



Thoracic Trauma

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
- Technique for Chest Drain Insertion in Trauma
- Transfer to MTC
- 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 saturation
- 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?

Intercostal Chest Drain

When performed in emergency situations, best practice should be followed along with Local Trust Policy when placing the chest tube to avoid complications from the procedure.

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.

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 are standard analgesia for trauma patients. It is best titrated to avoid subsequent respiratory depression but achieve adequate pain control. Ketamine can also be useful due to its analgesic and sedative effects.

Local Anaesthesia

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

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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 be about 30-50mm to 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.
- 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.

Transfer to MTC

Polytrauma patients should be assessed and transferred according to the Network Secondary Transfer Protocol.

The following situations may require transfer following discussion with thoracic surgeons:

- Bilateral or more than 4 unilateral rib fractures
- Sternal fractures with significant displacement or retrosternal haematoma
- Flail chest +/- pulmonary contusion
- Persistent air leak

Management in the Trauma Unit

- 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: multi-modal analgesia, regional anaesthetic techniques
- 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 patients over 70
- 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

Resuscitative Thoracotomy

Indications

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

Equipment (Trauma units are advised to have pre-prepared kits ready in the ED)

- Skin prep
- Sterile gloves
- Scalpel (no. 22)
- Spencer wells forceps x2
- Scissors
- Trauma shears
- Gigli saw (optional)
- Rib spreaders (optional)

Technique

- Don gloves and clean the area
- Perform open thoracostomy on most injured side.
- If no signs of ROSC repeat on other side
- If still no ROSC, join the thoracostomies with a skin/fat incision
- Use trauma shears to cut through intercostal muscles and sternum
- Gigli saw may be used if sternum cannot be cut with shears
- Open the chest using rib spreaders or an assistant (take care of sharp bone edges)
- Tent the pericardium with forceps and cut with with scissors
- Open the pericardium widely and anteriorly
- Evacuate any blood/clots
- Examine heart for activity, fullness and injuries to guide further management
- Perform internal cardiac massage

On return of spontaneous circulation

- Clamp internal mammary arteries
- Arrange immediate transfer to MTC
- Sedation / Analgesia / Neuromuscular blockade as required
- Tranexamic acid