NTS Clinical Guideline

Title:	Pneumothorax Management		
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Signs of Pneumothorax

- Respiratory distress
- Increasing oxygen and ventilation requirement, increasing carbon dioxide
- Reduced air entry on the affected side
- Hypotension
- Metabolic acidosis
- Increased tachycardia / bradycardia
- Collapse

Tension pneumothorax occurs when intrapleural pressure is greater than atmospheric pressure.

Assessment

Following respiratory deteriorations a logical assessment will need to be made, including;

- Assessing the symmetry of chest expansion and breath sounds.
- If a pneumothorax is suspected transilluminate using the cold light (unreliable in term babies). Urgent chest x-ray if on the neonatal unit.

If intubated assess

- D – Displacement
- O – Obstruction
- P – Pneumothorax / pulmonary haemorrhage
- E – Equipment failure

Management

A small, asymptomatic pneumothorax may not require drainage. However, if transferring the baby ensure you have a recent x-ray and have discussed if a drain is required with the on-call consultant. A higher concentration of oxygen can be used to 'wash out' nitrogen. Appropriate sedation +/- muscle relaxation is important to consider.

For urgent decompression a needle thoracocentesis should be performed using a butterfly needle connected to a three way tap. Please note for transfer a chest drain must be inserted after needle drainage.

Procedure: Prepare equipment, clean skin using chlorhexidine / alcohol wipe if as an emergency. Insert needle perpendicular to chest wall in the 2nd intercostal space, mid-clavicular line above the rib. Air should be aspirated. As a temporary measure this can be placed into a bottle of sterile water whilst equipment is found for a chest drain.

Equipment for inserting a chest drain

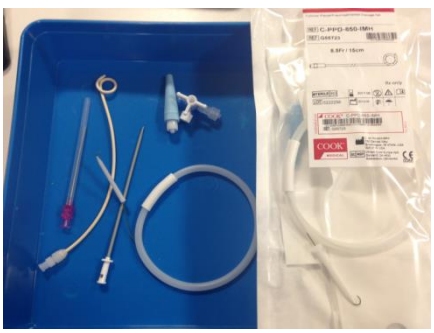
- Gown and sterile gloves
- Dressing pack
- Cleaning fluid (0.05% chlorhexidine for premature infants, 0.5% chlorhexidine for term babies)
- Chest drain – ideally use a pigtail catheter (8Fr) if available. If using trocar use size 8 Fr for < 32 weeks and Size 10 Fr > 32 weeks (and you will require artery forceps and a scalpel).
- Extension tubing
- Heimlich Flutter valve
- Steri-strips and transparent dressing
- 20ml Syringe / 10 ml syringe
- 3 way tap
- Sterile scissors
- Bottle of sterile water
- Flexible Funnel – if temporarily connecting to under water seal
- Consider if a suture will be required to secure the drain with scalpel and forceps

Technique for inserting a chest drain

- If a chest drain is required the Baby should first be intubated
- Appropriate sedation +/- muscle relaxation should be considered
- Consider local anaesthetic (lignocaine)
- Remember thermoregulation
- Prepare equipment
- Position baby with affected side raised to allow for smooth access.
- Wash and gown
- Clean skin using 0.05% chlorhexidine for premature infants and 0.5% for term infants.
- Locate position for drain – draw a line across from xiphisternum to mid axillary line. Drain to be inserted midway between this point and axilla. Palpate ribs and feel for intercostal space. Drains should be inserted at the 4th to 5th intercostal space, mid axillary line.
- Drape dressing towel over baby making a small hole in towel to expose site.

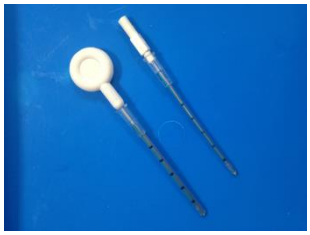
To insert a pigtail drain

- Insert the needle (with a syringe attached) into skin perpendicular to the chest wall.
- Insert the guidewire through the needle ensuring that the guidewire is inside the chest not inserting further than the mark on the wire. If resistance is felt consider if needle is still located in the appropriate site.
- Holding some gauze to the skin, carefully remove the needle ensuring that the guidewire remains in the chest.
- Use the dilator to increase the size of the opening by sliding this over the guidewire and using a gentle twisting movement.
- Remove the dilator, again leaving the guidewire in the chest and slide the chest drain over the guidewire, remove the guidewire.
- Steri-strip to skin and apply transparent dressing ensuring drain placed down against body taking care that the drain is not kinked.

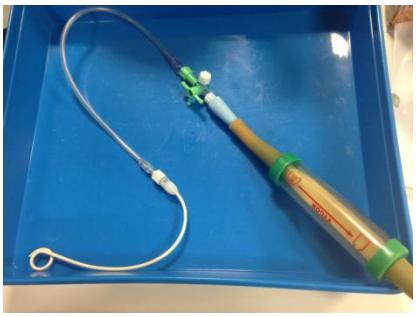


- Connect to the extension tubing, 3-way tap and Heimlich valve ensuring valve is placed in the right way (please see image) and is below the level of drain.
- Reassess and arrange an urgent x-ray.

To insert a trocar drain:



- Use a scalpel to make a small cut in the skin at the insertion point, parallel to the line of the rib.
- Gently use artery forceps to make hole for drain, separating the muscle layer. Push through to the intercostal space feeling a small "give" – there may be a slight gush of air.
- Remove trocar from drain and insert drain into prepared hole. Aim drain up towards opposite shoulder.
- Suture in place but do not use purse string suture as this causes significant scarring.
- Apply transparent dressing ensuring drain placed down against body.
- Connect to the extension tubing, 3-way tap and Heimlich valve ensuring valve is placed in the right way (please see image) and is below the level of drain.
- Reassess and urgent x-ray if on neonatal unit.



The connections between the drain and the Heimlich valve

The Heimlich valve has a picture of the lungs which should be connected onto the side of the drain

Pneumothorax during transit

If a pneumothorax is suspected during a transfer, the procedure above will have to be adapted due to the limitations of being within a vehicle. Ensure that the on-call consultant is aware of the circumstances. However, in addition please consider calling the Police or Highway Agency if on a motorway or dual carriageway hard shoulder to come and slow down traffic. Fast moving vehicles passing the stationary ambulance will cause significant turbulence that may occur at a crucial part of the procedure. Take the side down of the incubator and increase heater (on incubator and ambulance).