

Central Venous Catheters

AKA - “central line”, “CVC”

What is it?

A catheter inserted into a large, central vein - this is usually the internal jugular, femoral or, less commonly, the subclavian vein.

For CVCs inserted into the internal jugular and subclavian veins, the tip of the catheter should sit in the superior vena cava whilst the tip of a CVC inserted into the femoral vein should sit in the inferior vena cava.

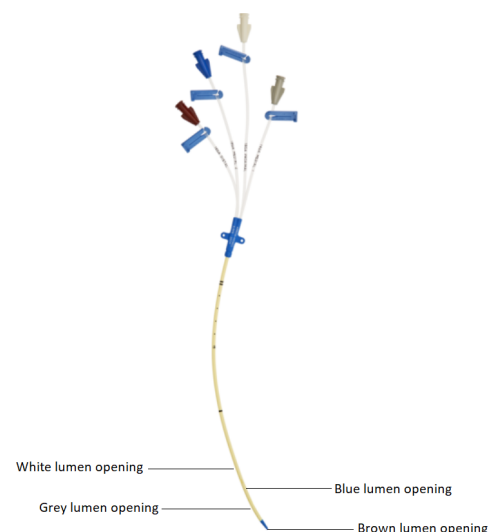
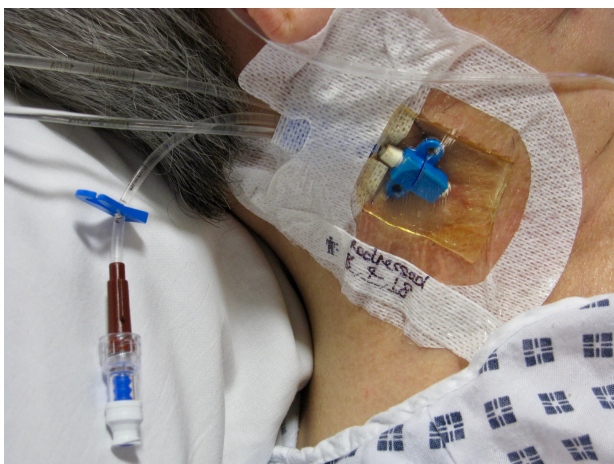
There are multiple lumens which correspond to fenestrations at different positions in the catheter. The most distal lumen should be attached to a pressure transducer followed by a bag of 0.9% saline pressurised to 300mmHg.

How does it work?

The larger size of these vessels and the greater flow rate of blood dilutes medication which would otherwise cause vascular irritation or severe vasoconstriction when given via a peripheral line. All other medications suitable for IV administration can be given through a CVC too.

Similar to an arterial line, fluid from a pressurised bag continuously flushes through the line at a slow rate to prevent occlusion of the line. Central venous pressure (CVP) is transmitted via the column of 0.9% saline in the line to a diaphragm in the transducer. This produces the CVP waveform displayed on monitoring devices.

What does it look like?



What does it do?

- Provides a means for administering potent, highly concentrated and vasoactive medications which are not suitable for peripheral administration.
- Measures the central venous pressure which can be used as an adjunct to assess volume status.
- Enables venous blood sampling.

What can go wrong?

The most **common** complications and how to deal with them:

- Infection and 'line sepsis'
 - → Remove the CVC, send the tip for culture and commence antibiotics
- Bleeding
 - → Apply prolonged direct pressure.
- Vein thrombosis
 - → Doppler ultrasound to confirm the diagnosis and consider anticoagulation.

The most **serious** complication:

- Infection and 'line sepsis'
 - → Remove the CVC, send the tip for culture and commence appropriate antibiotics

Key safety point

You may be asked to check a chest X-ray of a patient who has had an internal jugular or subclavian CVC inserted to ensure it is safe to use. You should ask for help if you are unsure but here is a general guide of what you should check for:

- Absence of the metal guidewire used for insertion,
- Tip position:
 - In the superior vena cava (equivalent to the level of the carina or 1-2cm above this),
 - Pointing inferiorly and not directly abutting the lateral wall of the vessel,
- Pneumothorax
- Enlarged cardiac silhouette (possibly indicating myocardial injury and haemopericardium).

Here is a link to a visual guide:

https://www.radiologymasterclass.co.uk/tutorials/chest/chest_tubes/chest_xray_central_line_anatomy

Other notes

CVCs are usually left in situ no longer than 7-10 days.

Further reading

Description of the central venous waveform.