

## Emergent Resuscitative Thoracotomy (ERT) Guideline November 2024

**Purpose:** Provide decision support guideline for determining appropriate patients for emergent resuscitative thoracotomy in the acute trauma setting. This guideline aims to better standardize the approach to the in-arrest trauma patient in order to optimize outcomes and avoid futile procedures.

**Background:** Emergency Resuscitative Thoracotomy (ERT) is a potentially lifesaving intervention for patients who develop or have impending post-injury cardiovascular collapse from a potentially reversible cause.

The purposes of this procedure are:

- Control of intrathoracic hemorrhage
- Release of cardiac tamponade
- Internal cardiac massage
- Aortic occlusion to control infra-diaphragmatic hemorrhage and to maximize cerebral and coronary perfusion

**Background:** Exsanguinated patients with profound hypotension or in hemorrhagic shock do not improve with external chest compressions. Thus, the team should quickly determine if an in-arrest trauma patient is a candidate for ERT or is non-salvageable and the patient pronounced with cessation of resuscitative efforts. It is prudent to ensure an adequate airway has been established and both pleural spaces decompressed to rule out other potentially reversible causes of arrest (hypoxia, tension physiology) before cessation of resuscitative efforts in those patients that do not meet criteria for ERT.

There are multiple published guidelines from the leading trauma organizations that have informed this ERT guideline. These include guidelines from the Western Trauma Association (WTA), Eastern Association for the Surgery of Trauma (EAST), and the Department of Defense's Joint Trauma System (JTS). The most recent WTA guidelines provide updated recommendations for ERT, integrating modern evidence. Key highlights from the WTA 2024 guidelines include:

1. **Cardiac Motion Assessment:**
  - Cardiac motion on ultrasound supports proceeding with ERT.
  - Absence of cardiac motion suggests cessation of resuscitation.
2. **Procedural Integration:**
  - Integration of REBOA (if available and appropriate) may complement ERT.

**Technique:** The steps of the ERT are as follows:

**1. Left anterior-lateral thoracotomy incision**

- Generous curvilinear incision at approximately 4th intercostal space (nipple line in males, inframammary fold in females)
- Simultaneous right-sided tube thoracostomy

**2. Open the pericardium**

- Open longitudinally at least one finger breadth anterior to the phrenic nerve
- Deliver the heart out of the pericardium to inspect for injury

**3. Control any cardiac injury *if present***

- Digital pressure for smaller injuries with definitive repair in OR
- Other options include skin stapler or Foley catheter for temporary control

**4. Temporarily control active lung bleeding *if present***

**5. Cross-clamp the descending aorta**

- Utilize an OG/NG to help differentiate from esophagus
- Open the mediastinal pleura
- Place aortic cross-clamp just above the diaphragm

**6. Internal cardiac massage and defibrillation**

- If non-perfusing rhythm, begin/continue open cardiac massage and resuscitation to evaluate for response
- Electric shock with internal paddles should be delivered at 20 Joules
- If no cardiac activity, *may consider* a brief period of open cardiac massage, resuscitation, and aortic occlusion to improve coronary circulation

**7. Extension to Clamshell**

- If large right-sided hemothorax, active bleeding from right chest, or trajectory consistent with right-sided injury. Utilize to facilitate exposure of mediastinum.

### **Blunt Agonal Arrest: For Patients in Cardiac Arrest Outside of the ED Thoracotomy Indications**

The evaluation and resuscitation of the trauma patient who is agonal or arrests as a result of a blunt mechanism constitutes a special subset of patients. The resuscitation is a rapid assessment and treatment of the various measures of a Pulseless Electrical Activity (PEA) that may be caused by a traumatic etiology (i.e. profound hypovolemia, airway compromise, tension pneumothorax, and pericardial tamponade). Notably, The utilization of Advanced Cardiac Life Support (ACLS) and Basic Life Support (BLS) measures (i.e. Epinephrine, Atropine, and closed Cardiopulmonary Resuscitation) in the setting of Advanced Trauma Life Support (ATLS) Resuscitation is of limited benefit in the setting of traumatic patient arrest.

- Adjusted Algorithm: “A-A-B-B-C-C”
  - Airway
  - Access
  - Bilateral Chest Tubes
  - Blood Products
  - Cardiac US
  - CPR (ACLS)

