

## South West London & Surrey Trauma Network

### Pan Network Policy for Thoracic Trauma

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#### Scope:

These guidelines are intended for use by trained medical and nursing staff within the SWL&S trauma network. They provide guidance for the management of major trauma patients with thoracic trauma injuries and should be used in conjunction with any local / Trust policies.

The following areas are included:

- Thoracic Injury Assessment and Initial Management
- Indications and Techniques for Chest Drain Insertion in Trauma
- Criteria for Transfer to MTC
- Guidelines for Management of Thoracic Injury in a Trauma Unit
- Analgesic Pathway for Rib Fractures
- Indications for Emergency Thoracotomy

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#### THORACIC INJURY ASSESSMENT AND INITIAL MANAGEMENT

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When assessing a patient with chest trauma consider the following:

- Mechanism
- Blunt or penetrating
- Vital signs – RR, PR, BP, O2 satn,
- Clinical assessment
- **Tension pneumothorax - Immediate action**
- Consider: Massive haemothorax, cardiac tamponade, flail chest with pulmonary contusion, pneumothorax, aortic injury
- CXR / CT (usually vertex to symphysis)
- Analgesia requirements
- Oxygen requirement
- Maintenance of ventilatory function
- Chest drain?
- Emergency thoracotomy ?

Author: A James. Acknowledgement to Mr I Hunt, Consultant Thoracic Surgeon, St George's Hospital

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## INTERCOSTAL CHEST DRAIN - PROCEDURE INFORMATION

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When performed in emergency situations, best practice should be followed when placing the chest tube to avoid complications from the procedure. Advanced Trauma Life Support (ATLS) principles<sup>1</sup> should be followed along with Local Trust Policy

### Site:

The chest tube is placed on the appropriate side in the mid- or anterior- axillary line, 4/5<sup>th</sup> intercostal space. On expiration, the diaphragm rises to the 5th rib at the level of the nipple, and thus chest drains should be placed above this level.

### Anaesthesia / Analgesia:

Chest tube insertion is a painful procedure, especially in muscular individuals.

A combination of intravenous analgesia and local anaesthesia is used for the procedure. Intravenous opioids such as morphine are standard analgesia for trauma patients. It is best titrated to avoid subsequent respiratory depression but achieve adequate pain control.

For local anaesthesia, 10-20mls of local anaesthetic is required. This is infiltrated under the skin along the line of the incision. The needle is then directed perpendicular to the skin and local anaesthetic infiltrated through the layers of the chest wall down onto the rib below the actual intercostal space. Here local is injected around the periosteum of the rib. The needle is then angled above the rib and advanced slowly until air is aspirated. The last 5mls or so of local anaesthetic is then injected into the pleural space.

### Position:

The ideal final resting place of the tube is determined by the clinical indication for insertion.

For a haemothorax the tube should be positioned posteriorly and for a pneumothorax the tube should be anteriorly positioned.

Trauma chest drains inserted in an apical and posterior direction will cover both injury patterns.

Chest tubes should be inserted so that the last hole of the drain is inside the thoracic cavity.

### Procedure:

The steps in insertion of a chest drain are as follows:

*Asepsis should be maintained at all times.*

#### **A Chest Drain Safety Checklist must be completed.**

- The area is prepped with 70% alcohol and 2% chlorhexidine solution.
- Drape patient with fenestrated drape.
- Infiltrate local anaesthesia.
- Identify site - fifth intercostal space anterior axillary line.
- Make skin incision. The incision should easily accommodate the operator's finger.
- Using a curved clamp, the track is developed by blunt dissection only. The clamp is inserted into muscle tissue and spread to split the fibres. The track is developed with the operator's finger.
- Once the track comes onto the rib, the clamp is angled just over the rib and dissection continued until the pleural is entered. Do not use the trocar.
- A finger is inserted into the pleural cavity and the area explored for pleural adhesions.

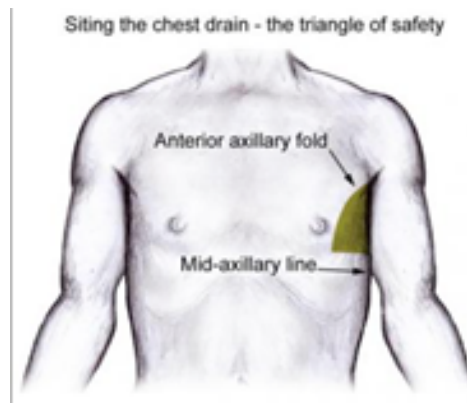
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- At this time the lung, diaphragm and heart may be felt, depending on position of the track.
- A large-bore (32 or 36F) chest tube is mounted on the clamp and passed along the track into the pleural cavity.
- The tube is connected to an underwater seal and sutured / secured in place.
- The chest is re-examined to confirm effect.
- A chest X-ray is taken to confirm placement & position.

**Safe area :**



<sup>1</sup> American College of Surgeons (2012) Advanced Trauma Life Support, Student Course Manual. ISBN: 13: 978-1-8806

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#### **CRITERIA FOR TRANSFER TO MTC**

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- **Polytrauma** – stabilise and transfer, ED to ED protocol
- **Bilateral or more than 4 unilateral rib fractures** – assess individually; consider ED to ED transfer or discuss with thoracic surgeons at MTC Switchboard: 020 8672 1255. Cardiothoracic SpR on call bleep 7370
- **Sternal fracture with significant displacement or retrosternal haematoma** – discuss with thoracic surgeons at MTC Switchboard: 020 8672 1255. Cardiothoracic SpR on call bleep 7370
- **Flail chest (clinically by failure of mechanical movement) +/- significant pulmonary contusion** – discuss with thoracic surgeons at MTC Switchboard: 020 8672 1255. Cardiothoracic SpR on call bleep 7370
- **Persistent air leak** – chest drain on suction and discuss with MTC Switchboard: 020 8672 1255. Cardiothoracic SpR on call bleep 7370

Note – 3D reconstruction of CT images should not delay transfer to MTC

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## GUIDELINES FOR MANAGEMENT OF THORACIC INJURY IN A TRAUMA UNIT

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### Principles:

- Appropriate resources available – if not then transfer to MTC
- Admit under general surgery with anaesthetic involvement for pain relief (+/- pain team referral)
- Minimum Level 1 area monitoring – Experienced nursing team; O2, CO2, Cardiac monitor (sternal fracture). Some patients may be appropriately managed on a surgical ward
- Clinical assessment + CXR / CT
- Oxygen delivery / ventilatory assistance as needed
- Analgesia – by anaesthetic team; see analgesia pathway
- Interventions to maintain ventilatory function – chest drain
- Regular chest physiotherapy
- Consider liaising with respiratory physicians if e.g. admission > 48hrs
- Involve elderly care physicians in over 70's
- Step down to appropriate ward – surgical or respiratory
- Consider discussion with thoracic surgery at MTC if mechanical failure with multiple rib fractures – selected patients may benefit from fixation

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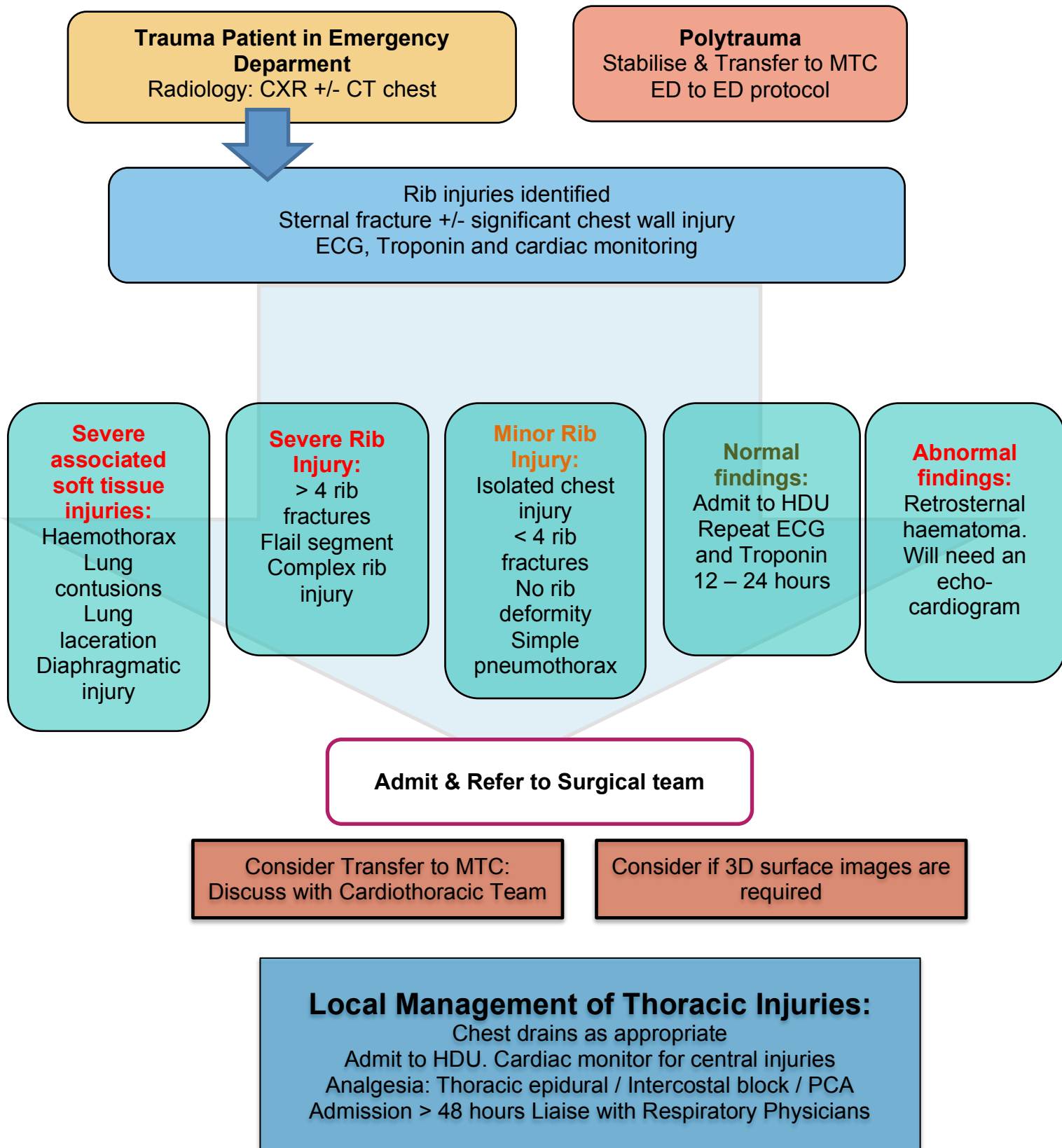
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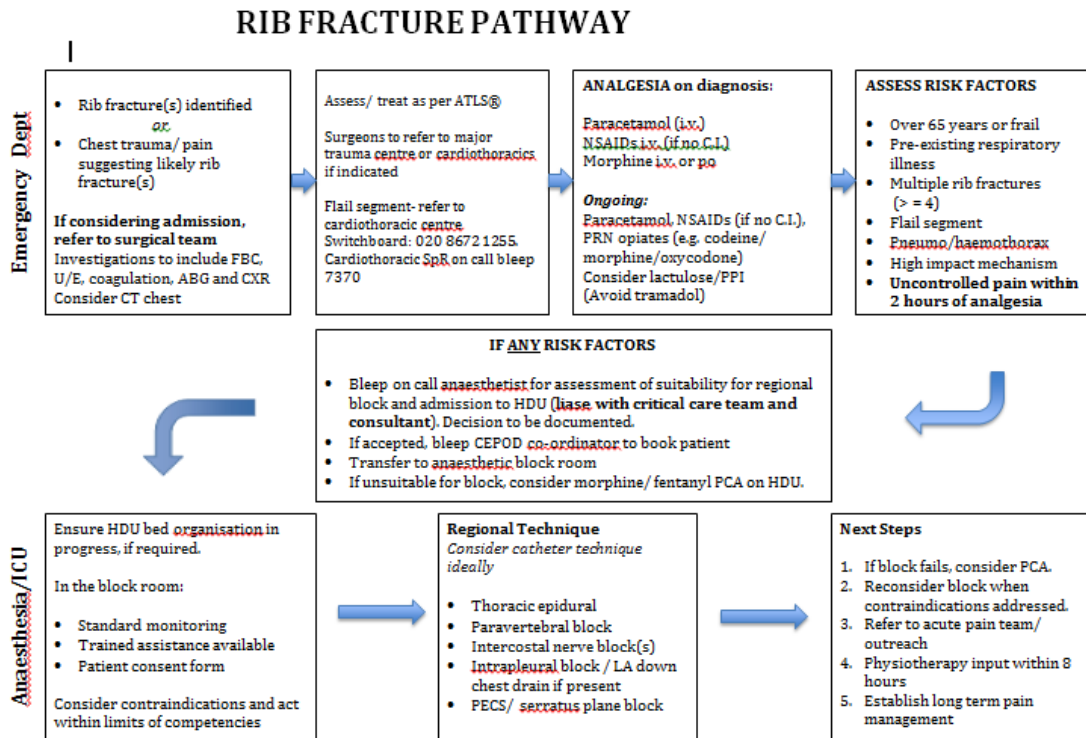
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**GUIDELINES FOR MANAGEMENT OF THORACIC INJURY (INC RIB FRACTURES) IN A TRAUMA UNIT**

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## ANALGESIC PATHWAY FOR RIB FRACTURES



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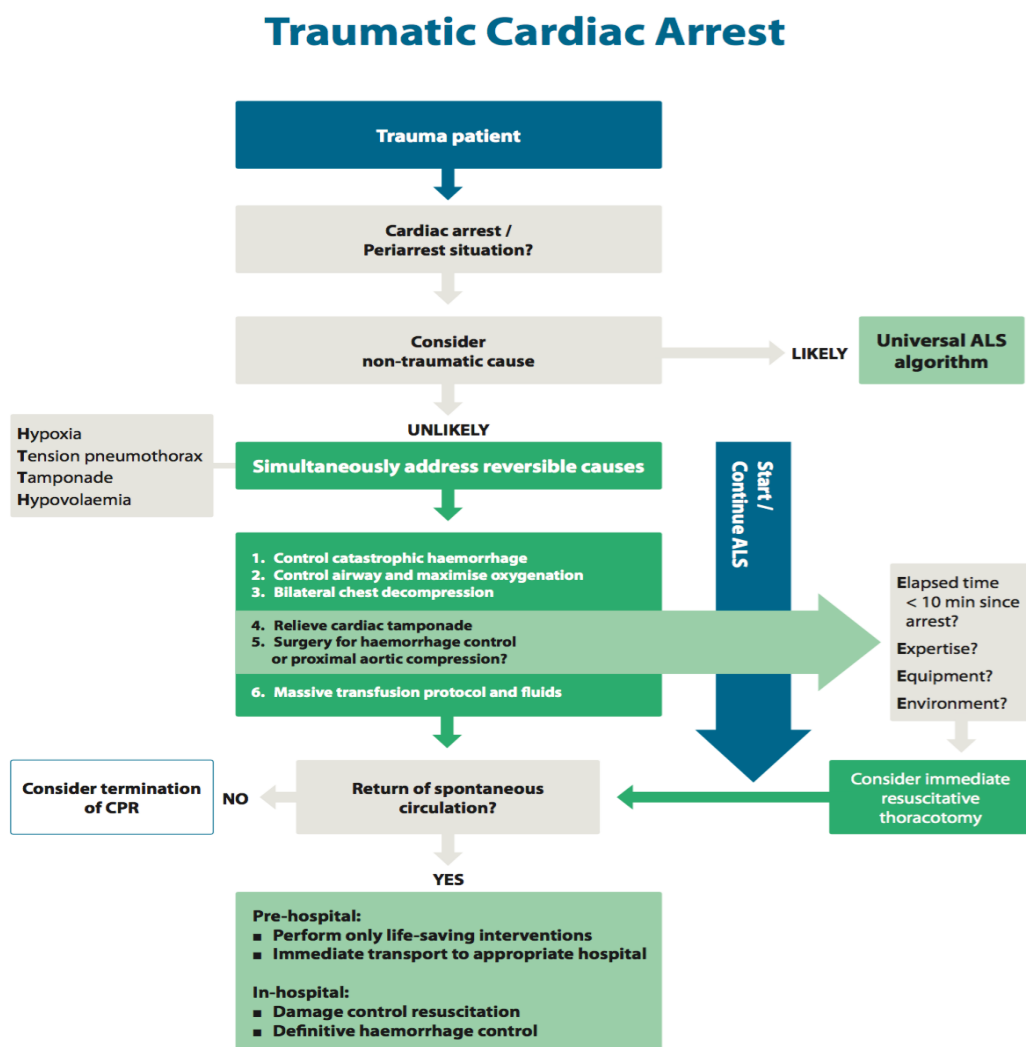
## EMERGENCY THORACOTOMY GUIDELINES

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### Indications.

- Penetrating chest trauma with loss of signs of life within the last 10 minutes
- Blunt chest trauma when tamponade release or haemorrhage control thought to be possible

### Decision making Algorithm. (ERC Guideline)



### Equipment.

- Skin prep and sterile gloves
- Scalpel (No. 22), Trauma Shears, Gigli saw (optional), Rib spreader (optional)
- Spencer-wells forceps x2, Scissors

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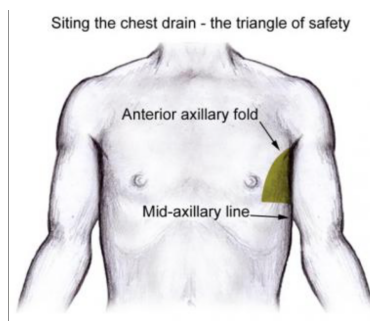
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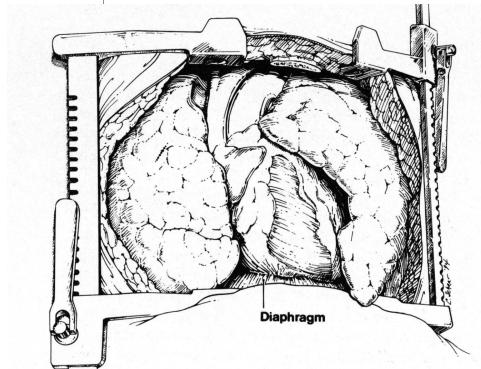
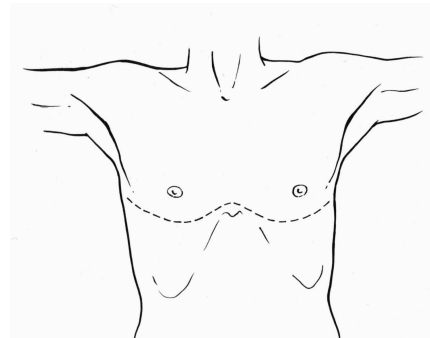
### Technique.

1. Don sterile gloves and clean the area.
2. Commence with thoracostomy hole on the most severely injured side.
3. If no ROSC repeat on the other side.
4. If no ROSC join the thoracostomies with an skin and fat/muscle incision
5. Using 'trauma shears' cut through the intercostal muscles and the sternum.
6. If the sternum will not cut the a Gigli saw may be used.
7. The chest should now open. If not then the incision can be extended posteriorly and a rib spreader used.
8. Open the pericardium – tent the pericardium between two spencer wells forceps and cut with scissors. Open the pericardium widely and anteriorly (avoiding the phrenic nerve). Deliver the heart.

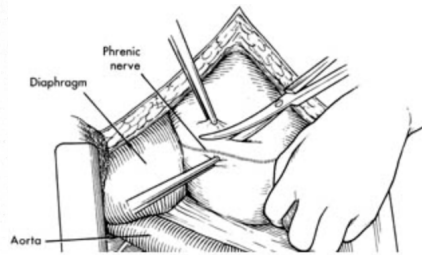
### 1. Thoracostomy holes



### 2. Clamshell Incision



### 3. Open the chest



### 4. Open the pericardium

### Aftercare/ Action on Return Of Spontaneous Circulation

- Clamp internal mammary arteries if needed
- Arrange transfer to MTC with appropriate escorts and support
- Sedation and Neuromuscular blockade as needed
- Tranexamic acid administration

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