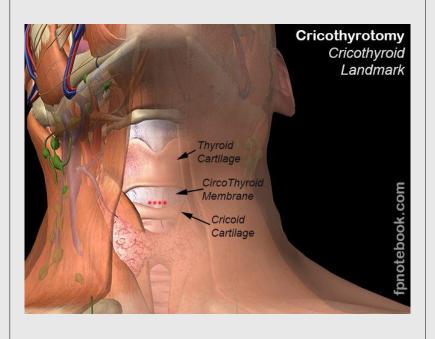


Background



- High acuity low occurrence (HALO)
- Final step in cannot intubate cannot oxygenate (CICO) and/or cannot intubate cannot ventilate (CICV) situaiton

Mechanisms to establish an airway:

1. Needle Cricothyroidotomy:

- Temporary method using a large-gauge angio catheter attached to a BVM or Jet Ventilator
- Preferred cricothyrotomy method for children < 9yo

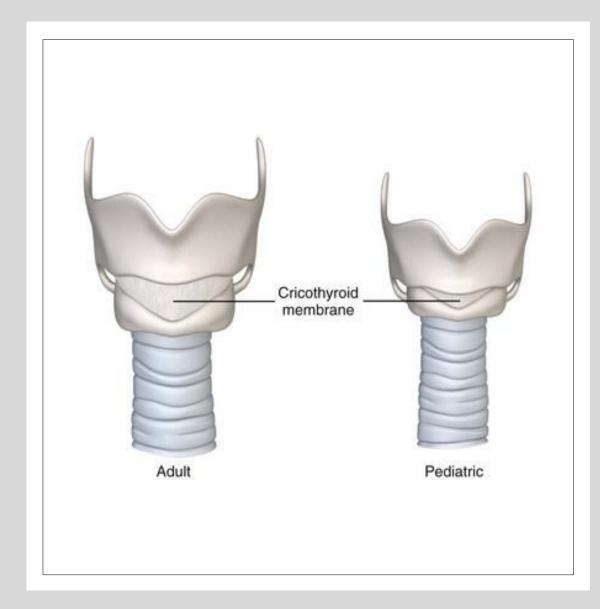
2. Percutaneous Cricothyrotomy:

Scapel/wire/dilator and airway

3. Bougie Assisted Cricothyrotomy

Scape/Bougie/ETT

4. Tracheostomy



Contraindications

Absolute contraindications

- ∘ Age < 8 years
 - due to the narrowest portion of a pediatric airway being the cricoid ring. As a child's tracheal diameter is smaller than adults, the development of a supraglottic stenosis will significantly impair air flow

Relative contraindications

- Inability to identify landmarks due to significant injury to the larynx, thyroid cartilage, or cricoid cartilage
- Partial or complete transection of the distal trachea
- Age 8 to 12 (varying age cutoffs without definitive expert consensus)
- Fracture or transection of larynx
- Bleeding disorders, This is

Complications

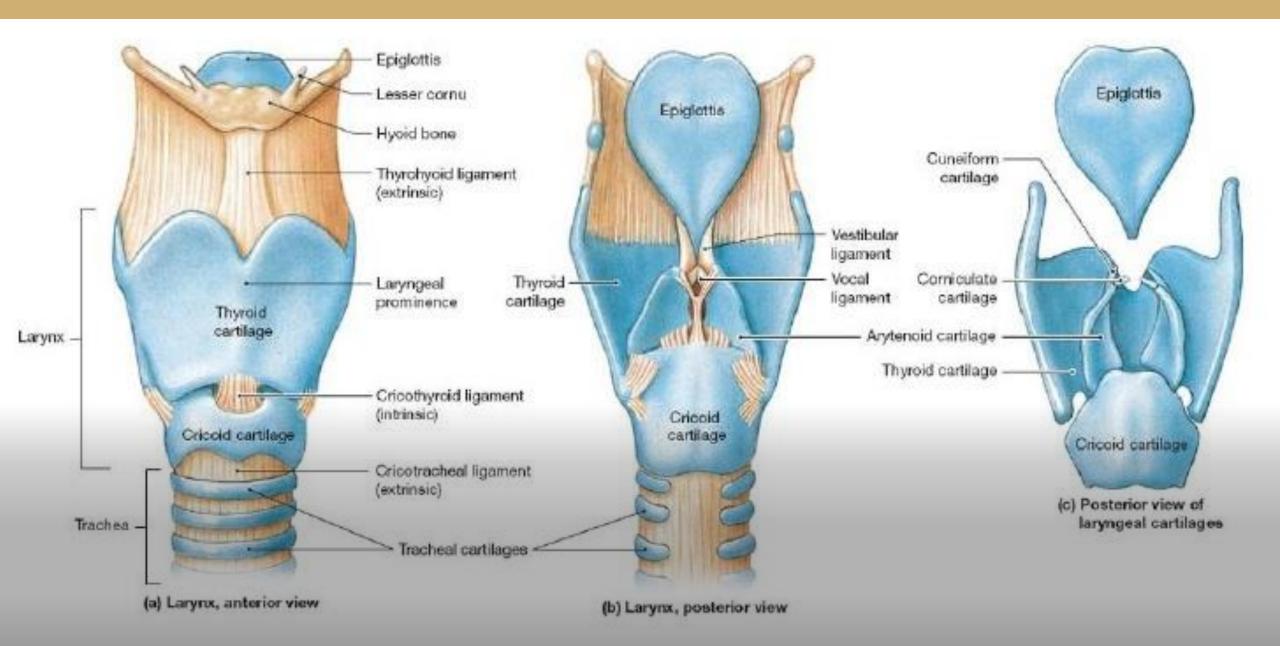
Early:

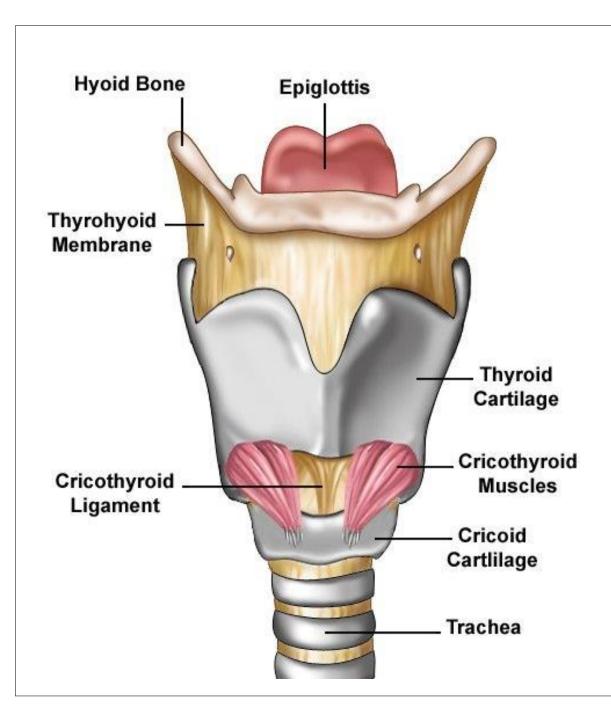
- recognized immediately or within hours after cricothyrotomy, include the following:
 - Bleeding, sometimes uncontrollable
 - Insertion of tube into neck tissues rather than trachea, typically immediately recognized by absence of breath sounds on lung auscultation and remediated by reinsertion of tube into trachea
 - Injury to or perforation of the posterior aspect of the trachea
 - Larynx, vocal cord, or thyroid injury

Late complications:

- recognized weeks or months after cricothyrotomy, include the following:
 - Progressive airway obstruction due to subglottic stenosis and stomal granulation tissue
 - Voice changes, which are chronic but may resolve with time
 - Wound infection

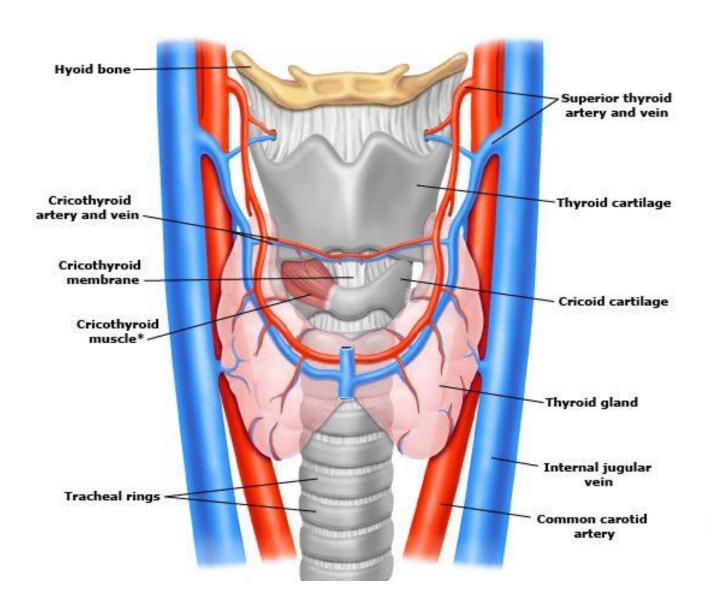
ANATOMY REVIEW



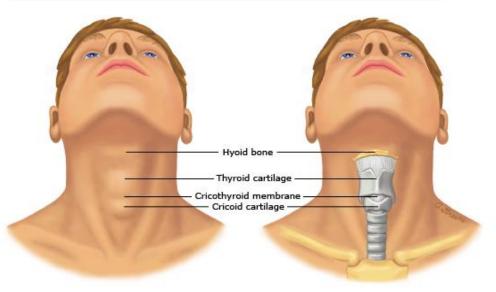


Anterior Ligaments (Membranes)

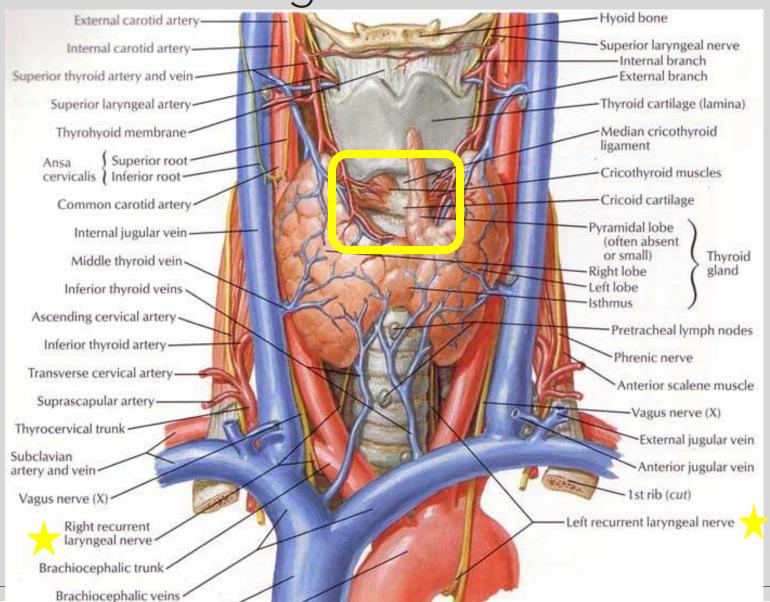
- Thyrohyoid Membrane
 - Attaches the larynx/thyroid cartilage to the hyoid bone
- Cricothyroid Membrane
 - Attaches the cricoid and thyroid cartilages
 - About 1 cm longitudinally and 2 to 3 cm transversely
 - Site for cricothyroidotomy
 - Site for a transtracheal block
 - Area around is rich with blood vessels (superior thyroid arteries and the relatively uncommon variant thyroid ima arteries).



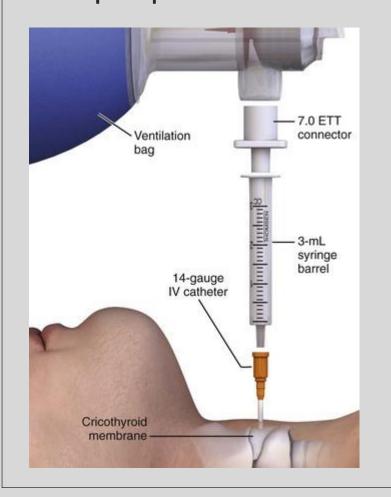
TARGET = CRICOTHYROID MEMBRANE

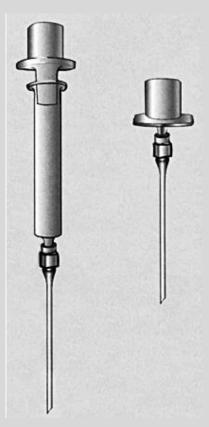


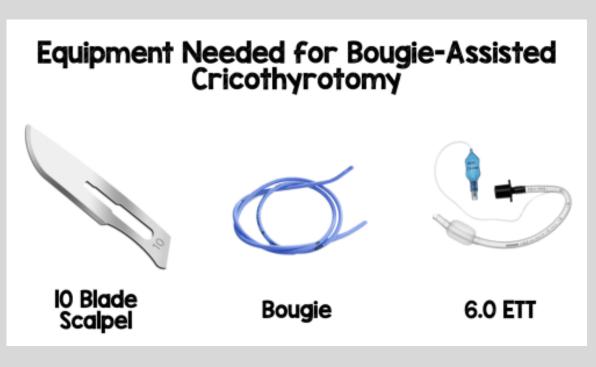
Just can't forget about all the rest...

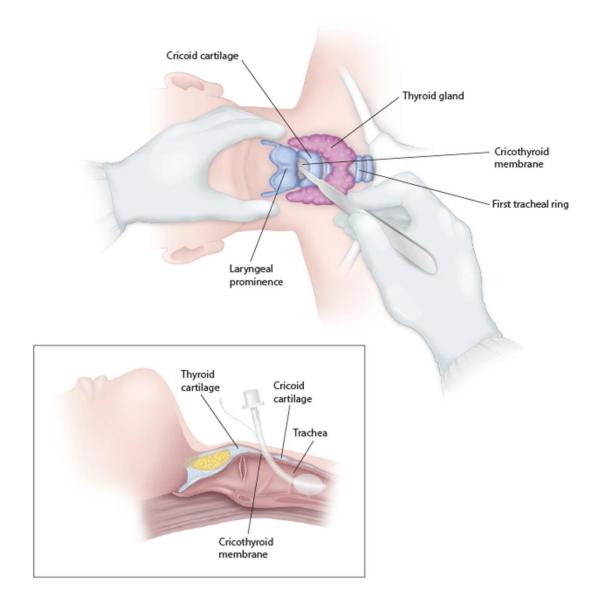


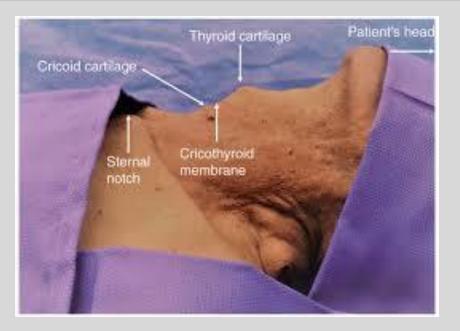
Needle and Bougie Assisted Cricothyrotomy Equipment





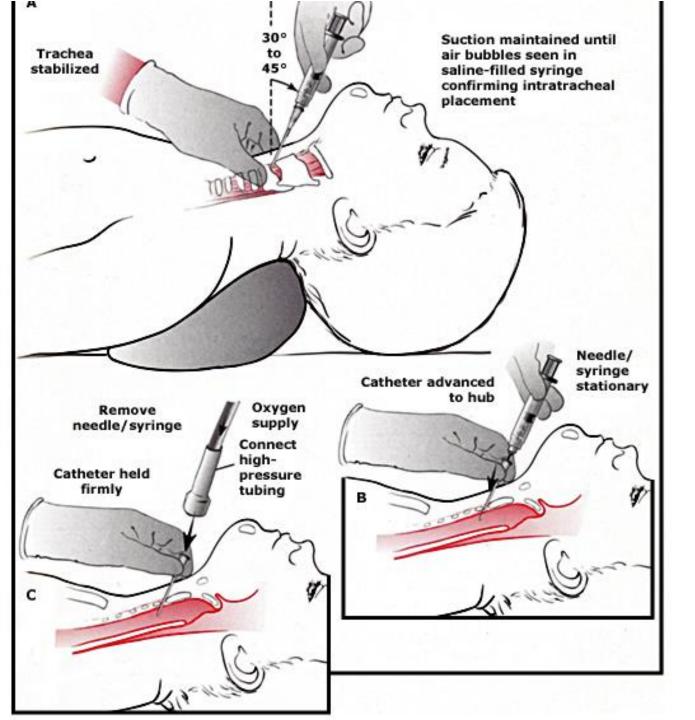






Positioning for cricothyrotomy

- Position the patient supine, and, if cervical spinal injury is not a concern, hyperextend the neck. The sniffing position is not necessary for cricothyrotomy.
- Use non dominant hand to stabilize trachea/larynx



Needle Cricothyrotomy with PTJV

- Needle cricothyrotomy through the cricothyroid membrane
- Percutaneous transtracheal jet ventilation
 - 1 second inspiration with PSI 25; 20 BPM = 285 VT or 5.7 L/min ventilation
 - Passive expiration
- For airways where surgical cricothyrotomy is difficult or as a temporary means of ventilation
 - Meant to be transitioned to more permanent airway within 72 hours
- Complications:
 - Barotrauma
 - Subcutaneous emphysema
 - PTX
 - Pneumomediastinum
 - Hypercarbia

Percutaneous Cricothyrotomy Steps

 $\begin{array}{c} 1 \\ \hline \end{array}$

Identify the cricothyroid membrane.

Move your finger caudally from the laryngeal prominence (the most prominent part of the anterior thyroid cartilage) until you feel the cricothyroid membrane,

Prep and Drape

Inject local (if pt needs)

- Stabilize with non dominate hand (thumb and middle finger)
- Create 2-3 cm horizontal incision over cricothyroid membrane (this may be after a vertical incision

Dilate

- Via scalpel 90 degrees or by using a clamp
- Dilator

Insert ETT

- Bougie vs. Direct
- 6.0-7.0 ETT
- Trach tube

Inflate and secure

- Ventilate
- Assess adequacy



Extend the neck whenever possible for better access to the trachea. Immobilize the larynx with your nondominant hand and palpate the cricothyroid membrane with your index finger.



Make a 3- to 5-cm vertical midline incision through the skin and subcutaneous tissues.

Palpate the membrane through the skin to confirm the anatomy.



Make a <1-cm horizontal incision through the cricothyroid membrane. Note that the skin incision is vertical, but the membrane incision is horizontal.



Insert the tracheal hook in the opening of the membrane, and rotate it cephalad, while grasping the inferior border of the thyroid cartilage. Ask an assistant to provide upward traction on the hook.



Place the tips of the Trousseau dilator into the opening in the membrane and spread in the longitudinal (vertical) plane.



Rotate the handle 90° until the handle is vertical or parallel to the neck



Insert the tube between the blades of the dilator until the flanges rest against the skin of the neck.

Keep your thumb on the obturator during tube insertion.



Carefully remove the Trousseau dilator and the obturator.



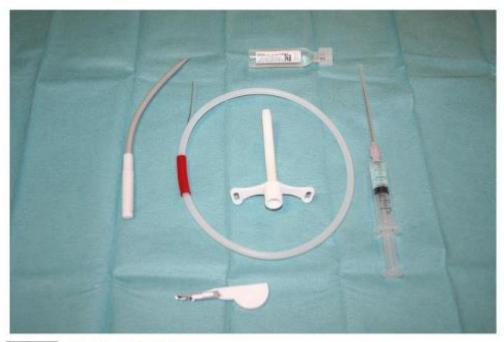
Replace the inner cannula of the tracheostomy tube and inflate the balloon.



Ventilate and confirm tube position by auscultation and end-tidal CO₂.

Secure the tube in place.

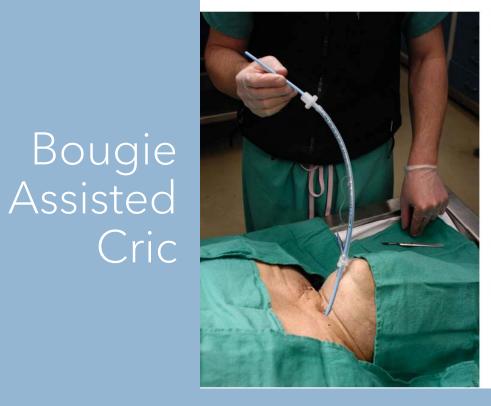
Cridothyroidotmy Kit



(CO) MY-SA

Svenriviere, Wikimedia Commons

tracheostomy tube over bougie. A 5.5-mm tube may be used in smaller adults







• https://www.youtube.com/watch?v=wVQFJR7qmrQ#action=share

