# UNITED STATES MARINE CORPS

FIELD MEDICAL TRAINING BATTALION
Camp Lejeune, NC 28542-0042

FMST 404

## Perform Emergency Cricothyroidotomy

### TERMINAL LEARNING OBJECTIVE

1. Given a casualty in an operational environment, standard field medical equipment and supplies, **perform emergency cricothyroidotomy to restore breathing**, within the scope of care, reducing risk of further injury or death. (8404-MED-2008)

### ENABLING LEARNING OBJECTIVES

1. Without the aid of references, given a description or list, **identify important anatomical landmarks for an emergency cricothyroidotomy**, within 80% accuracy, per Prehospital Trauma Life Support, Current Military Edition and Emergency Medicine, current edition. (8404-MED-2008a)

2. Without the aid of references, given a description or list, **identify the indications for performing an emergency cricothyroidotomy**, within 80% accuracy, per Prehospital Trauma Life Support, Current Military Edition and Emergency Medicine, current edition. (8404-MED-2008b)

3. Without the aid of references, given a description or list, **identify the proper equipment for performing an emergency cricothyroidotomy**, within 80% accuracy, per Prehospital Trauma Life Support, Current Military Edition and Emergency Medicine, current edition. (8404-MED-2008c)

4. Without the aid of references, given a description or list, **identify the procedural sequence for performing an emergency cricothyroidotomy**, within 80% accuracy, per Prehospital Trauma Life Support, Current Military Edition and Emergency Medicine, current edition. (8404-MED-2008d)

5. Without the aid of references, given a description or list, **identify potential complications of an emergency cricothyroidotomy**, within 80% accuracy, per Prehospital Trauma Life Support, Current Military Edition and Emergency Medicine, current edition. (8404-MED-2008e)

6. Without the aid of references, given a casualty and a Corpsman Assault Pack, **perform an emergency cricothyroidotomy**, to prevent further injury or death, per the FMST Performance Examination Checklist. (8404-MED-2008f)

1. **ANATOMICAL LANDMARKS** (see Figure 1)

**Trachea** - also known as the windpipe. It is the cartilaginous and membranous tube descending from, and continuous with, the lower part of the larynx to the bronchi.

**Thyroid Cartilage** - also known as the "Adam's Apple." The thyroid cartilage is located in the upper part of the throat. The thyroid cartilage tends to be more prominent in men than women.

**Cricoid Cartilage** - located approximately ¾-inch inferior to the thyroid cartilage. The cricoid and thyroid cartilage form the framework of the larynx.

**Cricothyroid Membrane** - soft tissue depression between the thyroid and cricoid cartilage. This membrane connects the two cartilages and is only covered by skin.

**Carotid Arteries** - two principal arteries of the neck.

**Jugular Veins** - two principal veins of the neck.

**Esophagus** - muscular tube extending downward from the pharynx to the stomach. The esophagus lies posterior to the trachea.

**Thyroid Gland** - largest endocrine gland, the thyroid gland is situated in front of the lower part of the neck. Consists of a right and left lobe on either side of the trachea.

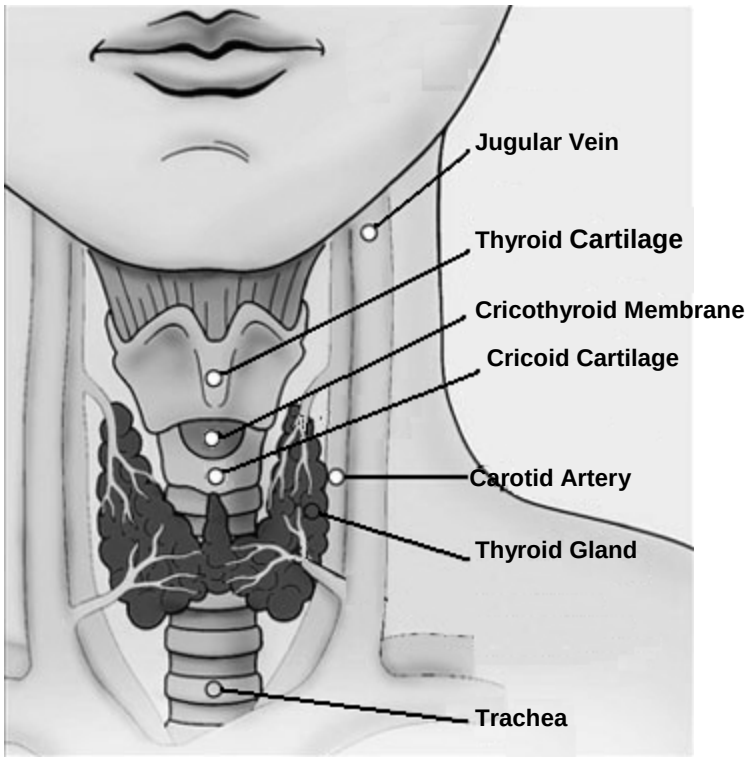


**Figure 1. Anatomical Landmarks**

2. **INDICATIONS**

**Definition** - Emergency cricothyroidotomy is a surgical procedure where an incision is made through the skin and cricothyroid membrane. This allows for the placement of a tracheal tube into the trachea when control of the airway is not possible by other methods.

There are many reasons an emergency cricothyroidotomy may be required. Listed below are a few of the most common reasons:

Obstructed airway and/or swelling of tissues will usually prevent the passage of an endotracheal tube through the airway. Therefore, a surgical airway distal to the obstruction is required. Causes of an obstructed airway include facial and oropharyngeal edema from burns or foreign objects (food or teeth).

Congenital deformities of the oropharynx or nasopharynx will inhibit or prevent nasotracheal or orotracheal intubation.

Trauma to the head and neck would preclude the use of an ambu-bag, oropharyngeal airway, nasopharyngeal airway and endotracheal tube insertion.

- Massive midface trauma
- Facial fractures (mandible fracture)
- Nasal bone fractures
- Cribiform fractures

Cervical spine fractures in a patient who needs an airway but whose intubation is unsuccessful or contraindicated.

**Contraindications** - Massive trauma to the larynx

3. **PROPER EQUIPMENT**

There are several types of pre-packed kits but you can also put together your own. CoTCCC has not recommended a specific emergency cric kit but has defined a set of preferred features for surgical airway kits.

- Scalpel: # 10 blade
- Antiseptic (Alcohol or Povidone-Iodine)
- 6 – 7 mm endotracheal tube with 10cc syringe for balloon cuff
- Means to secure tube (securing ribbon, tape or sutures)
- Instrument to expose and define the opening (Trach Hook or Curved Kelly hemostats)
- Gauze (Petroleum and sterile)
- Bag-valve-mask (BVM) and oxygen source, if available

4. **PROCEDURAL STEPS**

**Step 1** - **Assess patient**

Assess airway, LLF, attempt other airways. Make the decision to perform emergency cricothyroidotomy.

**Step 2** - **Gather equipment**

Ensure all equipment is available and assemble prior to starting the procedure.

**Step 3** - **Prepare and position patient**

The patient should be placed in a supine position, with the neck placed in the neutral position. Stand to one side of the patient at the neck. If you are right handed, stand to the right side of the patient; left handed, to the left.

**Step 4** - **Locate the cricothyroid membrane**

Palpate the thyroid and cricoid cartilage for orientation. The cricothyroid membrane is in the hollow between the two cartilages. If time permits, quickly cleanse the site with alcohol or betadine swabs.

**Step 5** - **Make incision**

- Stabilize the thyroid cartilage using the thumb and middle finger of your non-dominant hand to hold the skin taut.

- Using the scalpel, make a **vertical** incision through the skin approximately 1 inch long over the cricothyroid membrane. (See Figure 2)

- Visualize the cricothyroid membrane.

- Enter cricothyroid membrane by making a **horizontal** incision through the cricothyroid membrane. (See Figure 3)

- **DO NOT** make the incision more than **½ inch** deep or you may perforate the esophagus.

**Figure 2. Vertical Incision**

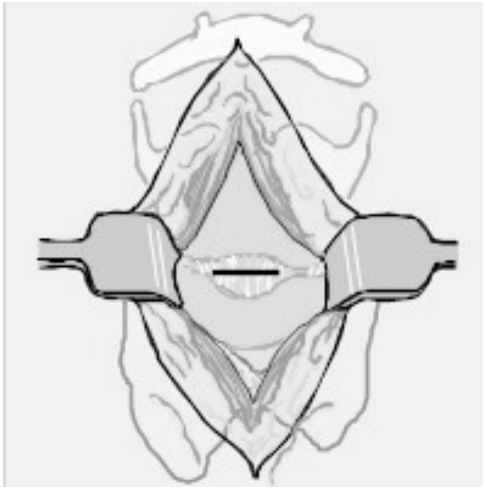

**Figure 3. Horizontal Incision**

**Step 6** - **Open Incision**

- Use Trach Hook or curved Kelly hemostats to open incision.

**Step 7** - **Insert Tube**

- Lubricate and insert the endotracheal tube into the opening.

- Ensure the tube is inserted no more than 3 to 4 inches so the tube does not slip down the right main-stem bronchus with any movement.

- Inflate balloon with 10cc's of air.

**Step 8** - **Check for proper placement**

- Connect a bag-valve-mask device or manually ventilate patient with two breaths.

- Check for breath sounds. If no ventilations are heard, pull the tube out and reinsert it.

- Recheck for breath sounds to ensure tube is positioned correctly.

- If breath sounds are **absent on the left** side only, the tube has been inserted down the right main-stem bronchus and should be pulled back a few centimeters. This typically occurs with the use of the endotracheal tube.

- Recheck for breath sounds to ensure tube is positioned correctly.

- Connect to Oxygen Supply (if available)

**Step 9** - **Secure Dressing**

- Secure the tube with ribbon, sutures and/or tape.

- Apply petroleum gauze followed by sterile gauze. (See Figure 4)

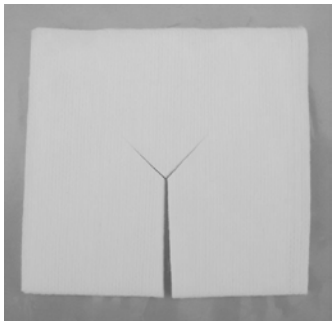

**Figure 4. Y-cut Gauze**

**Step 10** - **Monitor Patient**

- Continuously reassess and monitor patient.

- 1 breath every 5 seconds if patient is not breathing on their own.

5. **ASSOCIATED COMPLICATIONS**

**Hemorrhage** - **The most common complication.**

Causes

- Minor bleeding may be caused by lacerating superficial capillaries in the skin.

- Significant bleeding may be caused by the laceration of major vessels (carotid arteries and the jugular veins) within the neck.

Treatment

- Minor bleeding is treated with direct pressure and the application of a simple pressure dressing.

- Significant bleeding - treated same as minor. However, if unable to control the bleeding, the vessel may need to be ligated (tied off).

**Esophageal perforation** - the creation of a hole between the esophagus and trachea.

Causes

- Creating an incision too deep through the cricothyroid membrane.

- Forcing the ET tube through the cricothyroid membrane and into the esophagus.

Treatment

- Requires surgical repair at higher echelon of care.

**Subcutaneous emphysema** - the presence of free air or gas within the subcutaneous tissues. Upon palpation, a crackling sensation may be felt as the air is pushed through the tissue.

Causes

- Creating too wide of an incision will allow air entrapment under the skin.

- Air leaking out of the insertion site may get trapped under the skin.

Treatment

- No treatment is necessary; will resolve spontaneously within a few days.

- The placement of petroleum gauze dressing around the incision/insertion site will help reduce the incidence of subcutaneous emphysema.


**Why Don't We Learn How to Intubate? (PHTLS Manual)**

1. No studies have examined the ability of well-trained but relatively inexperienced military medics to accomplish endotracheal intubation.

2. Many Corpsmen and Medics have never performed an intubation on a live casualty or even a cadaver.

3. Standard endotracheal intubation techniques entail the use of a tactically compromising white light in the laryngoscope.

4. Endotracheal intubation can be extremely difficult in a casualty with maxillofacial injuries.

**CASUALTY ASSESSMENT AND EMERGENCY CRICOTHYROIDOTOMY**

**Care Under Fire Phase:** In the absence of life-threatening hemorrhage, there is no care given for a casualty who needs a surgical cricothyroidotomy in this phase.

**Tactical Field Care Phase:** Cricothyroidotomy is a skill you may use during the Tactical Field Care phase. The need to perform an emergency cricothyroidotomy is made after you have attempted to control the airway with other, less invasive methods (i.e. NPA). Remember, once the patient has received a cricothyroidotomy, they are now totally dependent upon you and now become much more difficult to manage in a tactical environment.

**REFERENCES**

Prehospital Trauma Life Support, current Military Edition

Emergency Medicine, current edition

## Field Medical Training Battalion

# EMERGENCY CRICOTHYROIDOTOMY
# PERFORMANCE EXAMINATION CHECKLIST

| **STUDENT** (Rank Last Name, First Name) | **PLT** |
|---|---|
| | |

| **PROCEDURAL STEPS FOR PERFORMING AN EMERGENCY CRICOTHYROIDOTOMY** | **1ST** | | **2ND** | | **3RD** | |
|---|---|---|---|---|---|---|
| | **P** | **F** | **P** | **F** | **P** | **F** |
| *** State the indications for an emergency cricothyroidotomy (obstructed airway, congenital deformities, trauma to head/neck, cervical spine fracture)** | | | | | | |
| *** State the contraindications for an emergency cricothyroidotomy (massive trauma the larynx or cricoid cartilage)** | | | | | | |
| *** Assess patient and make decision to perform emergency cricothyroidotomy. (ABC's, LLF, Failed attempts at all other airway management)** | | | | | | |
| Assemble and check equipment (Scalpel #10 blade, ET tube, 10 cc syringe, tape, Curved Kelly hemostats/Trach Hook, gauze) | | | | | | |
| Prepare patient (Place patient in supine or semi-recumbent position and place neck in neutral position) | | | | | | |
| *** Locate landmarks (palpate thyroid and cricoid cartilages, locate cricothyroid membrane)** | | | | | | |
| Cleanse the incision site with alcohol or betadine | | | | | | |
| Stabilize the thyroid cartilage using your non-dominant hand | | | | | | |
| Make 1 inch, vertical incision over the cricothyroid membrane | | | | | | |
| Visualize cricothyroid membrane | | | | | | |
| Make ½ inch, horizontal incision to cut through the cricothyroid membrane | | | | | | |
| Open incision with blunt dissection | | | | | | |
| *** Insert endotracheal tube into the incision, directing the tube distally down the trachea (no more than 3 - 4 inches)** | | | | | | |
| Inflate balloon with 10cc's of air | | | | | | |
| *** Ventilate patient with two breaths & check for proper placement (Auscultate epigastric area - If patient has epigastric sounds, remove and retry, observe for bilateral rise/fall of chest, misting or fogging in E.T. tube and auscultate for breath sounds bilaterally)** | | | | | | |
| Lung sounds on right side only (deflate cuff, pull back ¼- ½ inch, re-inflate cuff, recheck placement | | | | | | |
| Secure tube | | | | | | |
| Apply dressing (petroleum gauze on insertion site, dry sterile dressing over petroleum gauze) | | | | | | |
| Reassess & monitor patient (if not breathing on own, 1 breath every 5 seconds, suction as necessary) | | | | | | |
| State complications of cricothyroidotomy (hemorrhage, esophageal perforation subcutaneous emphysema) | | | | | | |

**Field Medical Training Battalion**

# EMERGENCY CRICOTHYROIDOTOMY
# PERFORMANCE EXAMINATION CHECKLIST

| GRADING CRITERIA | 1ST | 2ND | 3RD |
|---|---|---|---|
| **Total Non-Critical Items (5 or greater constitutes a failure)** | | | |
| **Total Critical Items (Any critical items missed constitutes a failure)** | | | |
| **"Stop & Think" (2 allowed for critical items, third constitutes a failure)** | | | |

| 1st Evaluator: | 2nd Evaluator: | 3rd Evaluator: |
|---|---|---|
| **PASS / FAIL** | **PASS / FAIL** | **PASS / FAIL** |
| **Student signature:** | **Student signature:** | **Student signature:** |
| **Notes:** | **Notes:** | **Notes:** |

Cricothyroidotomy Review

1. List the four indications for an emergency cricothyroidotomy.

2. List the ten steps in performing an emergency cricothyroidotomy.

| | |
|---|---|
| 1) | 6) |
| 2) | 7) |
| 3) | 8) |
| 4) | 9) |
| 5) | 10) |

3. Identify the three common complications from performing an emergency cricothyroidotomy.

4. What equipment is necessary to perform an emergency cricothyroidotomy?

5. Identify the anatomical landmarks below