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Deaconess REGIONAL TRAUMA CENTER

Emergency Resuscitative Thoracotomy

Purpose: Emergency resuscitative thoracotomy may be necessary to treat patients who present in extremis and might otherwise die without aggressive therapy. Emergency thoracotomy is not indicated in the resuscitation of all trauma patients who present in extremis. The following protocol is intended to be a guide and is not intended to be all-inclusive. Additional patients not covered by this protocol who might benefit from emergency thoracotomy will be rare and case-specific. The procedure is performed in conjunction with other resuscitative efforts and should not be employed in isolation. Under certain conditions, resuscitative efforts might best be accomplished in the Operating Room.

Definitions:

Signs of life include presence of blood pressure, cardiac electrical activity, and respiratory effort

Aggressive fluid resuscitation includes 2 units of packed red blood cells and 1-2 liters of LR

Guidelines:

A. Indications
   a. Patients who present pulseless but with signs of life after penetrating thoracic injury
   b. Patients who present pulseless and absent signs of life after penetrating thoracic injury
   c. Patients who present pulseless but with signs of life after penetrating extrathoracic injury
   d. Patients who present pulseless and absent signs of life after penetrating extrathoracic injury
   e. Patients who present pulseless but with signs of life after blunt injury

B. Procedure
   a. Rapid bilateral antero-lateral betadine prep while thoracotomy tray opened
   b. Left antero-lateral thoracotomy incision located beneath nipple in males and inferior breast fold in females
      i. Incision extends from left sternal border to anterior border of latissimus dorsi
      ii. Chest entered along the superior aspect of 4^{th} or 5^{th} rib

iii. Care must be taken to avoid injury to heart and lung
iv. A right antero-lateral thoracotomy may be preferred for primary right chest wounds

c. Additional exposure may be accomplished by extending thoracotomy incision across sternum into contralateral chest cavity
d. Insert rib spreader with handle located toward table laterally
e. Examine pericardium
    i. If tense hemopericardium present (pericardium distended with maroon discoloration), proceed to step "h" below
f. If system air embolism is suspected or massive hemorrhage from lung parenchyma or hilum is present, place appropriate clamp across hilum medially
g. Retract left lung with left hand
    i. Locate aorta by running right hand medially along posterior chest wall
    ii. Aorta located along lateral aspect of vertebral bodies and will be postero-lateral to esophagus
    iii. Dissect around aorta inferior to pulmonary hilum and apply aortic cross-clamp
h. Enter pericardium by longitudinally incising pericardium anterior and parallel to phrenic nerve
    i. This is best accomplished by grasping pericardium with forceps and cutting with surgical scissors
    ii. Pericardial incision is carried inferiorly to diaphragmatic reflection and superiorly to level of superior pulmonary hilum
    iii. Care must be taken to avoid injury to left atrial appendage and phrenic nerve
        1. This is best accomplished by lifting tip of scissors laterally as incision is made
i. Manually lift heart from pericardial sac
    i. If hemopericardium is present, examine for cardiac perforation
        1. Tamponade perforation if present
    ii. If hemopericardium is not present, begin open cardiac compression
    iii. Aortic cross-clamping, if not previously performed, is indicated if no hemodynamic response is noted

References:

- Advanced Trauma Life Support, American College of Surgeons, 10th Edition
- 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/TA0000000000000648