

## APPENDIX: D-2

## TITLE: CRICOTHYROTOMY (SURGICAL/NEEDLE)

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**I. BACKGROUND**

Cricothyrotomy is an emergency life-saving procedure. It is an invasive technique which allows a patent airway to be rapidly established for temporary ventilation and oxygenation of those patients in whom airway control is not possible by other means.

**II. INDICATIONS AND CONTRAINDICATIONS****INDICATIONS:**

- Surgical: patients > 8 years of age
- Needle: patients < 8 years of age
- Supra-glottic airway obstruction with:
  - Foreign body obstruction
  - Laryngeal trauma
  - Edema
- Inability to intubate and ventilate after use of paralytic agent, or if other alternative airways are ineffective or not feasible.

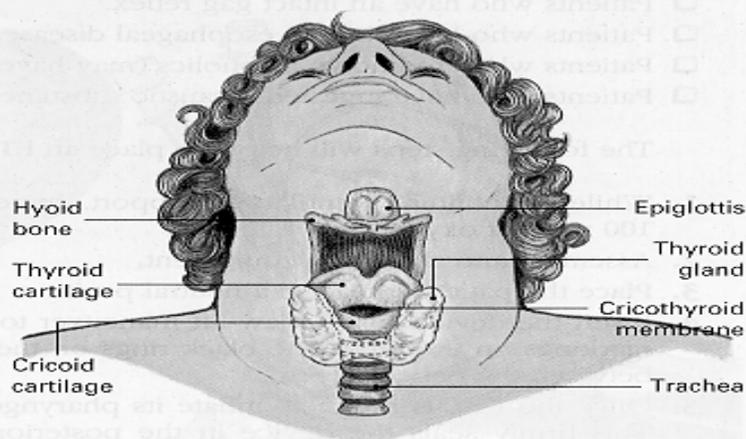
This procedure shall be utilized when all other methods of establishing a patent airway from above the glottis have failed.

**RELATIVE CONTRAINDICATIONS:**

1. Fractured larynx or significant damage to the cricoid cartilage or larynx.
2. Coagulopathy
3. Expanding hematoma in the area of the cricothyrotomy.

**COMPLICATIONS:**

- Venous hemorrhage
- Damage to arterial structures with severe hemorrhage
- Laceration of posterior tracheal wall
- Laceration of vocal chords
- Laceration of thyroid gland
- Tracheal stenosis (late)
- Creation of a false passage

**III. PROCEDURE:**

**FIGURE 11-60** Anatomical landmarks associated with the cricothyroid membrane.

**SURGICAL:**

- Gather and assemble the appropriate equipment:
  - a. 6.0 endotracheal tube, cut off just above the balloon port
  - b. Bougie (Flex-guide™)
  - c. #10 scalpel
  - d. Ruiz hook
  - e. Chlorhexidine swabs
  - f. Sterile gauze pad
  - g. Twill tape
  - h. Suction equipment
  - i. 10 mL syringe
  
- Hyperextend the patient's neck (unless cervical spine injury is suspected) to bring the larynx and cricothyroid membrane to an extreme anterior position.
- Locate the cricothyroid membrane between the cricoid and thyroid cartilage by palpating the depression in the midline, caudal to the prominence of the thyroid cartilage.
- Using aseptic technique, prepare the area with Chlorhexidine swabs.
- Palpate and maintain grasp on thyroid cartilage with non-dominant hand. Make a vertical 1-2" skin incision.
- Puncture the cricothyroid membrane with the Ruiz hook. Hook the inferior edge of the thyroid cartilage and lift cephalad.
- Orient the #10 scalpel transversely and puncture the membrane, creating a large enough incision to accommodate the ET tube. Do not remove the scalpel.
- Orient scalpel blade in the vertical position, and insert bougie next to the blade, advancing the bougie caudally into trachea. Remove scalpel.
- Slide ET tube over and advance it down the bougie. Twisting the ET tube as you slide it down the bougie and through the cricothyroid membrane will make it easier to advance.
- Ensure the balloon is through the membrane and into the trachea. Remove the bougie.
- Inflate the cuff and ventilate the patient with 100% oxygen.
- Once position is confirmed, remove the Ruiz hook. NOTE: It is not uncommon to mistakenly place the ET tube into a paratracheal position (i.e. outside the trachea). Do not remove the Ruiz hook until the ET tube is confirmed to be in the trachea and functional. Secure the ET tube using twill tape.
- Verify proper tube placement by:
  - a. Auscultation of lung fields
  - b. ETCO<sub>2</sub> detector
  - c. Lack of subcutaneous air in the neck

**NEEDLE:**

- Gather and assemble the appropriate equipment:
  - a. Chlorhexidine swabs
  - b. #6 fr. Cook Needle
  - c. 3cc Syringe
  - d. 3.0 ETT Barrel
  - e. 4 x 4
  - f. 36" twill tape
  - g. Sterile gauze pad
- Hyperextend the patient's neck (unless cervical spine injury is suspected) to bring the larynx and cricothyroid membrane to an extreme anterior position.
- Locate the cricothyroid membrane between the cricoid and thyroid cartilage by palpating the depression in the midline, caudal to the prominence of the thyroid cartilage.
- Using aseptic technique, prepare the area with Chlorhexidine swabs.
- Stabilize the airway between the thumb and forefingers.
- Insert the reinforced 6 Fr Cook catheter through the skin overlying the cricothyroid membrane at a 30 degree angle caudally.
- When the needle is through the skin, aspirate for air as you advance to ensure tracheal entry. 1-2 mL of saline in the syringe will help identify presence of air bubbles.
- Advance the catheter over the needle and seat catheter hub against skin, remove the needle.
- Attach the 3.0 ETT adapter with flex tube to the hub of the catheter and begin ventilations with the BVM.
- Secure the cannula with twill tape after confirming correct placement by auscultation for breath sounds (5 point check) and ETCO<sub>2</sub> (may have low readings), observe the catheter for kinking.
- Consider sedation.

**Notes and Precautions:**

1. Hazard in performing this procedure are primarily damage to nearby structures. Major vessels are present on either side of the midline the vocal cords may be injured if the puncture is made too high and a through and through injury of the trachea may occur if the puncture is made too deep.
2. Palpation of the cricothyroid membrane is very difficult in the infant and younger child. The key to success is immobilization of the trachea throughout the procedure.

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