

Policy for the Insertion and Management of Chest Drains

Thoracic trauma is believed to be the primary cause of death in 25% of all trauma deaths, and a significant contributing factor in a further 25-50%. Whilst such casualties are also likely to have other significant and possibly life-threatening injuries, it is essential that these injuries are identified as rapidly as possible, and life-saving procedures performed emergently to save the casualty's life.

It is not acceptable for a casualty to die from hypoxia or cardiovascular collapse resulting from pathology caused by trauma that can be treated emergently. Less than 10% of blunt trauma and 15-30% of penetrating trauma requires operative intervention; up to 85% of thoracic trauma could be treated by Trauma Physicians/Surgeons using techniques that are now well-established and taught on Trauma Life Support Courses (like the Advanced Trauma Life Support Course and the European Trauma Course).

Traumatic pneumothorax and traumatic tension pneumothorax, as well as haemothorax, are potentially immediately life-threatening as a result of their effects on the lungs and cardiovascular system. Early recognition of these injuries, by clinical or radiological/sonographic means, could ensure immediate treatment and thus prevent further deterioration in the clinical course. Traumatic pneumothorax, tension Pneumothorax and haemothorax, are pathologies which can be treated by means of pleural decompression, using needle thoracocentesis, finger thoracostomy and/or chest tube thoracostomy. These procedures have a significant risk of morbidity and mortality if performed poorly, and must therefore be performed only when indicated, and either by an experienced and competent Trauma Team member, or under direct supervision.

Whilst tube thoracostomy is undoubtedly a life-saving procedure, it is also associated with significant risks. In 2008, the NPSA issued a rapid response report following reports of 12 deaths and 15 cases of serious harm relating to chest drain insertion between 2005 and 2008. The report made the following recommendations:

- Chest drains only inserted by staff with relevant competencies and adequate supervision
- Ultrasound guidance strongly advised when inserting a drain for fluid
- Clinical guidelines are followed and staff made aware of the risks
- Identify a lead for training of all staff involved in chest drain insertion
- Written consent obtained from patients before the procedure, wherever possible
- Local incident data relating to chest drains reviewed
- Staff encouraged to report further incidents

Admittedly some of these recommendations are not wholly relevant in the context of this policy. Trauma teams in the MTC and TU should always be led by a senior physician/surgeon, ideally of Consultant level, and as such should always have the required expertise available during insertion. These procedures are generally required as an emergency in critically-unwell patients and cannot therefore be postponed. Written consent is often not possible in major trauma patients, though verbal consent is advisable if possible.

Chest drain insertion is a core competency expected of doctors doing core accident and emergency, anaesthetic, intensive care, medical, radiology, respiratory and surgical training. All doctors expected to be able to insert a chest drain should be trained using a combination of didactic lecture, simulated practice and supervised practice until considered competent. There is a hierarchy of competencies; see Appendix 1. All incidents, accidents or near misses related to the insertion and management of chest drains should be reported through the Trust Incident reporting system and reviewed by appropriately trained staff.

Tube Thoracostomy Insertion

Indications

Pneumothorax (simple and tension), haemothorax

Equipment for tube thoracostomy

Local anaesthetic, needle and syringe
Skin cleansing solution
Surgical drapes
Artery forceps
Scalpel
Appropriately sized chest drain
Suture
Dressing
Underwater drainage system correctly assembled.

Procedure

1. If conscious inform patient of procedure and obtain verbal or written consent as able. If patient is not able to consent document senior clinician making best interests decision.
2. Ensure IV access has been secured. If massive haemothorax is suspected ensure blood products are available
3. Confirm correct side for insertion and identify safe insertion site.
 - a. Fully abduct the patients arm to allow a clear approach to the axilla and lateral chest wall
 - b. Drain should be inserted in the "safe triangle" (see figure1)
 - c. If trained, and immediately available, use sonography to confirm the correct site for insertion.
 - d. When sonography is not available or possible identify the sternal angle and the medial end of the 2nd costal cartilage. Count down to the 4th or 5th ICS and make a mark 1 cm anterior to the mid axially line.

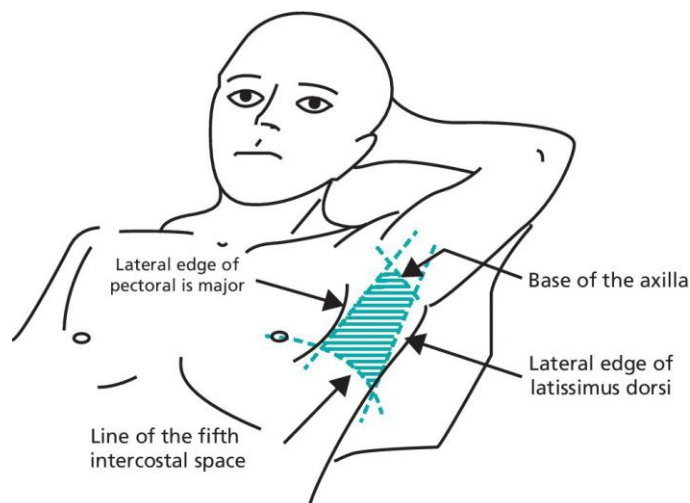


Figure 1 – safe triangle for tube thoracostomy insertion

4. Clean area fully and apply sterile drapes
5. If patient is conscious, infiltrate with local anaesthetic and consider systemic analgesia

6. Make a 3-5 cm incision along the line of the rib
7. Use blunt dissection to reach the pleura. As the neurovascular bundle runs along the lower boarder of the rib, dissect over the superior boarder of the lower rib
8. Pierce the pleura using artery forceps
9. Insert a finger into the pleural cavity and sweep around the space to detect any adhesion (or bowel in the case of ruptured diaphragm). Take care in presence of rib fractures.
10. Direct the chest drain into the pleural cavity using an artery forcep/clamp through the distal side hole in the drain.
11. Connect drain to underwater drainage system. Swinging, bubbling or the presence of blood confirm placement in the pleural cavity.
12. Secure the chest drain using sutures and an appropriate dressing
13. Re-examine the patient following insertion to assess for improvement or deterioration
14. Chest radiograph is required not only to confirm the position of the tip, but also to ensure that all the drain holes are within the pleural cavity: if one or more chest drain holes are outside of the pleural cavity, the drain will need to be reinserted as otherwise air/fluid will leak into the chest wall tissue, and result in severe emphysema. The chest drain should not simply be pushed in but should be replaced all together so as not to increase risk of infection; the same chest wall hole can be used however, following appropriate cleaning and draping of the site.

Post tube thoracostomy care

1. Patients with chest drains should be managed on wards familiar with chest drains and their management.
2. Drains should be checked daily for signs of wound infection, fluid drainage volumes and documentation for swinging and/or bubbling.
3. Accurate daily recordings of the drain and bottle readings, any changes instituted to the drain and any microbiological swabs taken should be documented appropriately on a dedicated chest drain chart.
4. Any concerns regarding the drain should be escalated to an appropriate clinician

For more information please see link to the British thoracic society guidance:

[Pleural procedures and thoracic ultrasound: British Thoracic Society pleural disease guideline 2010 | Thorax \(bmj.com\)](#)

Chest drain insertion competencies		
Stage 1 competency	CT1, CT2, or equivalent in core accident and emergency, anaesthetic, intensive care, medical, radiology, respiratory, and surgical training	Can perform chest drain insertion with supervision by an operator (level 2 or greater) who has recent experience of chest drain insertion.
Stage 2 competency	Accident and emergency, anaesthetic, intensive care, medical, radiology, respiratory, and surgical trainees ST3/equivalent and above	It is expected that doctors within this grade will have undertaken a number of chest drain insertions and have been directly supervised undertaking the procedure on at least 2 occasions in each year. Following such assessment, they may carry out the procedure independently.
Stage 3 competency	Any senior medical personnel experienced at performing these procedures, preferably with experience in ultrasound assisted drain insertion.	These doctors are experienced and independent operators and may undertake the observation and assessment of other operators carrying out the procedure.

