



**UK HEMS**

*Clinical Excellence in  
Helicopter Medicine*

## Blunt Chest Trauma

### **Aims:**

- Describe the assessment of blunt chest injury.
- Describe the types and indications for pleural drainage.
- Describe how thoracostomy differs from chest drain insertion.

### **Background:**

One of the fundamental philosophies behind the HEMS operation is to maximise oxygen delivery as early as possible, avoiding any ventilatory component to cellular hypoxia. Polytrauma patients should have pneumothoraces and any obstructive element to their shocked state corrected as soon as possible after injury. Patients should not arrive at hospital with collapsed deflated lungs contributing to oxygen debt and tissue damage. There are several interventions used to address these issues each with pros and cons and are described below.

It is important to remember that in the pre-hospital phase, injury is evolving and may not display the classic clinical features present in 'fully established' disease. It is also important to quantify the risk/benefit ratio for interventions. A damaged under-perfused brain will be highly susceptible to hypoxia. If there is doubt about the presence of a pneumothorax then it is better to be cautious and presume worst case scenario.

## **Policy:**

### **1. Assessment of Blunt Chest Injury**

#### **Common Indications of Pneumothorax**

- Surgical emphysema
- Bony crepitus to chest wall
- Flail chest
- Decreased air entry
- Wheeze
- External signs of trauma with significant mechanism of injury
- Dyspnoea (often described as tightness in breathing not shortness of breath)

Pneumothoraces are often difficult to diagnose and only become apparent after a period of positive pressure ventilation. If initial assessment does not indicate a problem, continue to re-assess the situation throughout packaging and en-route to hospital. Revise your diagnosis as indicated. Warning signs should include the following:

- Problems getting saturation readings
- Hypotension with no obvious cause
- Rising ventilator pressures

#### **Flail Chest**

The diagnosis of this condition is notoriously difficult, as the movement of the anterior chest wall appears symmetrical. A conscious effort should therefore be made to go to the feet of the patient and look up to the chest and monitor the movements for anterior flails and then to position your view vertically down on the patient for lateral flails.

## **2. Needle Thoracocentesis (Needle Chest Decompression – NCD)**

Indications:

- Peri-arrest situation before moving to a more formal thoracocentesis.
- Respiratory distress in the trapped patient breathing spontaneously.

Advantages:

- Quick

Disadvantages:

- Gives the impression chest problems have been sorted out.
- Only removes the obstructive element to the shocked state. Does not facilitate complete (if any) lung re-expansion.
- Cannula rapidly tracks back out of pleural space and ceases to function.
- The majority of people have soft tissues greater than the length of a 14G cannula in the 2nd intercostal space mid-clavicular line leading to a misguided sense of having treated the problem.

### **3. Tube Thoracocentesis [Chest Drain]**

Indications:

- Pneumothorax in a spontaneous breathing patient.
- If respiratory distress is minimal, the patient has single system disease and there is little to indicate an oxygen debt, consider leaving chest drain insertion until hospital. A typical example would be simple pneumothorax following a stabbing to the chest outside the nipple line.

Disadvantages:

Once sutured in place, the drain and its collecting system effectively become a closed system and have the potential to re-tension. There are several mechanisms that can lead to this, all of which are common when drains are inserted in the emergency situation and the patient is being moved on and off stretchers and in and out of ambulances:

- Lung or clots can block the drainage holes within the chest.
- The drain may kink within the chest.
- The drain or tubes connecting the drain to the collecting bag may kink.
- Large airway leaks can rapidly fill the collecting system

### **4. Simple Thoracostomy without Drain Insertion**

The commonest form of pleural drainage at HEMS. It can only be used in patients undergoing positive pressure ventilation. Whilst the principle of the process is the same as the ATLS technique to place a chest drain there are certain points to note and reinforce:

- The incision is usually made with the patient on the floor. The natural position for the doctor in these circumstances is to face in a cephalic direction between an abducted arm and the chest wall. In this position it is easy to undertake blunt dissection into the chest which has the tips of the Spencer Wells forceps directed superiorly to the inferior surface of the rib and the neurovascular bundle. Similarly the relative height difference also encourages an incision that is anterior to the mid-axillary line and through pectoralis major. To avoid these pitfalls the patient should be approached in a caudal direction with the arm abducted to 30-40 degrees or 90 degrees. When the initial incision is made the doctor's face should be brought down near to the plane of the incision. Blunt dissection should be directed in a caudal direction over the top of the 4th or 5th rib.

- The presence of surgical emphysema and flail segments can make placement of the incision over the 4th or 5th intercostal space difficult. The incision should always be above the nipple line (in males).
- Bleeding from the subcutaneous tissues in the axilla would normally be compressed by the drain and sutures. This effect is not present in simple thoracostomy. Blunt dissection is essential to limit the effect of any bleeding.
- The hole through intercostal muscles should allow free insertion of a finger without pushing. This may require some of the intercostal muscle being “stripped” of the rib.
- Iodine spray and clean (sterile) gloves should be used to undertake the procedure.
- If pneumothoraces are suspected and the patient is undergoing intubation, thoracostomy should be performed as soon as possible (i.e. a minute or two) after endotracheal intubation has been secured. In a peri-arrest situation needle chest decompression should be considered and bilateral thoracostomies performed while intubation is taking place. Be aware several positive pressure breathes via an ‘Ambu Bag’ can turn a small pneumothorax into a large tension.

## **Process**

- With the patient supine abduct the arm to approximately 30 degrees.
- Spray the axilla with iodine spray.
- Make a 2-inch incision along the line of the ribs in the 4 or 5th intercostal space in the mid-axillary line.
- Use a scalpel for the skin only. There after use blunt dissection to pass through the intercostal muscles.
- Make a hole sufficient to push 1 finger into the pleural cavity. Be careful when you push, as there may be fractured ribs that are sharp.
- Ensure the lung is felt up and expanded.
- Leave the soft tissues to fall back over the wound, which will act as a flap valve.
- Re-spray the wound with iodine.

**Advantages:**

- The lung can be felt / seen to re-expand.
- If the patient persists in a shocked state during transport, the thoracostomy can be “re-fingered” to ensure the lung is up, thus excluding one cause of obstructive shock.
- Avoids intubation of the chest in a non-clinical area.
- Avoids risk of re-tension caused by blockage and kinking of drainage systems.

**Disadvantages:**

- Invasive
- Risk of thoracostomies becoming occluded by patient’s arms when packaged.

**Indications:**

- Any pneumothorax in a patient undergoing positive pressure ventilation
- Actual or near traumatic cardiac arrest.
- Shocked state with no apparent cause.
- Pleural drainage is not indicated in drowning or hangings unless pneumothorax is diagnosed. Remember pleural decompression will reduce the efficiency of the ACD and impedance valve.