PRACTICE GUIDELINE

Effective Date: 6-18-04 Manual Reference: **Deaconess Trauma Services**

TITLE: PENETRATING CHEST INJURY

PURPOSE: To define guidelines for the management of penetrating injuries to the chest. To define an optimal diagnostic strategy and appropriate treatment plans for suspected injuries.

DEFINITIONS:

1. Penetrating injury to the chest is any penetrating injury to the thorax in an area bounded superiorly by the lower neck and inferiorly by the lower costal margin.

2. Point of Maximum Impulse (PMI) - the point on the chest where the impulse of the left ventricle is felt most strongly, normally in the fifth intercostal space inside the midclavicular line

GUIDELINES:

1. Any penetrating injury to the chest must be assumed to have caused internal organ damage which may involve the:
   a. Heart
   b. Lungs
   c. Tracheobronchial tree
   d. Esophagus
   e. Great vessels
   f. Diaphragm
   g. Spinal cord

2. In all patients, assess the ABCs and obtain an airway as quickly as possible.

3. If patient has suffered cardiac arrest, proceed directly to left anterior thoracotomy while the patient is being intubated and large bore intravenous lines are being inserted.

   Recommendations for Emergency Room Thoracotomy:
   a. Pts. who present pulseless but with signs of life after penetrating thoracic injury.
   b. Pts. who present pulseless and absent signs of life after penetrating thoracic injury.
   c. Pts. who present pulseless but with signs of life after penetrating extrathoracic injury.
   d. Pts. who present pulseless and absent signs of life after penetrating extrathoracic injury.

4. In the non-arrested patient, determine whether the patient is hemodynamically stable (normal) or unstable (hypotensive or tachycardic) and whether the patient has respiratory distress.

5. If patient is hemodynamically unstable or has respiratory distress consider:
    a. Tension pneumothorax
        i. Absent breath sounds on the affected side
        ii. Tympanic percussion on the affected side
        iii. Distended neck veins if adequate blood volume available
        iv. Shift of the trachea and/or the PMI
        v. Insert ≥ 28 Fr chest tube (consider needle thoracostomy to temporize and convert tension to open pneumothorax).
    b. Massive hemothorax:
        i. Absent breath sounds on the affected side
        ii. Dull to percussion on affected side.
        iii. Stabilize blood pressure with vigorous fluid resuscitation
        iv. Insert ≥28 Fr chest tube
        v. Take immediately to OR if
            a) Hemodynamically unstable
            b) Initial drainage is >1500 ml, or
            c) Drainage continues at >200 ml/hr for 2-3 hours.
        vi. Consider massive transfusion protocol

    c. Cardiac Tamponade:
        i. Possible projectile trajectory near the heart
        ii. Distended neck veins
        iii. Distant heart sounds
        iv. Cyanosis
        v. Tension pneumothorax has been treated or ruled out.
        vi. Perform FAST exam.
        vii. Perform needle pericardiocentesis or open subxiphoid pericardiocentesis if FAST positive.
        viii. Go immediately to the OR for thoracotomy or median sternotomy if needle pericardiocentesis or open subxiphoid pericardiocentesis positive for blood.

6. If patient is stable and has little respiratory distress, obtain AP supine chest x-ray (mark the entry and exit sites with radiopaque markers).

7. If x-ray shows:
    a. Pneumothorax: place ≥28 Fr chest tube.
    b. Hemothorax: resuscitate the blood volume and place ≥28 Fr chest tube.
    c. Consider massive transfusion protocol

8. If the wound is below the nipples, consider abdominal injury.

9. If the injury is in Zone 1 of the neck (clavicle to inferior border of the cricoid), consider angiogram, bronchoscopy and esophagoscopy or exploration.

10. If the injury is between the nipples and between the suprasternal notch and xiphoid consider the possibility of cardiac injury with occult cardiac tamponade:
    a. Consider central line for monitoring.
    b. Consider cardiac tamponade.
    c. Obtain FAST to look for pericardial effusion.
11. If all x-rays are normal and there is no firm indication that the pleural space or mediastinum was penetrated, obtain a repeat chest x-ray.
    a. If there is a pneumothorax or hemothorax, follow guidelines as above.
    b. If the film is normal, consider discharge from the ED at the discretion of the trauma surgeon.

REFERENCES:

- Deaconess Trauma Guideline Manual, PENETRATING INJURIES TO THE ABDOMEN.
- Deaconess Trauma Guideline Manual, EMERGENT THORACOTOMY.
- Deaconess Trauma Guideline Manual, PENETRATING NECK INJURY.
- Seamon, Mark, Haut, Elliott, MD, PhD, Van Arendonk, Kyle, Barbosa, Ronald,Chiu, William, et al. (2015). An evidence-based approach to patient selection for emergency department thoracotomy: A practice management guideline from the Eastern Association for the Surgery of Trauma. *Journal of Trauma and Acute Care Surgery, 79, 159-173. Https://doe.org/10.1097/TA.0000000000000648*

REVIEWED DATE	REVISED DATE
JAN 2005	JAN 2008
JAN 2006	MAR 2014
JAN 2007	AUG 2016
OCT 2011	
AUG 2014	
JAN 2017	
JAN 2018	
JAN 2019	
AUG 2020	
JUNE 2021	