South West London & Surrey Trauma Network

Pan Network Policy for Thoracic Trauma

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

THORACIC INJURY ASSESSMENT AND INITIAL MANAGEMENT

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

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INTERCOSTAL CHEST DRAIN - PROCEDURE INFORMATION

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) principles¹ 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, 4/5th 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.

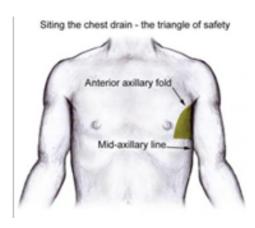
- The area is prepped with 70% alcohol and 2% chlorhexidine solution.
- Drape patient with fenestrated drape.
- Infiltrate local anaesthesia.
- Identify site fifth intercostal space anterior axillary line.
- Make skin incision. The incision should easily accommodate the operator's finger.
- Using a curved 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:



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

CRITERIA FOR TRANSFER TO MTC

- 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

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

Trauma Patient in Emergency Department

Radiology: CXR +/- CT chest

Polytrauma

Stabilise & Transfer to MTC ED to ED protocol

Rib injuries identified
Sternal fracture +/- significant chest wall injury
ECG, Troponin and cardiac monitoring

Severe associated soft tissue injuries:

Haemothorax
Lung
contusions
Lung
laceration
Diaphragmatic
injury

Severe Rib Injury:

> 4 rib fractures Flail segment Complex rib injury

Minor Rib Injury:

Isolated chest injury < 4 rib fractures No rib deformity Simple pneumothorax

Normal findings:

Admit to HDU Repeat ECG and Troponin 12 – 24 hours

Abnormal findings:

Retrosternal haematoma. Will need an echocardiogram

Admit & Refer to Surgical team

Consider Transfer to MTC: Discuss with Cardiothoracic Team

Consider if 3D surface images are required

Local Management of Thoracic Injuries:

Chest drains as appropriate

Admit to HDU. Cardiac monitor for central injuries

Analgesia: Thoracic epidural / Intercostal block / PCA

Admission > 48 hours Liaise with Respiratory Physicians

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ANALGESIC PATHWAY FOR RIB FRACTURES

RIB FRACTURE PATHWAY ANALGESIA on diagnosis: ASSESS RISK FACTORS Assess/ treat as per ATLS® Rib fracture(s) identified Dept or. Chest trauma/ pain Paracetamol (i.v.) Over 65 years or frail Surgeons to refer to major NSAIDsiv (ifno.C.I.) Pre-existing respiratory trauma centre or cardiothoracies illness suggesting likely rib Morphine i.v. or po if indicated Emergency fracture(s) Multiple rib fractures Ongoing: Paracetamol, NSAIDs (if no C.I.), (> = 4) Flail segment-refer to cardiothoracic centre. Switchboard: 020 86721255. If considering admission, Flail segment refer to surgical team PRN opiates (e.g. codeine/ Pneumo/haemothorax Investigations to include FBC, morphine/oxycodone) Cardiothoracic SpR on call bleep High impact mechanism U/E, coagulation, ABG and CXR Consider lactulose/PPI Uncontrolled pain within 2 hours of analgesia Consider CT chest (Avoid tramadol) IF ANY RISK FACTORS Bleep on call anaesthetist for assessment of suitability for regional block and admission to HDU (liase with critical care team and consultant). Decision to be documented. If accepted, bleep CEPOD co-ordinator to book patient Transfer to anaesthetic block room If unsuitable for block, consider morphine/fentanyl PCA on HDU. Regional Technique Consider catheter technique Ensure HDU bed organisation in **Next Steps** progress, if required. Anaesthesia/ICU ideally 1. If block fails, consider PCA. Reconsider block when In the block room: Thoracic epidural contraindications addressed. Standard monitoring Paravertebral block Refer to acute pain team/ Trained assistance available outreach Intercostal nerve block(s) Patient consent form Intrapleural block / LA down Physiotherapy input within 8 chest drain if present Establish long term pain PECS/ serratus plane block management within limits of competencies

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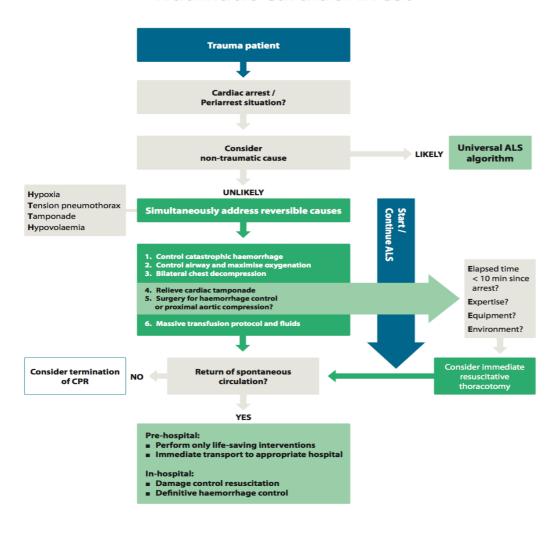
EMERGENCY THORACOTOMY GUIDELINES

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)

Traumatic Cardiac Arrest



Equipment.

Skin prep and sterile gloves

Scalpel (No. 22), Trauma Shears, Gigli saw (optional), Rib spreader (optional)

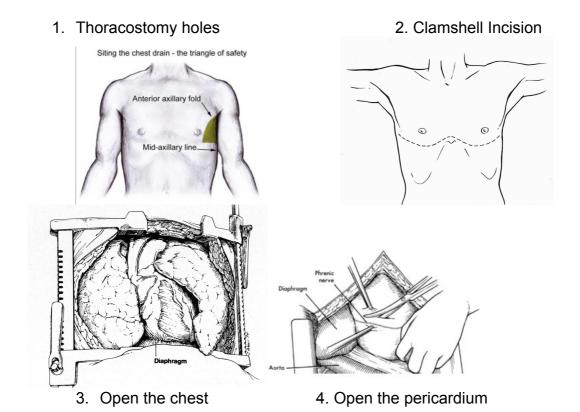
Spencer-wells forceps x2, Scissors

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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 inscision
- 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.



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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