Pneumothroax aspiration

Indications: therapeutic drainage of a pneumothorax (primary pneumothorax if >2cm/symptomatic; asymptomatic secondary pneumothorax 1-2cm)
Relative contraindications: coagulopathy (INR >1.4, platelets <50, therapeutic anticoagulant <24 hours, clopidogrel <7days)

Introduction

- **W**ash hands, **I**ntroduce self, **P**atients name & DOB & wrist band, **E**xplain procedure and get written consent
    - Risks: pain; bleeding; infection; organ puncture & damage; subcutaneous emphysema; persistent site leak; re-expansion pulmonary oedema
- **Check patients clotting screen, platelet count and if they have been on an therapeutic anticoagulant/clopidogrel**
- Ensure assistant is available
- Confirm the correct side to aspirate
    1. Review chest X-ray
    2. Examine patient's chest

Preparation part

- Wash hands and apply apron
- Clean a trolley
- Gather equipment onto bottom of trolley (think through what you need in order)
    - Sterile pack
    - Cleansing snap-sponge (iodine or alcohol/chlorhexidine) x2
    - Sterile drape with hole in centre (or 2-3 drapes without holes in)
    - 10ml syringe and 3 needles (1 orange *25G*, 2 green *21G*) *for local anaesthetic*
    - For pneumothorax aspiration
        - Grey *16G* or green *18G* intravenous cannula
        - 3-way stopcock with extension tube
        - 50ml syringe
    - Cotton gauze swabs (used whenever needed throughout procedure to dry/clean sterile area)
    - Sterile dressing
    - Equipment to be kept outside of the sterile field
        - Sterile gloves
        - 10ml 1% lidocaine (maximum 3mg/kg – *note 1ml 1% lidocaine = 10mg*)
- Walk to patient
- Wash hands
- Open sterile pack to form a sterile field on the top of the trolley
- Open packets (without touching the instruments themselves) and drop sterile instruments neatly into the sterile field
- Pick up waste bag from sterile pack without touching anything else and stick to side of trolley

Patient part

Positioning and exposure

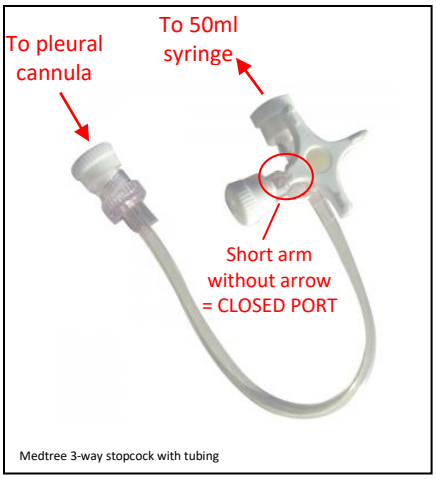
- Expose patient's chest
- Position patient lying supine at 45˚
- Locate insertion point:
    - 2nd intercostal space, mid-clavicular line
    - Just above the 3rd rib (to avoid the neurovascular bundle on the inferior rib surface of the 2nd rib above)
- Use different site if there is overlying infection
- Confirm pneumothorax is present at proposed entry site
    - Percuss chest to confirm hyper-resonance and auscultate for reduced breath sounds
- Mark insertion point with a skin pen/indentation

Preparation

- Wash hands
- Apply sterile gloves using sterile technique (open pack on a side surface)
- Sterilize area
    - Work from middle outwards in one spiral motion (using cleansing snap-sponge)
    - Repeat with second cleansing snap-sponge
    - *Discard used snap-sponges as they are no longer sterile, but note all equipment used after this (including all needles) can be returned to the sterile field after use*
    - Apply the sterile drape over the patient's body so that the hole is in the correct place to allow access to the insertion site (or apply 2-3 drapes centred around exposed insertion site if no holes)
- Anaesthetise tract
    - Ask assistant to snap open lidocaine bottle and hold open upside-down

- Draw up lidocaine using 1st green needle on 10 ml syringe and expel any air
- Change to the orange needle and insert at an acute angle to form a single subcutaneous bleb around insertion site in order to anaesthetise the skin
- Change to the 2nd green needle and insert perpendicular to the skin to anaesthetise the insertion tract
  - This is done by instilling lidocaine in small increments of increasing depth – only anaesthetise the intercostal muscles and pleura (the fat in between has no nerves)
  - Always aspirate when advancing the needle (so you know when you get to the pleural cavity) and aspirate before injecting lidocaine (to check you are not in a vessel)
  - When air is aspirated, note entry depth, then withdraw the needle
  - Aim to leave around 2ml lidocaine in the syringe
  - **DO NOT PROCEED** if you do not get an aspirate!
- Wait 1 minute to work

Pneumothorax aspiration



Medtree 3-way stopcock with tubing

- Expel the air from the lidocaine syringe and attach it to the end of the cannula
- Inert cannula perpendicular to the skin into the insertion tract
- Aspirate during infiltration
- When air is aspirated (bubbles seen through the lidocaine left in the syringe), advance the needle 1-2mm further (to ensure the cannula tip has fully entered the intercostal space)
- Advance the cannula body off the end of the needle, whilst holding the needle still
- Ask the patient to exhale and then remove the needle and syringe, leaving the cannula tubing in place
- Immediately cover the cannula opening with your thumb (to stop air entering the pleural cavity)
- Attach the tubing of the 3-way stopcock to the cannula opening (ensure all caps are removed and the pleural cannula port is closed)
- Ask the assistant to apply sterile gloves and to hold the cannula body in place
- Now attach the 50ml syringe to the back-port of the 3-way stopcock
- Aspirating
  - Close the side-port of the 3-way stopcock
  - Aspirate 50ml of air from the pleural cavity
  - Close the pleural cannula port and expel the 50ml of air (it will come out via the side port into the environment
  - Close the side port again to repeat the aspiration
  - Continue this cycle (asking the assistant to count the number of syringes aspirated) until there is no longer any air to aspirate or 2.5L has been aspirated (signifies air leak)
  - *Note the closed tap of the 3-way stopcock should be alternated between the pleural cannula port and the side port (the 50ml syringe port or the stopcock side with no port should never be closed as this would allow air to communicate between the environment and the pleural cavity, which could allow air to enter the pleural cavity)*
- Remove cannula

Finally

- Dress wound with airtight dressing

To complete

- Thank patient and cover them
- Bin waste and gloves, dispose of sharps safely in sharps bin, clean trolley and wash hands
- Fully document procedure in patients notes
- Request post-procedure chest X-ray
- Observe patient for 6 hours post-procedure
- Advise patient they can never go diving (unless they have pleurodesis) and that smoking increases risk of recurrence