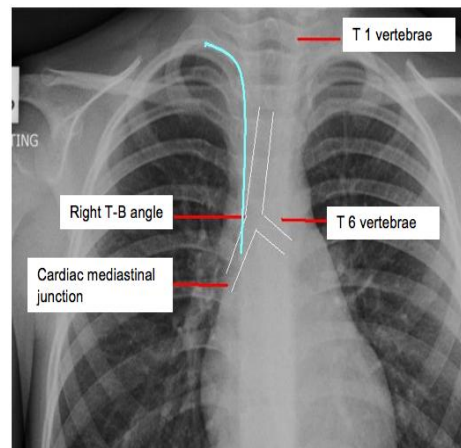
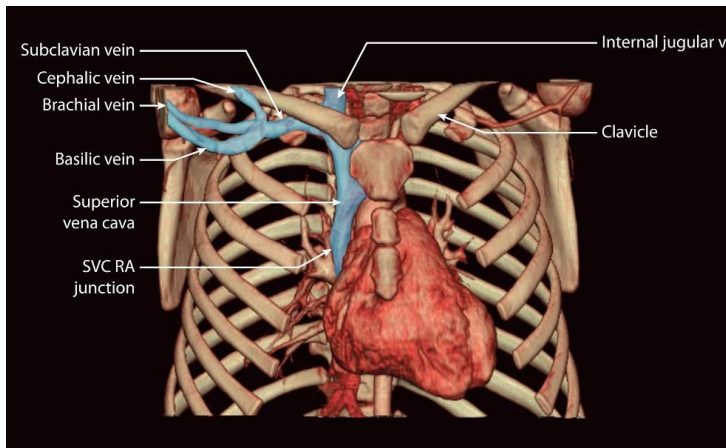


CVAD TIP POSITION

Tip position for upper venous system CVADs

- The ideal tip position is the lower SVC
- A tip left in any other position is more likely to result in complications.
- The end of the catheter should lie parallel to SVC wall: tips positioned high in the SVC abutting the wall can cause erosion, perforation & predispose to thrombosis
- If positioned too high the catheter can flick out of the SVC and upwards into the neck with patient arm movement
- Tips positioned too low can enter the heart, and risk perforation and arrhythmias



Anatomical landmarks for tip position

- The most reliable anatomical landmark for the lower SVC in children is one vertebral body below the carina (consensus from RCH Interventional Radiology Department and available paediatric literature)
- **Less reliable landmarks of lower SVC** include where the right superior cardiac shadow meets the mediastinal edge (the drawback is that this is obscured by the thymus in young children) and the T6 thoracic vertebrae (count down from the T1 Vertebrae which is joined by first rib)

Further Advice on positioning using on table image intensifier screening

- During continual x-ray screening the CVAD tip will move with the heart beat if it is positioned in the atrium or ventricle and will become still when withdrawn into the SVC
- The image lag on an image intensifier means that sometimes the fast moving catheter tip in the heart (RA or RV) may not be seen due to image blur and only the stationary part of the catheter in the SVC may be visible on quick examination of the II image. It is important that the catheter tip be identified with confidence otherwise the proceduralist may be falsely reassured that the catheter tip is correctly positioned. A catheter may not be seen on the lower resolution image intensifier captured image
- If there is any doubt, a radiopaque dye (1-2 ml of Isovue 300 may be used to identify tip position (see "use of radiopaque dye") or a CXR should be obtained for confirmation.

Tip position for lower venous system CVADs

- **Lower venous system PICC/ UVC:** Position at/ just below diaphragm
 - L5 is the level of the lower border of the IVC – position PICCs above this
- **CVC/ Vascaths:** Position in the lower IVC
- Avoid L1 level – the renal veins are at this level
- A good catheter position is parallel to the vertebral column and above L5

X-raying CVADS inserted peri-operatively

Simple CVCs inserted for intra-operative use

May be used prior to imaging provided the majority of the following criteria are met

- uncomplicated insertion with no concerns re line position
- ultrasound used for insertion of IJV lines
- transduced pressure wave confirms placement in SVC
- ventricular ectopic beats on ECG with wire placement
- free aspiration of blood from all the lumens

An x-ray must be performed at the end of the case; this can be done in theatre, recovery or PICU/ NNU.

Tip position needs to be documented on the CVAD sticker in the anaesthetic chart

NOTE: if there is any doubt that the CVC is in a central vein an x-ray should be taken prior to use

If re-positioning the CVAD will require a second anaesthetic or sedation it is highly recommended that the x-ray be performed whilst the patient is still anaesthetised

PICCs and tunnelled CVCs

- Require on table image intensifier to confirm position