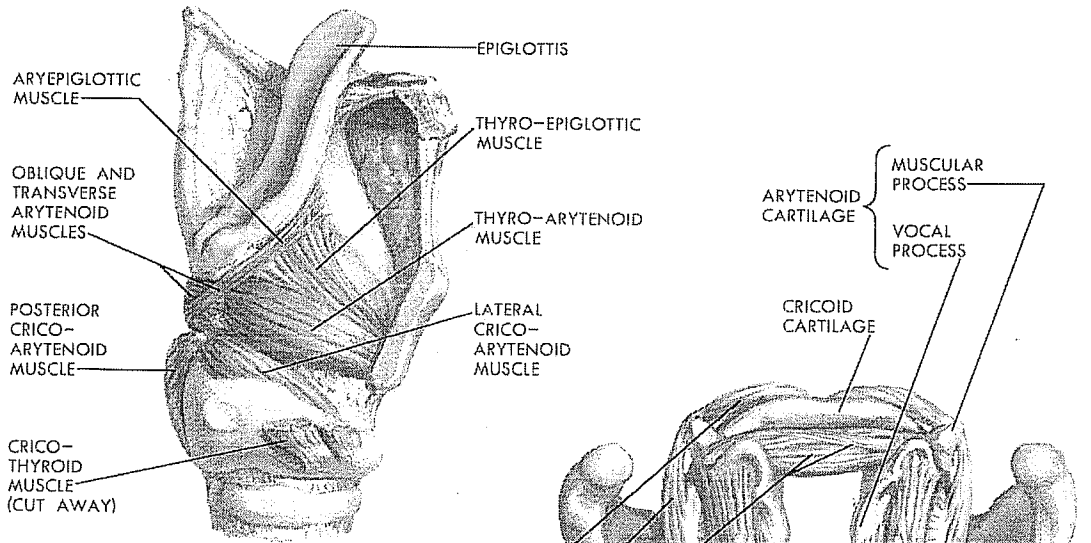
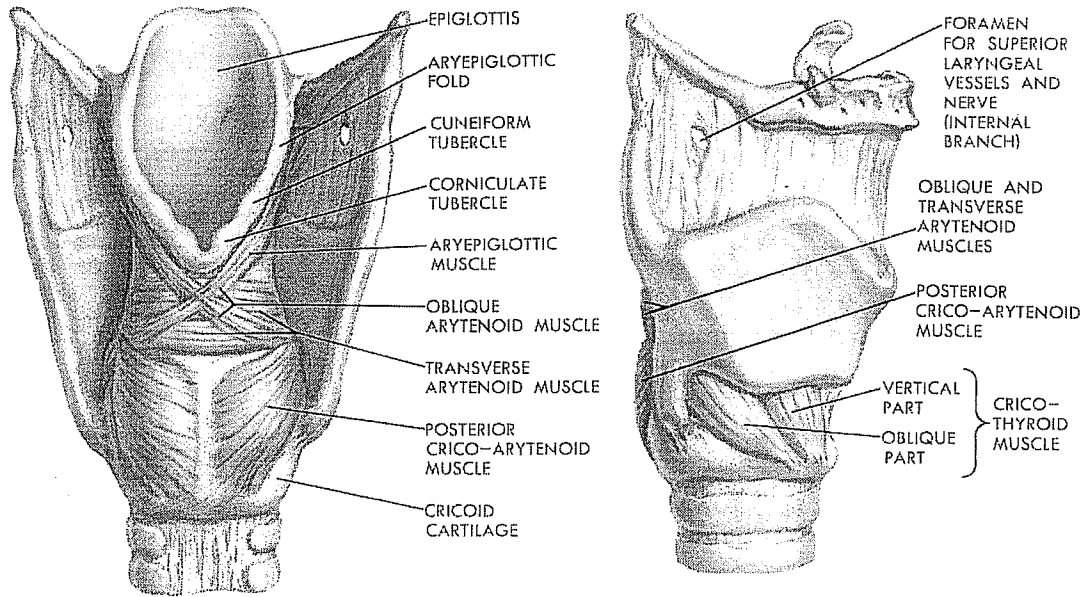
- more pressure causes tight, loud tone
- insufficient pressure causes a weak tone

The tension comes from the vocal folds trying to maintain control in a soft tone.

OBS !!!!! BIG NEWS !!!!!
APPROPRIATE TENSION IS NECESSARY!!!!!!

Questions and answers?

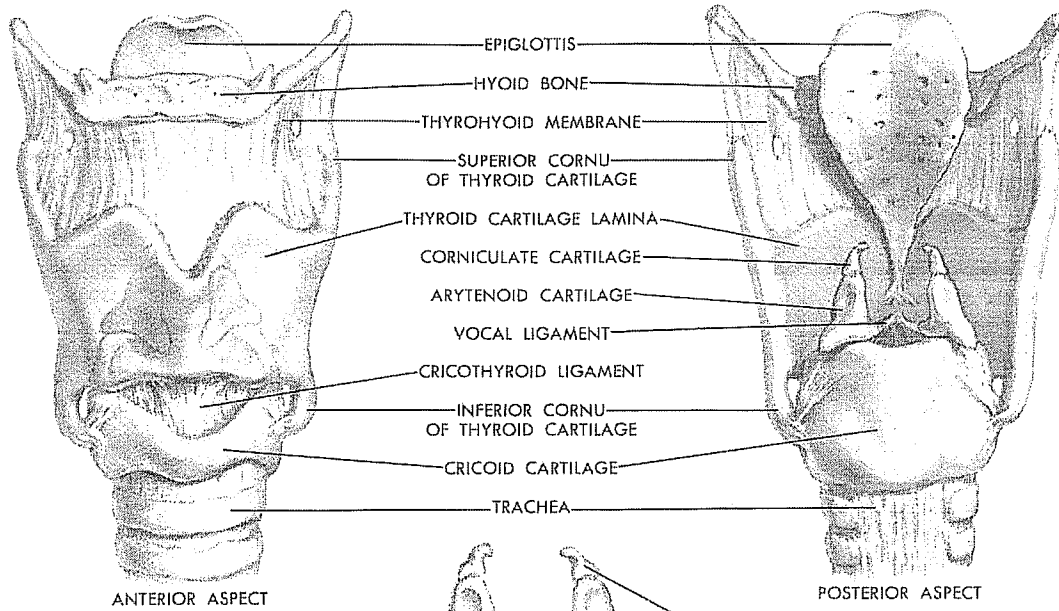
1. What is the break? (Picture #4)
The break is the coordination process between the intrinsic muscles.
2. Why is it easier for some to manage the break?
Like any other muscular/coordination process do we have different flexibility and elasticity in the muscles.
3. Why is it so hard to sing softs with full support?
The natural way producing a soft tone is with less air pressure. When singing supported softs, we ask the body to sing with more air pressure than comes natural. We need to manufacture that process.
4. What are nodules? (Picture #5)
Speaking and singing with too much pressure on the vocalis muscle causes nodules. Nodules are small (similar to a rice grain) grains of lactic-acid on the vocal folds. The harshness in the voice is caused by the insufficiency in closing the chords.
5. How do I get rid of them?
With proper voice therapy and a continuous proper use of the voice.
6. Why am I often tired almost hoarse in the voice after a rehearsal?
Like any other muscle the vocalis muscles can be fatigued. If you recover in a couple of days it's ok. Otherwise you have to check if you use your voice in an improper way. You should never be hoarse more than three weeks without contacting a physician.
7. My voice sounds tight or pressed, what to do?
 - a) Check your posture and breathing technique for signs of tension.
 - b) Keep the "yawn feeling" consistently.
 - c) Check your jaw, keep it relaxed.
 - d) Exercise with vowel sounds that are round and open, like ah, oh, uh.
 - e) Imitate in an exaggerated way a leaky voice (pendel effect).
8. My voice is leaky, what to do?
 - a) Check your posture and breathing technique. Good solid support is #1 priority!
 - b) Use a lot more energy while singing without unnecessary tension.
 - c) Hum softly with energy.
 - d) Exercise with front vowel sounds like eeh, eh.
 - e) Project your sound to a specific spot in front of you (i.e. third row).
 - f) Let your emotions rule, get into the song with unlimited feeling.
 - g) Imitate a tight voice (Pendel effect)



W. H. Miller
© CHA

PLATE II

INTRINSIC MUSCLES OF THE LARYNX



CRICOID, ARYTENOID, AND CORNICULATE CARTILAGES, VIEWED FROM IN FRONT

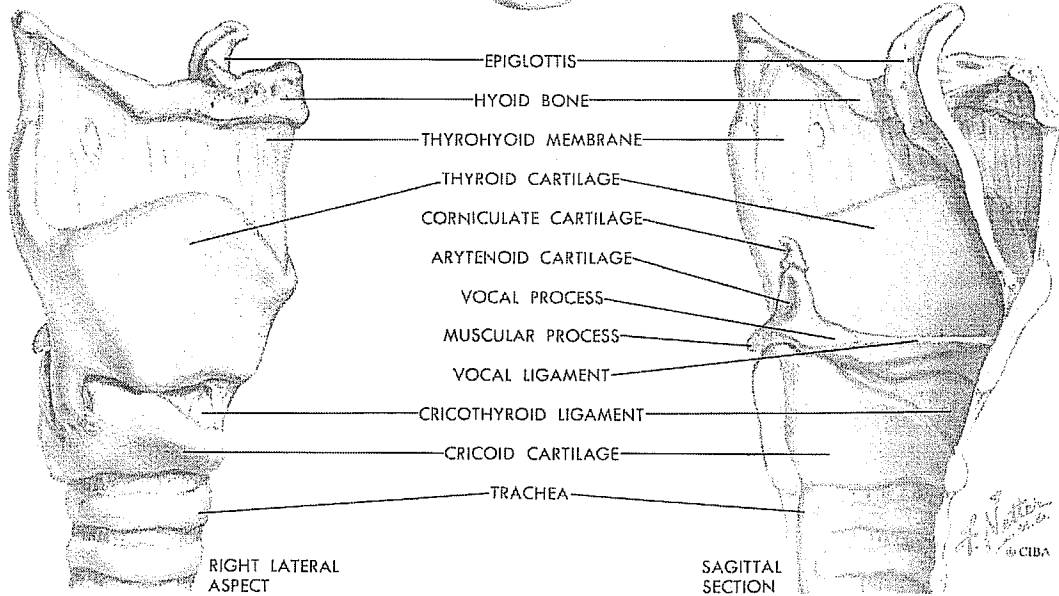
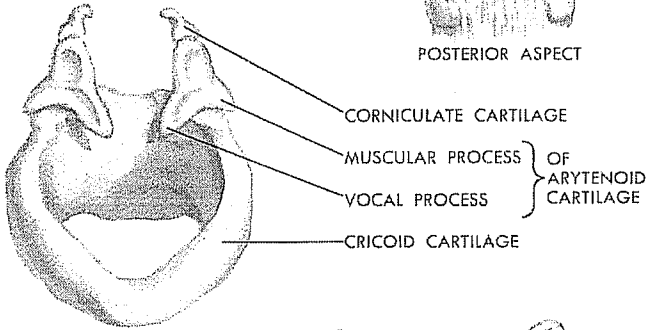
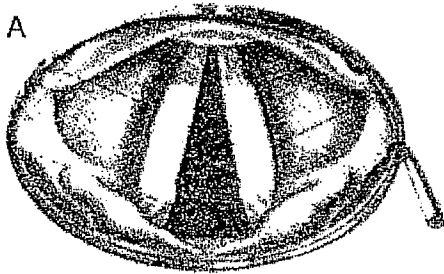


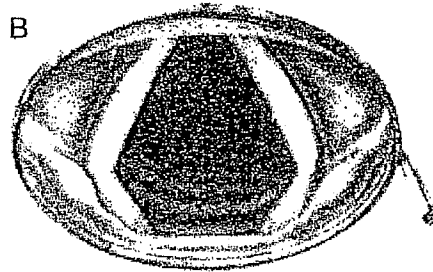
PLATE 1

CARTILAGES OF THE LARYNX

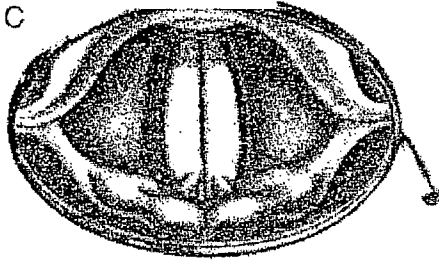
POSITION AT BREATHING



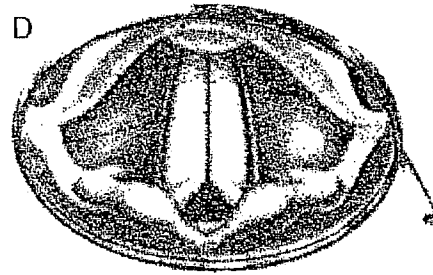
POSITION AT DEEP BREATHING

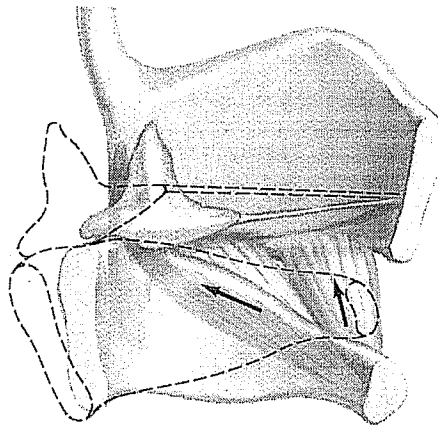


POSITION AT PHONATION WITHOUT LEAK

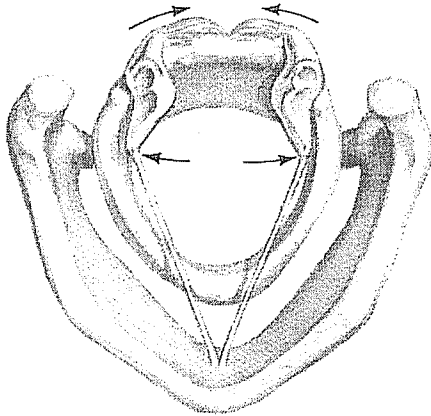


POSITION AT PHONATION WITH LEAK

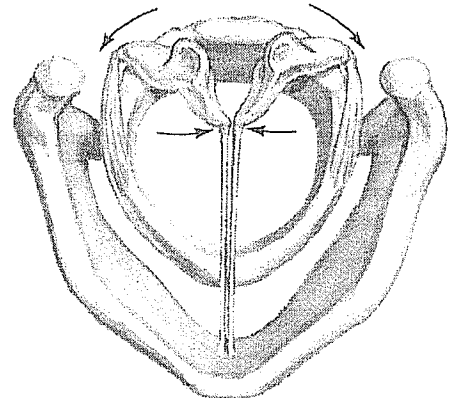




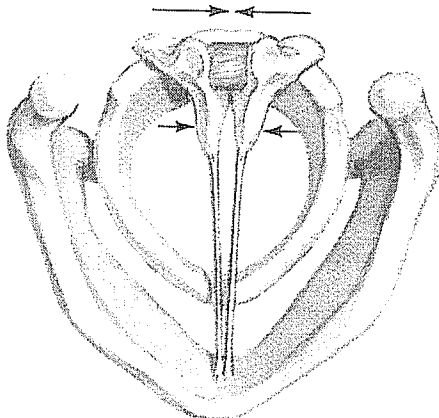
ACTION OF CRICOTHYROID MUSCLE



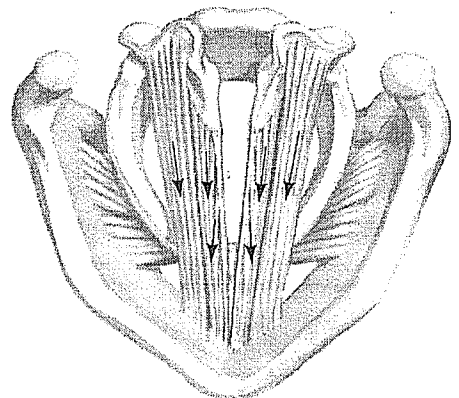
ACTION OF POSTERIOR CRICO-ARYTENOID MUSCLES



ACTION OF LATERAL CRICO-ARYTENOID MUSCLES



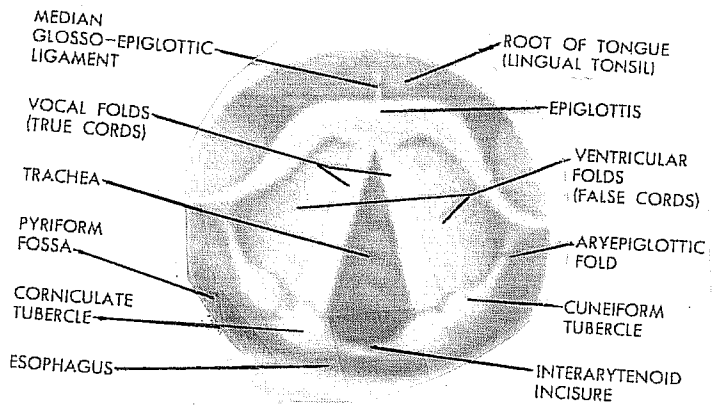
ACTION OF ARYTERNOIDEUS MUSCLE



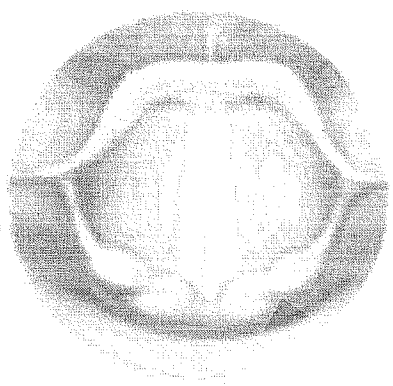
ACTION OF VOCALIS AND THYRO-ARYTENOID MUSCLES

PLATE III

ACTION OF THE INTRINSIC MUSCLES

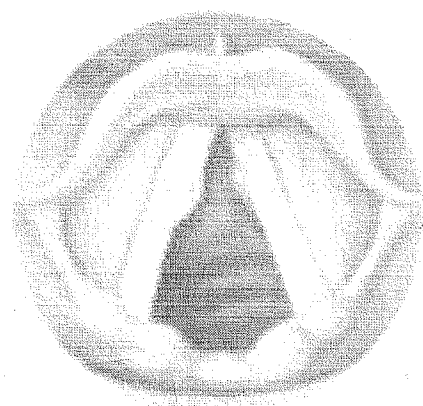


NORMAL LARYNX: INSPIRATION

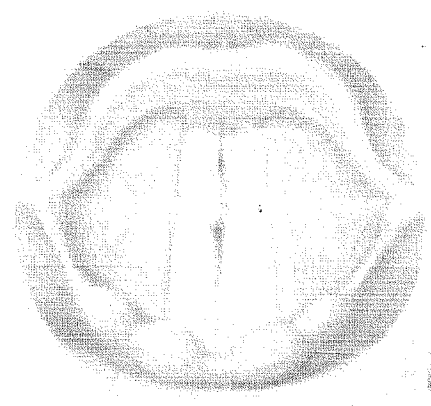


NORMAL LARYNX: PHONATION

EXAMINATION OF THE LARYNX



VOCAL NODULES (INSPIRATION)



VOCAL NODULES (PHONATION)