

How to Avoid Malpositioning of Central Venous Catheter Using Ultrasound?

The Editor,

Central venous catheter (CVC) placement is a common procedure done in the practice of anesthesia and critical care medicine for several indications. The right internal jugular vein (IJV) is usually preferred as it has a straight course and has less tendency for thrombosis and venous stenosis.^[1] Arrhythmias on negotiating a guidewire during CVC insertion is considered as a confirmatory sign of entering right atrium (RA) by many clinicians. Atrial and ventricular premature contractions are the most common however supraventricular tachycardia can also result when the guide wire touches atrioventricular node for a prolonged duration.^[2] Electrocardiographic (ECG) guidance is also used for confirming correct entry of CVC into superior vena cava (SVC) and RA. However, it requires special equipment and Schummer *et al.* described that increase in P wave size need not always correspond with the entry into of guide wire into RA. Moreover, ECG guidance is also unable to distinguish between venous and arterial catheter placement.^[3]

CVC under ultrasound (US) guidance is considered standard of care.^[4] The needle is introduced under US guidance using either an out of a plane or an oblique approach to puncture the vein in real time. Most clinicians remove the US probe once the vein is punctured. A guide wire is inserted, and the CVC is introduced in the vein after dilating the skin. A chest radiograph is used to confirm the position of catheter after the procedure. The incidence of CVC malposition can be up to 5.01%.^[5] Malpositioned CVC have been found occupying arteries, mediastinum, pleura, pericardium, trachea, esophagus, and subarachnoid space. Once malposition is confirmed

on chest radiograph, the CVC is usually rewired redirected/repositioned over a guide wire with or without fluoroscopy. The process of repositioning not only adds to patient's discomfort and anxiety, it also delays further treatment for the patient. Repositioning can also compromise sterility.

In our practice, we include the supraclavicular area during sterile preparation and perform a scan of the area with the probe in caudal orientation once the guide wire is inserted. This way, one can follow the guide wire going down into SVC/RA. In case the wire is not visible, the probe is moved medially or laterally to trace the guide wire. Figure 1 shows a guide wire which was inserted through right IJV, and instead of going down it took a right turn to enter the right subclavian vein (SCV). This can be repositioned in the same sitting before inserting the CVC by withdrawing the guide wire in real time till the right turn vanishes [Figure 2]. By rotating the guide wire, it is maneuvered in such a way that it goes down into SVC/RA. By following this technique, another procedure involving readjustment can be avoided. While cannulating the left IJV, the wire would be seen taking a right turn on US for entering the RA/SVC, and the guide wire should not be seen inside the left SCV in the supraclavicular area.

In conclusion, we suggest to use US not only for puncturing a central vein but also to ensure that the catheter enters the destined place instead of getting malpositioned.

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Figure 1: Guide wire turning right, into subclavian vein instead of superior vena cava



Figure 2: Guide wire entering superior vena cava after rewiring in the same setting before introducing the central venous catheter

Conflicts of interest

There are no conflicts of interest.

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