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The EM Educator Series

The EM Educator Series: Mastering the Cricothyrotomy

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Case 1:
A 22-year-old male is brought in by EMS with severe facial trauma after a severe motorcycle crash. He appears to be in respiratory distress. Facial structures are unrecognizable.

Case 2:
A 53-year-old obese female presents with angioedema that has rapidly worsened over 4 hours. You are unable to view the posterior pharynx due to her enlarged tongue. Unfortunately, you do not have a flexible intubating endoscope.

Questions for Learners:

1. What defines an anatomically or physiologically challenging airway?
2. When should you consider cricothyrotomy?
3. When is cricothyrotomy potentially your first option for airway intervention?
4. What is the relevant anatomy, what equipment is needed, and how do you perform a cricothyrotomy?
5. Are there any contraindications to cricothyrotomy?
6. What complications may occur with cricothyrotomy?

Suggested Resources:

- Articles:
  - LIFTL
  - First10EM
  - EMCrit – Surgical airway
  - EMCrit – Video
  - emDocs – Unlocking common ED procedures
  - emDocs – Sphincter series
  - Emergency Medicine Cases

Answers for Learners:

1. What defines an anatomically or physiologically challenging airway?

Whenever an intubation attempt fails, there should be some change to the next approach such as changing the size/type of laryngoscope, attempt with a bougie, attempt nasal intubation, etc. Common reasons that may lead to failure to intubate or failure to oxygenate that would necessitate a cricothyrotomy include angioedema, massive hemoptysis, large volume emesis, and obstructing lesions (i.e. cancer) or anatomical changes (congenital and acquired such as post operative, post radiation, and post trauma). Indication for cricothyrotomy also includes need for an emergent airway intervention, but you are unable to obtain oral access either due to anatomy, trismus/spasm, or external factors such as a jaw that is wired shut.

Usually, when emergency medicine docs think of cricothyrotomy (CT), it is in the "failed airway" scenario…the dreaded "can't intubate, can't oxygenate," or the CICO. However, there are some primary indications for cricothyrotomy, in which a surgical airway can be attempted under more "controlled" circumstances as a primary maneuver, but most of these typically fall into the "scary airway" category as well.

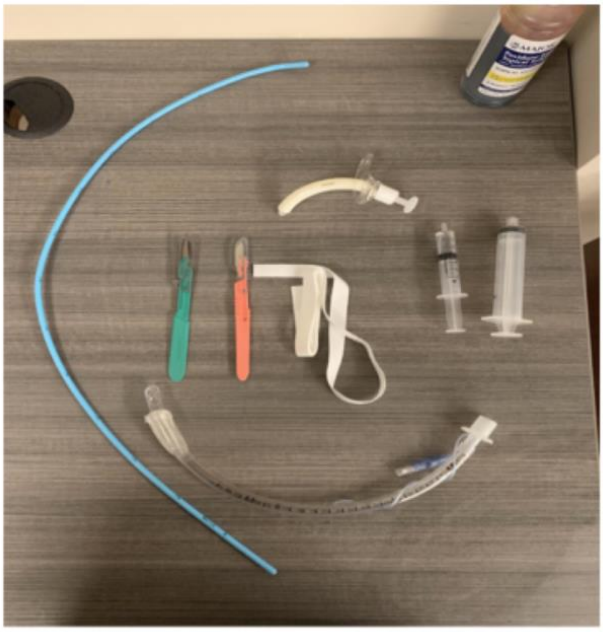
Although the primary indication for CT is inability to secure the airway with noninvasive techniques, there are several additional scenarios to consider CT. We will review the most common scenarios below.

2. When should you consider cricothyrotomy?
3. When is cricothyrotomy potentially your first option for airway intervention?

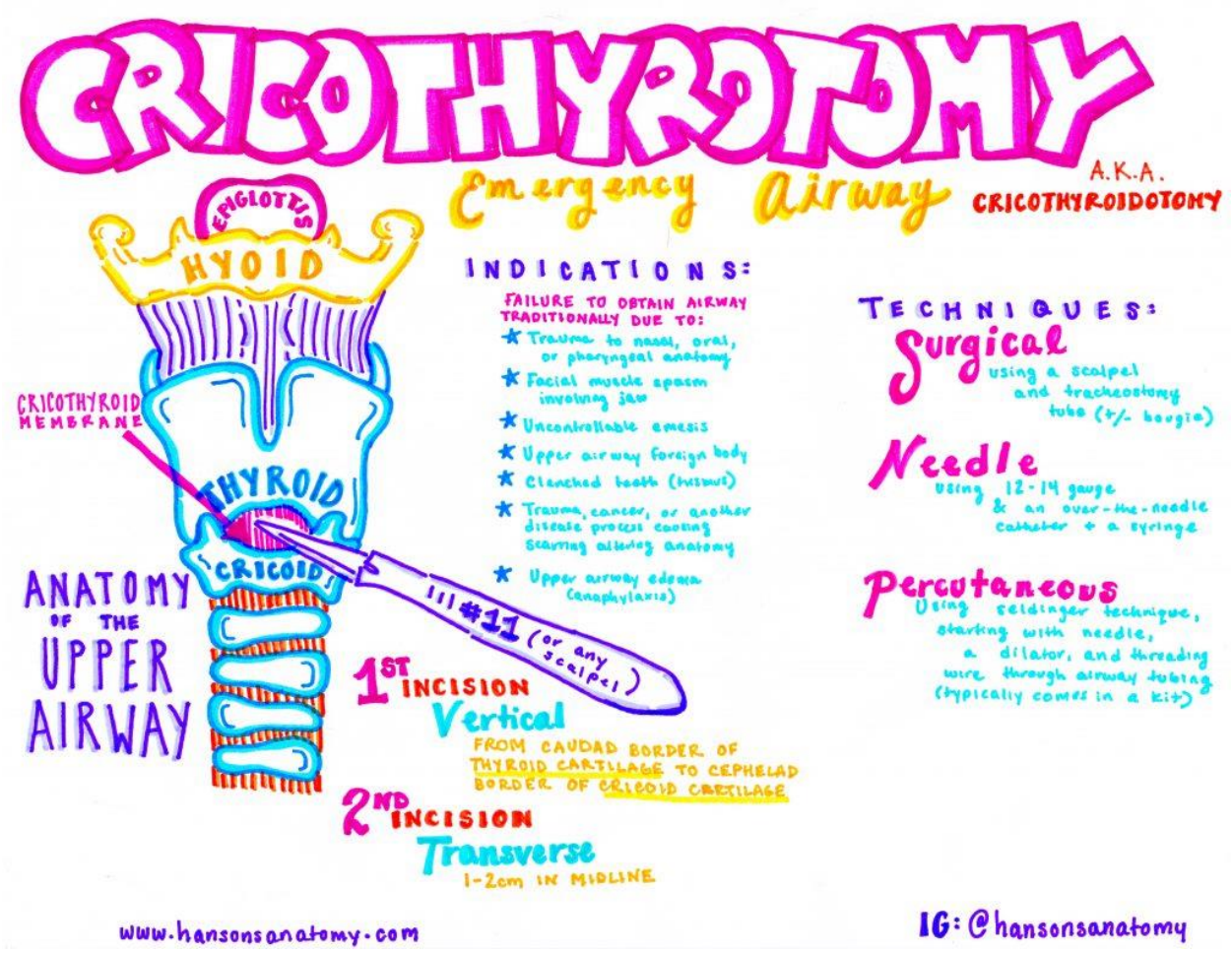
Indications:

- Cannot intubate/cannot oxygenate
- No oral access
- Masseter spasm, clenched teeth, or trismus
- Structural upper airway deformities (acquired, traumatic, or congenital)
- Laryngospasm
- Massive upper airway hemorrhage or emesis obscuring airway from orotracheal or nasotracheal approach
- History of upper airway stenosis or history of previous failed airways
- Mass effect or displacement of trachea from cancer, tumor, polyps, webs, or hematoma, etc
- Airway swelling (angioedema, Deep space neck infections, hematomas, etc)
- Massive facial trauma
- Awake intubation is desired but not achievable
- Foreign bodies in airway that cannot be easily or safely removed
- No viable connection between upper airway and lower airway that would allow passage of an ETT

4. What is the relevant anatomy, what equipment is needed, and how do you perform a cricothyrotomy?



Bougie, Scalpel (#10 or #11), tracheostomy tube AKA Shiley (Usually number 6 cuffed), 10cc Saline syringe, Iodine solution (or other anti-septic), ET tube as backup



5. Are there any contraindications to cricothyrotomy?

The pediatric larynx is more compliant and funnel-shaped. Because of these anatomical differences, it is contraindicated (in most pediatric literature) to perform a cric in children **< age 8 years**. There are several other textbook sources that give possible cric age ranges from 5-10 years. ACLS and PALS define the infant airways as up to 1 year, and the child airway from age 1 to age 8 years. The pediatric alternative to cricothyrotomy is **trans-tracheal jet ventilation**.

6. What complications may occur with cricothyrotomy?

- Failure to secure airway.
- Prolonged attempt (>2min), most studies reviewed for this article identify an "upper limit" between 180 and 300 seconds, but 40 seconds more realistic in a "can't intubate/can't ventilate scenario."38,39
- Incorrect initial incision.
- Misplacement of ETT (pretracheal, with insufflation).
- Hemorrhage… the inability to control it, that we didn't expect it, or it just plain freaks us out.
- Cartilaginous injury.
- Injury to posterior airway/esophagus.
- Initial incision requiring revision.
- Misplacement of tube without insufflation.

- First operator failure (procedure has to be taken over by 2nd operator).
- Alternatives/devices, surgical alternatives to cric in a failed airway (nasotracheal, percutaneous jet insufflation).