# Intercostal Catheters and Needle Thoracocentesis

## Needle Thoracocentesis

- Needle Thoracocentesis provides rapid emergency decompression of a tension pneumothorax
- It is a temporary life saving procedure – a definitive chest drain will be required to stabilise the ongoing air leak

## Indications

Clinical evidence of a tension pneumothorax:
- Hypoxia
- Hypotension
- Tachycardia
- Decreased air entry +/- hyperresonance on side of pneumothorax
- Deviated trachea to opposite side
- Increased difficulty in ventilation

Radiographic evidence of a tension pneumothorax in a haemodynamically stable patient

## Equipment

- 14g or 16g cannula
- 3-way tap
- 10mL syringe
- 2% Chlorhexidine/70% isopropl alcohol

## Procedure
• Identify the second intercostal space, mid clavicular line of affected hemi thorax
• Cleanse the skin
• Consider local anaesthetic in the conscious child (if time permits)
• Attach 10mL syringe to the end of the cannula
• Insert the cannula into the lower half of the second intercostal space, at 90º to the chest wall
• Aspirate the syringe as the needle enters
• Continue advancing the cannula until you aspirate air (3-4ml of 0.9% saline in the syringe may help with presence of air bubbles) or until you insert to the maximum depth
• At either of these end points remove the syringe and needle, leaving the cannula in the chest wall
• Check for improvement of the child’s clinical condition
• A 3-way tap may be applied for ongoing aspiration, if required
• Consider a second needle decompression if there is no apparent improvement
  ° 1cm adjacent to the original cannula
• Proceed to chest drain insertion as soon as possible when patient is stabilised
• Perform the CXR after the formal chest drain has been placed

**Intercostal Catheter Insertion**

- An intercostal catheter provides drainage of pleural air, blood or fluid

**Indications**

- Following a needle decompression of tension pneumothorax
- Large pneumothoraces (> 20%)
- Most traumatic haemathoraces
- Large pleural effusions

**Equipment**

- 2% Chlorhexidine/70% isopropl alcohol
- Sterile surgical drapes, gown, mask
- Sterile gloves
- Local anaesthetic, syringe and needle
- Gauze
- Scalpel blade
- Forceps for blunt dissection
- Chest drain – without trochar
- Suture – 2.0 silk
- Sterile transparent occlusive dressing
- Atrium draining system (underwater seal drain)
- 2 x large chest drain clamps

**Chest Tube Size**

Size: approximately (in Fr) 4 x ETT size (in mm)

<table>
<thead>
<tr>
<th>Age</th>
<th>Chest tube size (Fr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn</td>
<td>8-12</td>
</tr>
<tr>
<td>Infant</td>
<td>14-20</td>
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</tbody>
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### Procedure

- Position Patient
  - Supine or sitting 30° upright
  - Arm on affected side positioned above the shoulder behind the head
- Consider the need for adjunctive analgesia or sedation
  - Within limits of patient safety as determined by the clinical scenario
  - E.g. intranasal fentanyl or intravenous morphine
- Identify insertion site
  - Typically 5th intercostal space anterior to mid-axillary line
- Prepare skin with 2% Chlorhexidine/70% isopropl alcohol
- Drape area
- Infiltrate local anaesthetic
  - Superficially under the skin
  - Advance needle fully until air aspirated from pleural cavity
  - Slowly withdraw and infiltrate from deep to superficial
- Perform skin incision in the identified rib space parallel to rib (above the lower rib to avoid neurovascular bundle)
  - Length: approximately twice the width of the drain
  - Depth: until subcutaneous fat is on view
- Blunt dissect through remainder of the chest wall using blunt dissection forceps
  - Continue until the pleural space is penetrated (evidenced by a “give” or air hiss)
- Remove instruments and insert finger through the tract into the pleural space
  - Perform a single sweep with finger internally within the pleural space
  - This is only possible in older children
- Insert chest drain, without trochar, into pleural space
  - Using forceps to guide the drain, if necessary
  - Aim for apex if draining air and base if draining fluid
- Insertion depth is approximately the width of the hemithorax – ensure all holes in chest drain are within pleural space
- Connect chest drain to underwater seal drain
- Check for fogging of the tube, bubbling of underwater seal or swing of blood, fluid
- Suture drain in place
- Place an occlusive dressing over the area
- Confirm position with CXR
- Secure connection of chest drainage system with cable ties

This open technique for chest drain insertion should be used for all trauma patients. A Seldinger technique using commercial intercostal drain kits may be used for spontaneous pneumothoraces or pleural effusions after discussion with senior clinicians.
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