Academic Department of Critical Care
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CVC Insertion and Removal in Critical Care

Aim: To provide key points for safe and effective insertion and removal of Central Venous Catheters in Critical Care

Scope: All Adult patients in Critical Care. This SOP describes key safety points, assuming the reader is already competent in CVC insertion and removal, so it is not a step by step guide

Reducing risk of allergy

- Confirm no allergy to skin preparation or products impregnated in line

Reducing task fixation

- Ensure adequate monitoring – ECG, SpO2, BP as minimum
- Ensure you have another colleague in the bed space during the line insertion. This is necessary to observe the patient, their monitoring and help with procedural tasks

Reducing the risk of air embolism

- Patient positioning – bed angle should be < 0 degrees for subclavian or internal jugular lines. Femoral lines should be placed with the patient supine.
- All ports should be flushed prior to line insertion (this will also ensure patency of the lumens)
- All but the distal port, open to permit passage of the guidewire, should be clamped or closed with a sterile bung

Sterility and personal protective precautions

- Hat, mask, gloves, gown, fenestrated drapes and eye protection should be worn
- A fresh site should be used unless urgent requirement
- 2% Chlorhexidine with 70% Isopropyl alcohol preparation from planned insertion point outwards – allow to dry
- Clean blood from site post procedure and apply transparent occlusive dressing

Reducing risk of local anaesthetic or chlorhexidine injection

- Use a closed system for saline flushes. A 100ml bag of normal saline with a blunt fill needle inserted would be ideal.
- Use a sealed Chlorhexidine stick

Reducing risk of needle stick

- Use blunt fill needles for drawing up saline or local anaesthetic
- Never push a suture towards your own fingers
- Ensure you are given undistracted “focus” time when handling any sharps

Reducing risk of accidental removal

- Suture CVC to skin with 4 point fixation

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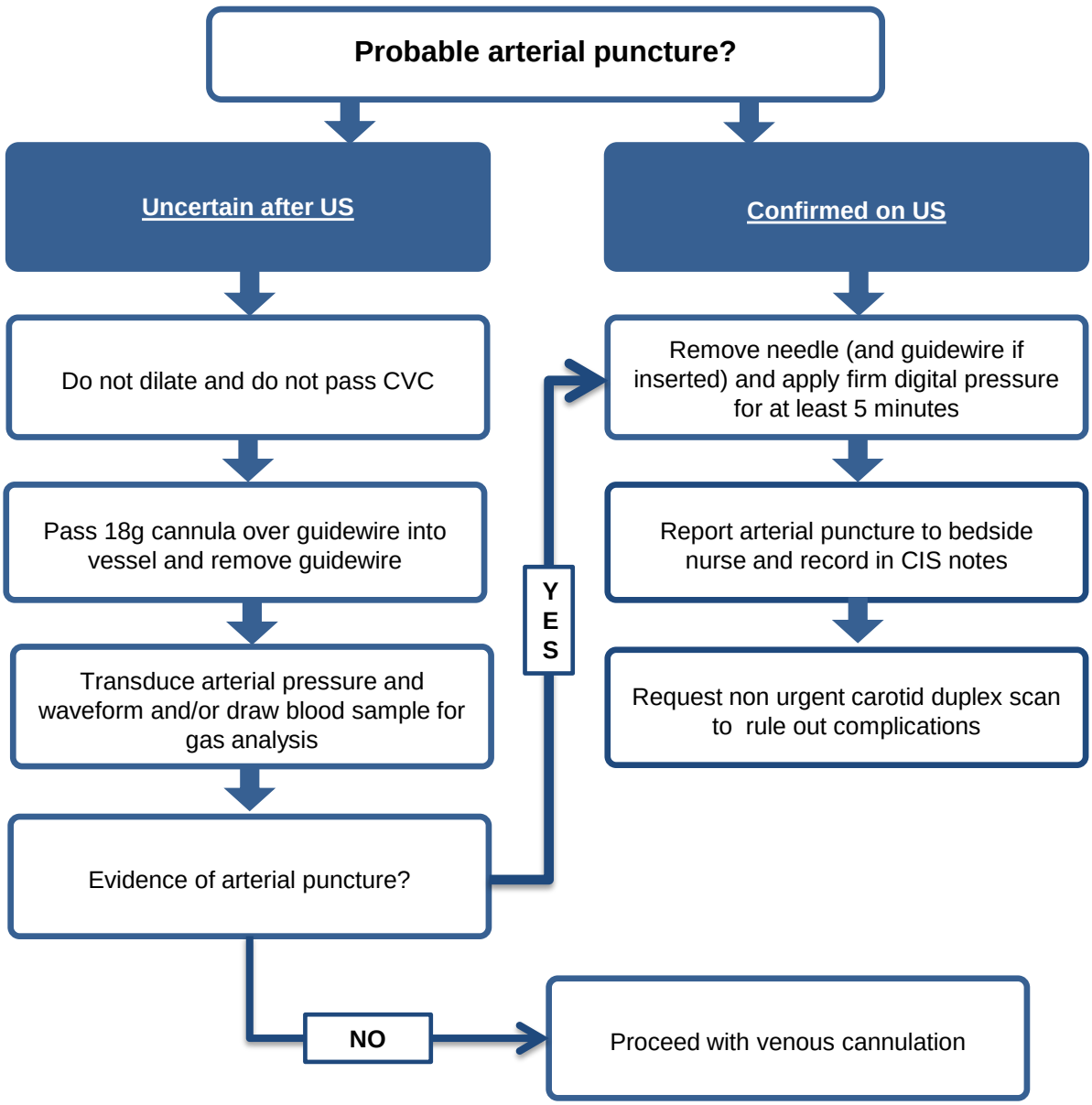
Reducing risk of arterial puncture/dilation

- Use real time US guidance and consider in plane technique to ensure needle depth clearly seen at point of vein puncture
- Confirm guidewire position in vein with US prior to dilation
- Transduce the CVP before proceduralist leaves the bedspace to ensure not an arterial trace (note we however do not transduce vascaths)



If artery dilated and CVC inserted into artery

- Do not remove catheter
- Discuss urgently with vascular surgeons

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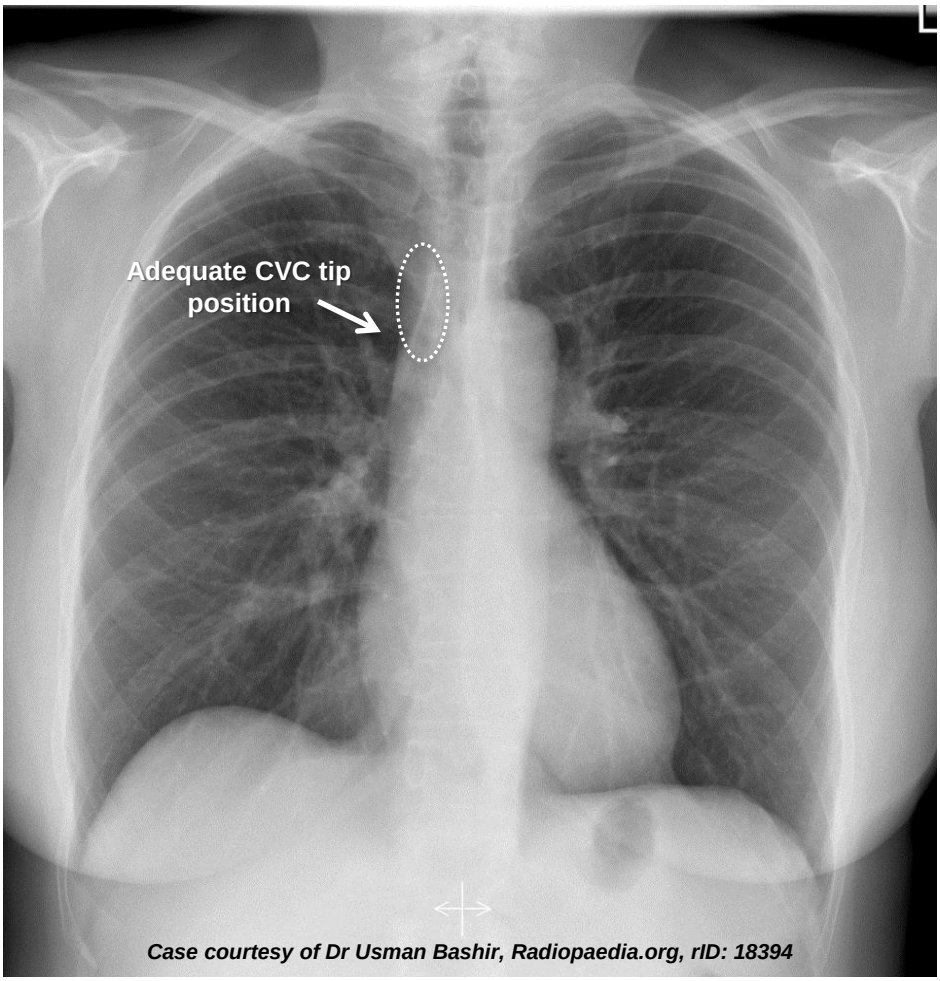
Reducing risk of retained guidewire

- Retain view of +/- hands on guidewire during procedure
- Guidewire removal should be completed before attempting aspiration or flushing of any ports on an inserted line
- Do not allow yourself to be distracted when exchanging catheter over guidewire
- Confirm guidewire removal verbally with bedside colleague

Reviewing imaging post subclavian or internal jugular line insertion

- Confirm date, time and patient ID to ensure you are reviewing the correct radiograph
- Review for pneumothorax, haemothorax, enlarged cardiac outline and line position
- Tip of CVC should be within in the superior vena cava, just superior to the right atrium – radiographically represented level of the origin of the right main bronchus
- When inserting line from the left side, the tip should not be abutting the side wall of the superior vena cava
- Document line depth at skin at the time of xray to aid future assessment in event of line migration



Case courtesy of Dr Usman Bashir, Radiopaedia.org, rID: 18394

Ensuring traceability of adverse events

- Document procedure in CIS including lot number of line inserted

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Reducing risk around CVC Removal

- Any qualified nurse who has been assessed as competent and who follows these guidelines can remove **Non-tunnelled** CVCs.
- Y**ou may need assistance** during this procedure: always liaise with in an adjoining bedspace, a nurse nearby or the nurse in charge before starting
- **Check patient's coagulation status**. If there is an increased risk of bleeding discuss with medical team before proceeding. If platelets are < 50, platelets should be administered immediately prior to the procedure. If the patient is anticoagulated, this should be managed as for surgery.
- **The risk of air embolism increases if patient is dehydrated, is unable to lie flat, or has an uncontrolled cough.** Only proceed if satisfied that it is safe to do so.
- **Use aseptic technique** throughout.
- **Lie the patient flat and tip the head of the bed downward** to reduce the risk of air embolism (except femoral catheters).
- **Remove the dressing**. If there is any sign of infection, take a swab of the exit site. **Remove any stitches**.
- **Ask patient to perform Valsalva's manoeuvre** (i.e. take a deep breath, hold it, and bear down). If patient unable to do this, remove the catheter during expiration and NEVER when the patient is breathing in, as this will increase the risk of air being sucked into the venous system.
- **Gently and swiftly pull out the catheter** and immediately apply pressure to the site using sterile gauze. The patient can now breathe normally and the bed can be returned to the flat position.
- **Continue applying pressure to the exit site for three minutes** (or longer in cases of deranged clotting).
- **If systemic infection is suspected**, use sterile scissors to cut off the tip of the catheter and without contaminating it drop it into a dry sterile specimen pot. Send it to microbiology for culture.
- **Apply a sterile occlusive dressing** to prevent air from entering the venous system.
- **Advise the patient to lie flat for 30 minutes**.
- **During this time observe patient** for signs of haematoma (i.e., swelling, pain, altered voice, airway obstruction).
- **The wound should be kept dry for 5 to 7 days** and the wound monitored until healed.

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