



NCCU CLINICAL GUIDELINES  
SECTION: 2

RESPIRATORY PROBLEMS AND MANAGEMENT

Section 2: Respiratory problems and management  
Intercostal Catheter Insertion (ICC) & Pigtail Catheters  
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## INTERCOSTAL CATHETER INSERTION (ICC), INCLUDING PIGTAIL CATHETERS

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To remove air or fluid from the pleural space or to allow lung re-expansion following surgery. **Surgical chest drains should never be put on suction unless ordered by the surgeon.** The insertion of an ICC is a painful procedure requiring analgesia and/or sedation, depending on the infant's condition.

### EQUIPMENT

This is a sterile aseptic procedure.

- Skin Prep soln as per protocol
- Lignocaine 0.5% / 1mL syringe / 25g needle
- Scalpel
- Argyle size 8 (2.7mm) chest drain catheter or Pigtail catheter (6/8.5) with trochar or introducer (A size 16Fg cannula attached to a short extension can be used instead of a chest drain on small infants at the request of the consultant.)
- Leukostrips / tegaderm (optional)
- Suture and needle
- Underwater seal drainage unit (Standard unit at KEMH/Atrium 6B).
- Heimlich valve (if applicable)
- Sterile water
- Low pressure suction unit attached to panel at 3-5 cmH<sub>2</sub>O. Non-toothed chest drain clamp (1 per drain)

### PROCEDURE

1. Consider appropriate sedation/analgesia/local anaesthesia before commencing.
2. Assemble drainage unit.
3. Position the infant supine and supported.
4. Prep the skin (care with <27weeks).
5. Placement in most cases should be in the 4th intercostal space in the mid-axillary line. Avoid the nipple.
6. Infiltrate the area before making the incision.
7. Insert argyle ICC directing it anteriorly or posteriorly as indicated (see next page for Pigtail insertion).
8. Connect drain to tubing ensuring the water level is correct, the drainage system is 'on' and the suction is on (if applicable) or drain connected to Heimlich valve if applicable.
9. If drain for pleural effusion – send specimen for analysis.
10. Secure the ICC with a suture and/or leukostrips/tegaderm as applicable.
11. Secure the tubing and drainage unit to prevent dragging and accidental removal.
12. CXR for catheter placement and resolution of pneumothorax /pleural effusion.

13. Observe ICC, tubing and drainage device for effectiveness i.e. bubbling, swinging and drainage. Maintain correct water level and suction pressure if in use. Heimlich valves may need dressing/container for drainage. Label if more than one.
14. Observe insertion site for bleeding / exudate.
15. Drainage unit / tubing should not be routinely changed, leave until full or removed.
16. Clamping is only necessary when changing unit or raising it above head height. It should be clamped for the least time possible.

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## **PIGTAIL INTERCOSTAL CATHETER INSERTION FOR PLEURAL EFFUSION OR PNEUMOTHORAX**

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The insertion of a pleural drain is a painful procedure requiring analgesia and/or sedation, depending on the infant's condition. A chest ultrasound is often performed prior to drainage to document any loculations and the point of maximal fluid collection. Pigtails are the ICC of choice in the drainage of pleural effusions.

There are 2 types of pigtail ICCs. The end of the Cook catheter is metal therefore patients cannot have an MRI with one of these catheters in situ.

- Cook 8.5 Fr (with J-wire)
- Cook Wood 6 Fr

### **ADVANTAGES OF PIGTAILS**

- Less traumatic insertion and smaller diameter therefore potentially less complications. This is particularly the case for the very preterm infant where Argyle ICCs have a high rate of complications.
- Can be used successfully to drain pneumothoraces in very preterm infants and in paediatric patients.

### **DISADVANTAGES**

Softer therefore can kink and obstruct and may not satisfactorily drain a pneumothorax where there is an ongoing air leak.

It is important to remember that the insertion of any ICC must be done with close attention to anatomy. The preferred location for both pigtail catheters is the 4<sup>th</sup> or 5<sup>th</sup> intercostal space, above a rib in the mid axillary line, well clear of the nipple (remembering the intercostal vessels run under the rib so going above a rib should miss piercing these vessels).

### **COOK 8.5FR PIGTAIL - USE THE SELDINGER APPROACH**

1. Glove and gown as for a sterile aseptic procedure
2. Prepare the skin as per NCCU protocol.
3. Insert lignocaine 0.5-1% (0.5% for preterm infants, 1% may be used for term infants) into the chosen site. Do not use more than 1mL.
4. Open the packet and assemble the needle and syringe
5. If draining pleural fluid insert needle above the rib, aim posteriorly and aspirate until fluid obtained.
6. If draining air insert needle above the rib, aim anteriorly and aspirate until air obtained.

7. Remove the syringe and advance the soft tipped j-wire (j-end first) through the needle. Only about 5cm of the wire needs to be in the chest.
8. Remove the needle, holding onto the J-wire where it exits the body as soon as the needle tip leaves the skin to avoid inadvertently removing the j-wire.
9. Advance the dilator over the wire using a rotating action to pass through the chest wall. Only need the dilator to enter the chest cavity and remove the dilator (again holding onto the J-wire where it exits the body as soon as the dilator leaves the skin to avoid inadvertently removing the j-wire
10. Feed the pigtail catheter over the wire, and advance through the chest wall into the chest cavity.
11. Remove the J-wire
12. Suture or use steri-strips to anchor catheter to skin
13. Place tegaderm dressing over catheter insertion site, if gestation allows.
14. Connect the catheter to drainage unit, making sure there is a 3 way tap attached to the pigtail
15. Confirm location of catheter with Xray
16. Document procedure in the medical notes, noting Xray findings.

### **COOK WOOD 6FR PIGTAIL**

This pigtail is inserted using a technique akin to the emergency draining of a pneumothorax using an IV cannula.

1. Glove and gown as for a sterile aseptic procedure
2. Prepare the skin as per NCCU protocol.
3. Insert lignocaine 0.5-1% (0.5% for preterm infants, 1% may be used for term infants) into the chosen site. Do not use more than 1mL.
4. Open the packet and assemble the catheter and needle, using the grey plastic straightener and then peel this off.
5. Attach a syringe to the needle
6. Pass the needle through the chest wall (see anatomy above for description of location) and as soon as air is aspirated, maintain a stable position and slide the pigtail catheter off the introducer needle
7. Connect a 3-way tap and luerlock to drainage unit.
8. Suture or use steri-strips to anchor catheter to skin and cover insertion site with tegaderm dressing if skin allows.
9. Confirm location of catheter with Xray
10. Always send fluid for microscopy & culture, as well as biochemistry (glucose, protein, triglycerides - for a chylous effusion).
11. Document procedure in the medical notes, noting Xray findings.