

Laryngeal Videostroboscopy

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History of Stroboscopy

- To examine larynx since the late 19th century.
- Now as a routine clinical test: the most practical technique to examine:
 - VF vibration patterns,
 - differential diagnosis (functional & subtle structural)

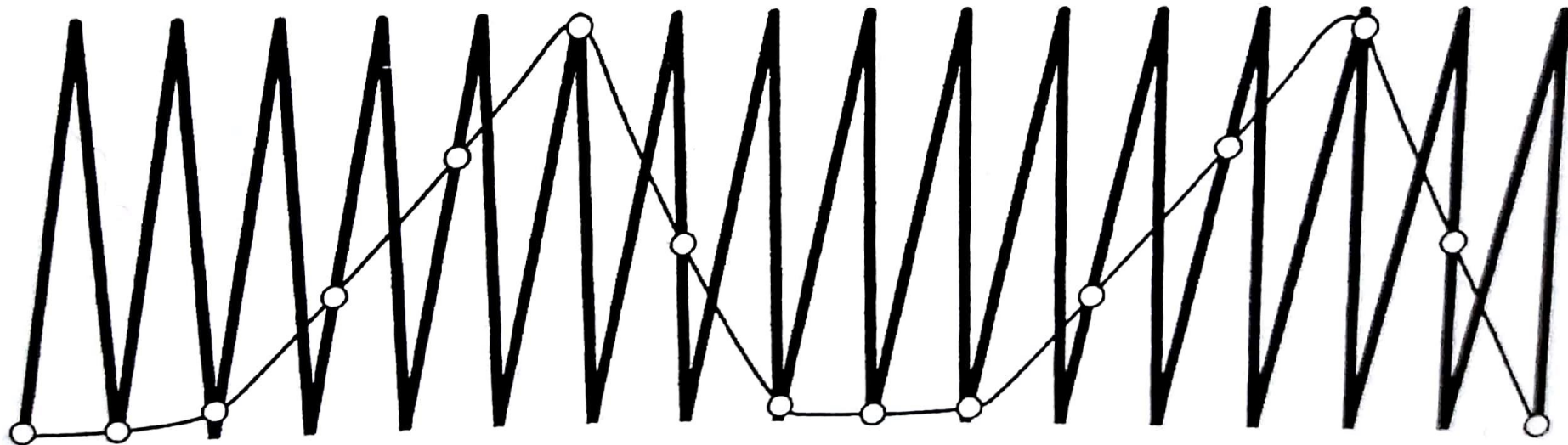
The Mechanism of stroboscopic light

- Talbot's law:

- states that: an image persists on the retina for 0.2 sec.
- A rapidly rotating or vibrating object can not be seen if the speed of movements exceeds 5 per sec.
- VF are very rapidly vibrating (100-300 Hz)→ the eyes fuses the image of successive cycles→ standstill and blurred image

- Flashes triggered after onset vibratory cycle by a fixed time interval → the adjacent phases illuminated successively.
- At a frequency slightly less or greater
- If the flashes are exactly equal to vibratory cycles → VF will appear motionless.

Fusing different cycles



Two types of endoscope:

Flexible Endoscope

- **Advantages:**
 - Speech
 - Singing
 - visualization of subglottic and VP structures
 - all age groups
 - Hyperactive gag reflexes
 - those in whom anatomical relationships are minimally distorted
 - Biofeedback
- **Limitations:**
 - smaller lens diameter: Lower image quality
 - Wide angle lens distortion effect
 - Needs more skills of examiner

Rigid Endoscope

- Straight tube (encased light+image carrying) + prism (at end)
- Angles: 70° , 90°
- **Advantages:**
 - The Clearest image
 - Easy to learn
- **Limitations:**
 - not applicable for: Aphonic, constant Aperiodicity
 - gagging, bruising, chipping of the teeth



How to do Videostroboscopy examination?

- Placing microphone
- Switch on strobe light
- Sustain phonation of the vowel /ee/
- Position
- Protrude tongue and held by examiner
- Insertion the endoscope
- obtain various phonations

Interpreting of the Stroboscopic image

- Horizontal Excursion of TVC (Amplitude): 0-3 grades
- Horizontal Excursion of Mucosal Wave: (vertical and horizontal (travels at least 1/3 width of visible part), 0-3 grades
- Symmetry of TVC vibration
- Aperiodicity
- Vocal Fold Edge → 0(smooth) to 4(extremely rough)
- Phase Closure → proportion of open time
1(wide open phase) to 5 (hyperadduction)
- normal: 3 (40% to 60% of total)
- Vibratory Behavior → whether entire TVC vibrate
- 1 (fully present) to 5 (complete absence always: immobile)

(Contin.) Interpreting of the Stroboscopic image

- **Glottal Closure Configuration**

- Complete
- Ant. Chink
- Irregular
- Bowed
- Pos. Chink
- Hourglass
- Incomplete

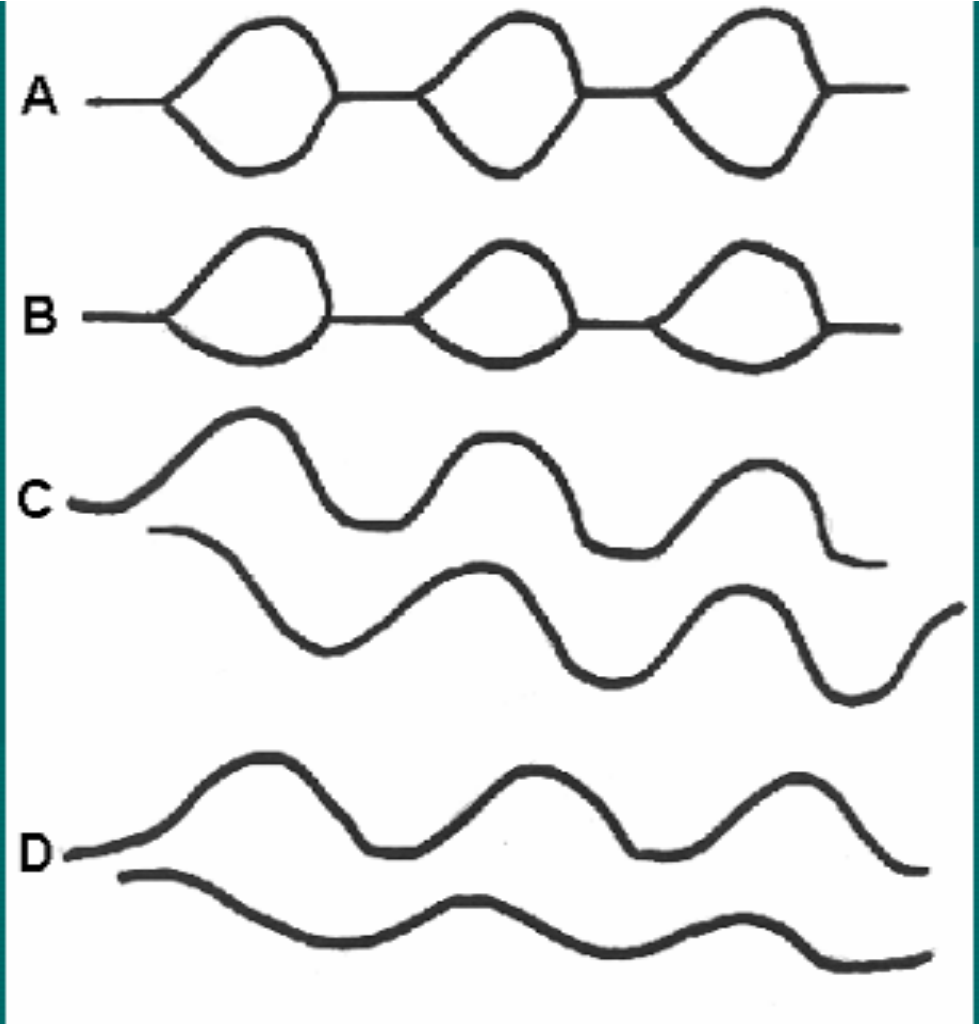
Symmetry of TVC vibration

Graph A displays **the normal amplitude and timing patterns** of both VFs. The upper graph represents the RVF movement during the opening, closing and closed phase of the glottal cycle. The lower graph represents the LVF movement during the opening, closing and closed phases of the same glottic cycle.

Graph B displays **asymmetry in amplitude** where the range of the LVF excursion is less than that of the RVF.

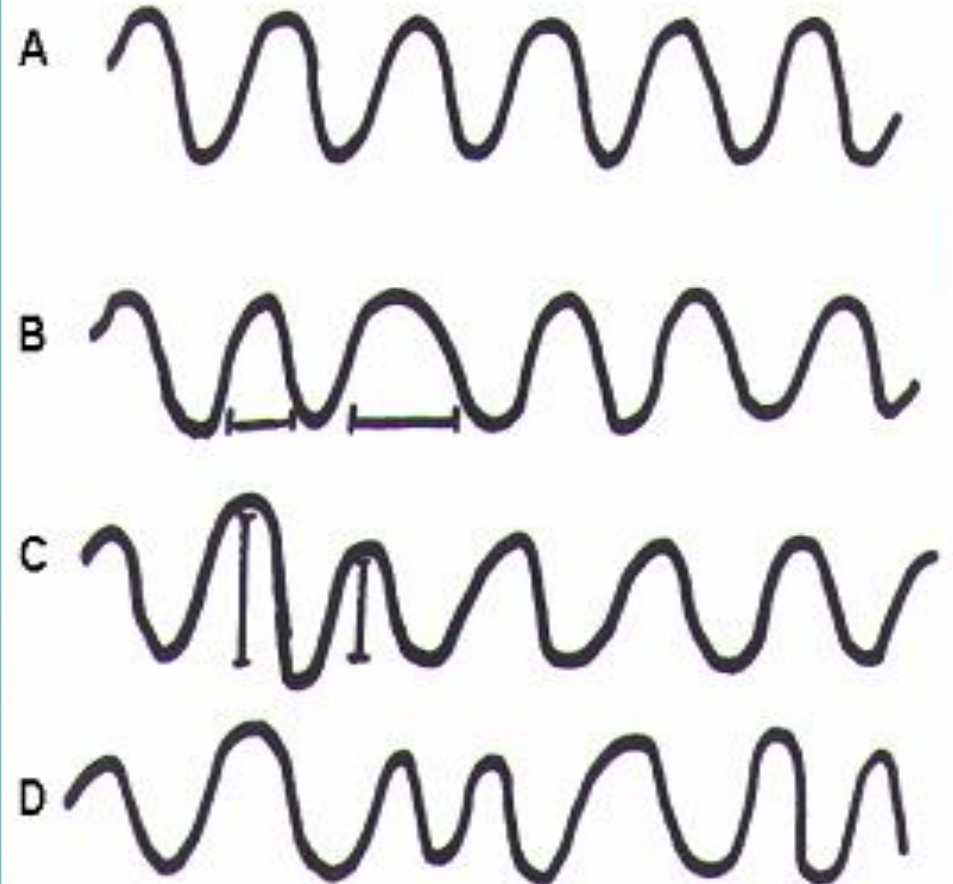
Graph C displays **asymmetry in phase** where the RVF is closing while the LVF is opening.

Graph D displays **asymmetry both in phase and amplitude**.

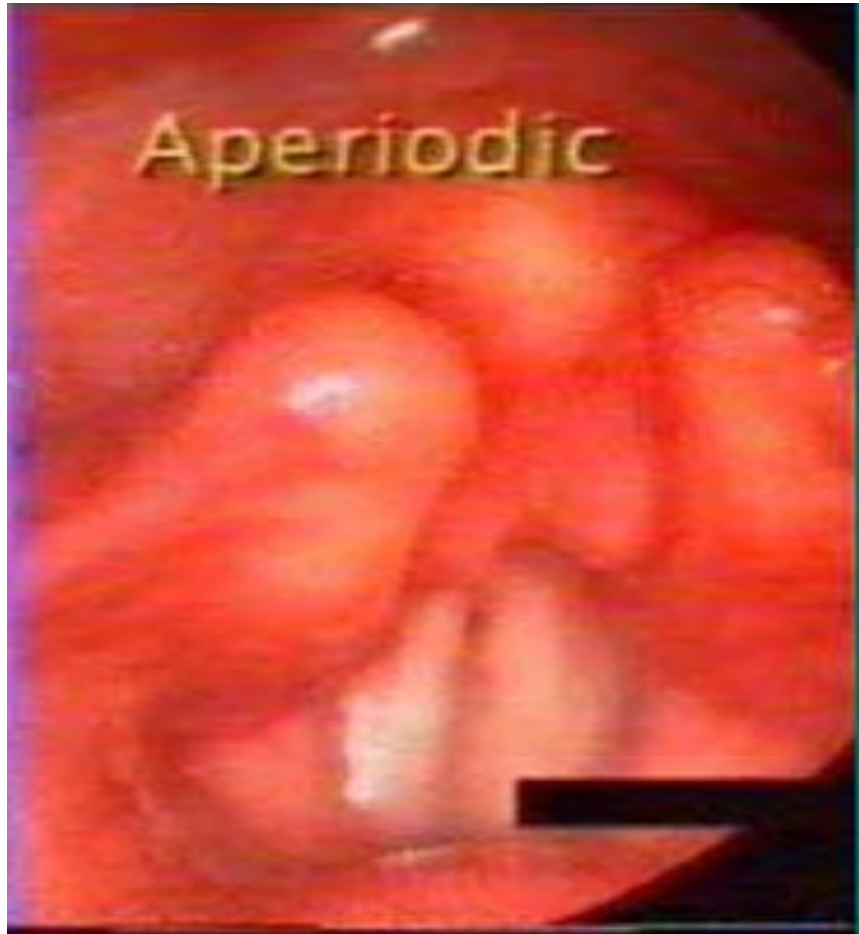


Aperiodicity

- **Graph A** displays the glottal waveform of **normal periodic vibrations** where successive glottal cycles are uniform in amplitude and timing.
- **Graph B** displays **aperiodicity in timing** between successive glottal cycles.
- **Graph C** displays **aperiodicity in amplitude** between successive glottal cycles.
- **Graph D** displays **total aperiodicity** in timing and Amplitude.

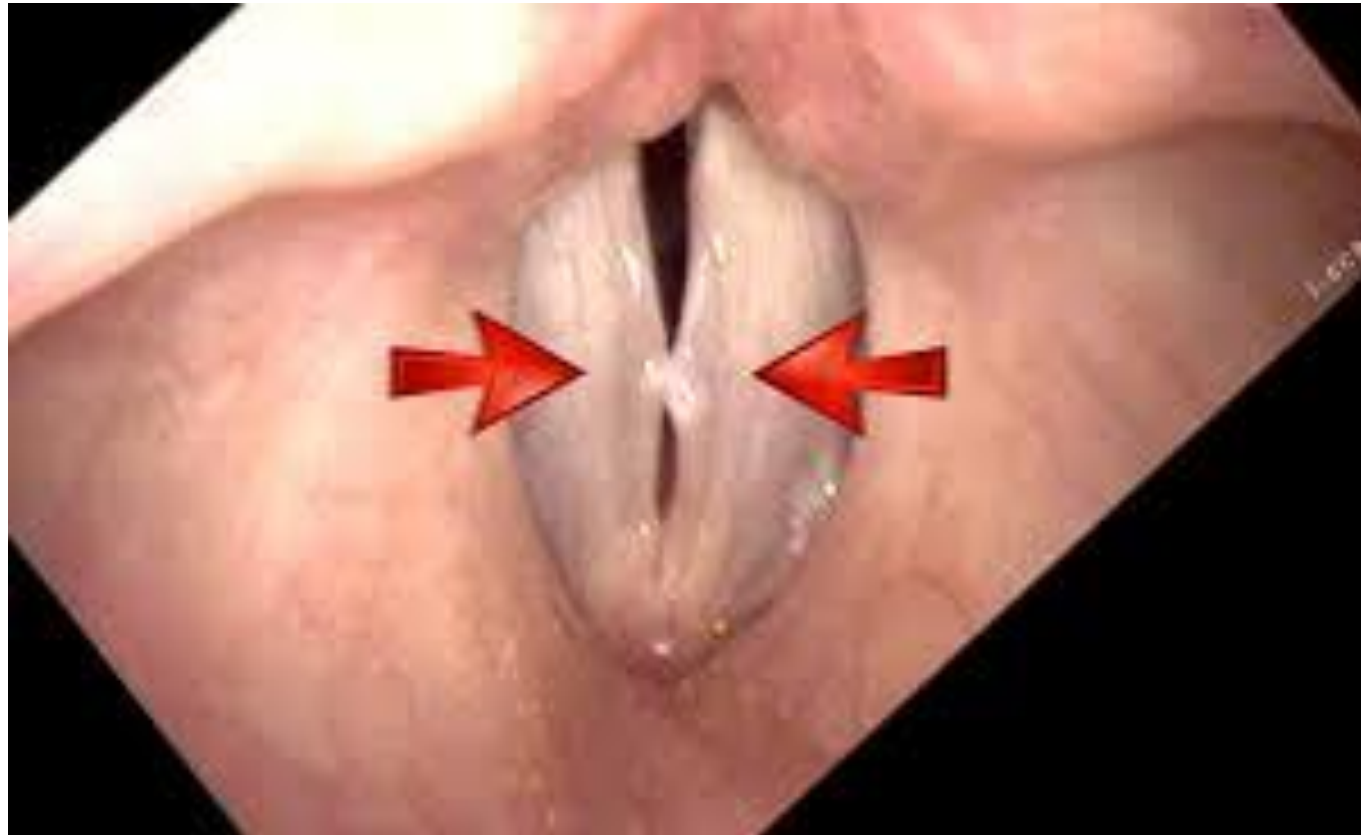


(Cotin.) Aperiodicity

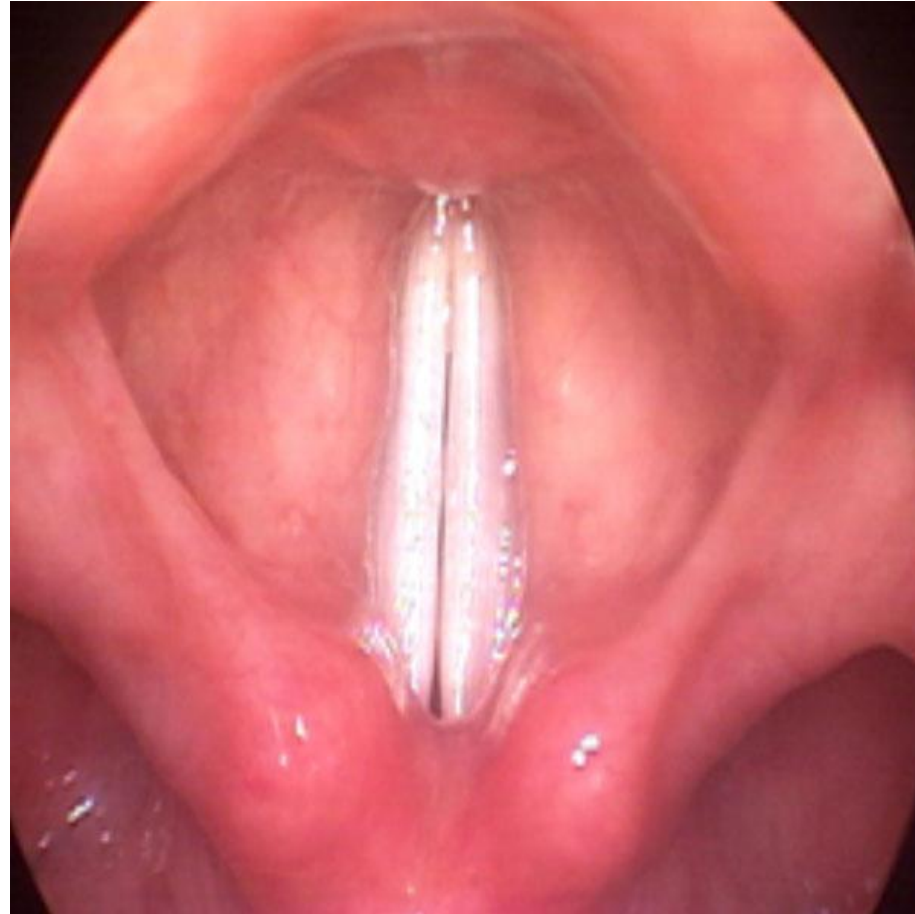


In cases with irregular successive glottal cycles (Aperiodicity) the flashes will not coincide with the same phase of the glottal cycle. This will result in a hazy shivering laryngeal image.

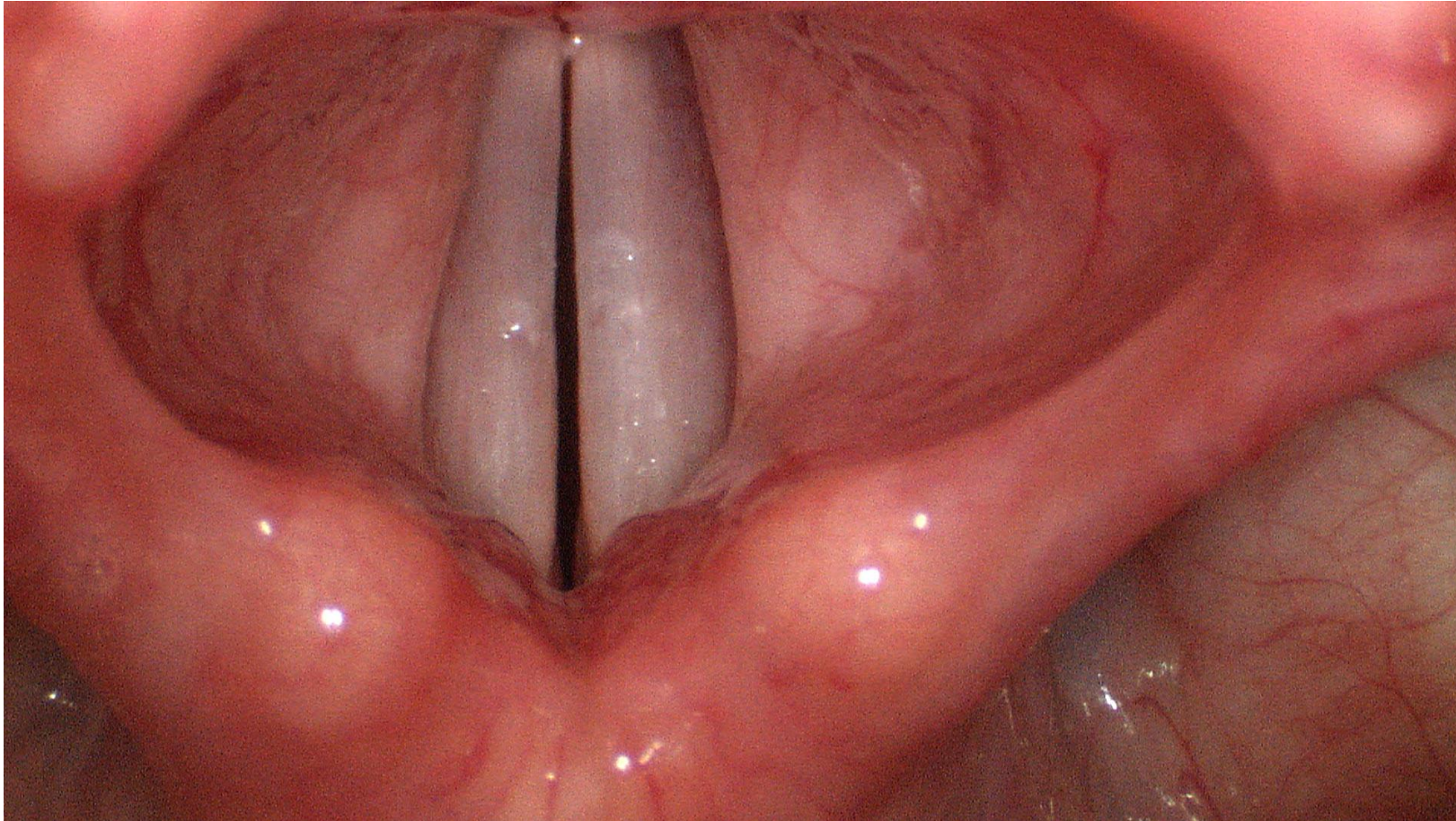
Hourglass



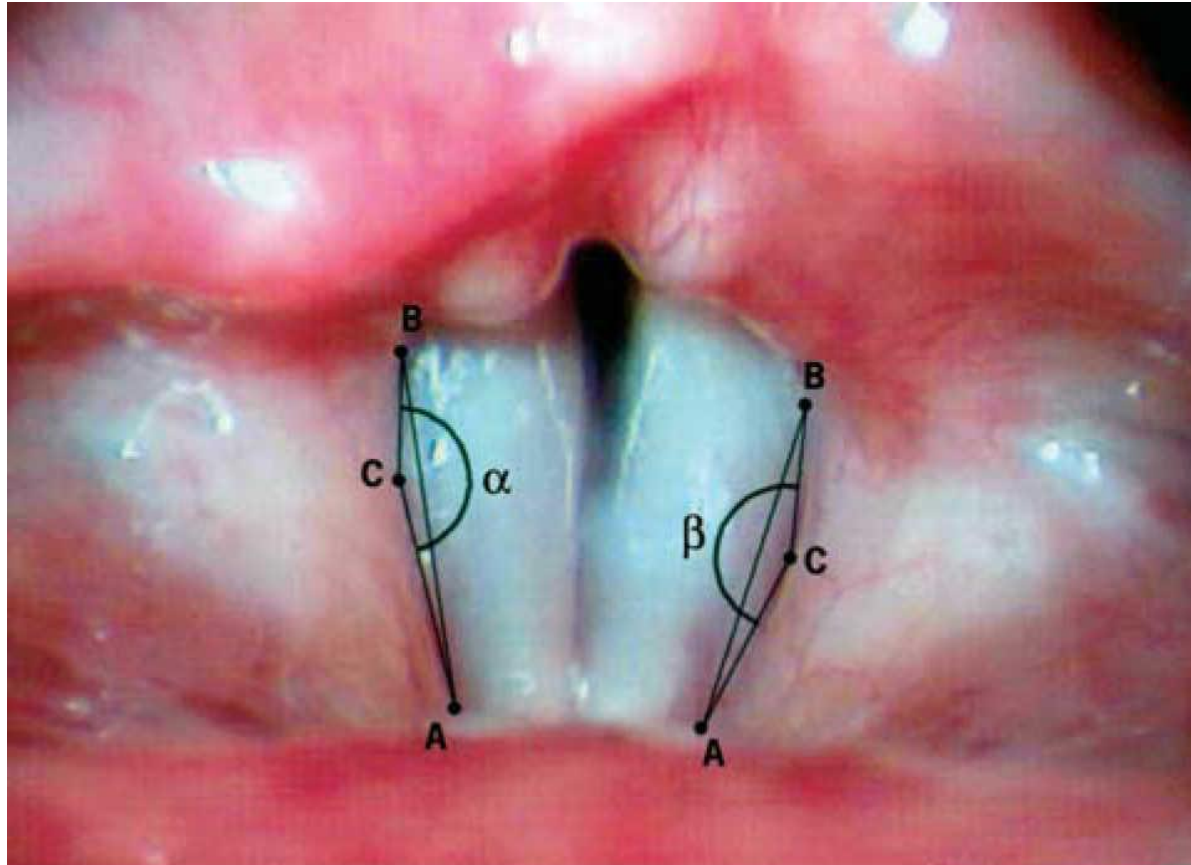
Complete



Incomplete



Posterior Chink



Measuring mass on TVC by stroboscopy

