Case Report

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Central Line Necklace

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Abstract

A 25-year-old female presented with altered sensorium and left lower limb arterio-venous thrombosis. The patient has a history of young stroke (post mechanical thrombectomy status). Detailed evaluation suggested that patient has extensive venous thrombosis all over the upper limb and neck veins. Considering a difficult venous access, central line was planned in the left internal jugular vein. Chest x-ray done after placing the central line showed displacement of catheter tip.

Keywords: Central line, Jugular vein; CVADs; Catheter.

INTRODUCTION

Central venous access devices (CVADs) are used for short or long-term infusion of fluids, medications and monitoring, or when establishing a peripheral venous access is not possible or difficult. CVADs can be inserted into the subclavian or jugular vein as centrally inserted central venous catheters (CICCs or conventionally called CVCs). The main risks of central venous access devices misplacement include infections, bleeding, perforation of the vessel or organ, and difficulty in removing the device. Misplacement can also lead to catheter related bloodstream infections and thrombosis, which can result in serious complications such as sepsis and pulmonary embolism. Prompt recognition and correction of misplacement are crucial to reduce these risks and improve patient outcomes.

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CASE CAPSULE

A 25-year-old female presented with altered sensorium and left lower limb arterio-venous thrombosis. The patient has a history of young stroke (post mechanical thrombectomy status). Detailed evaluation suggested that patient has extensive venous thrombosis all over the upper limb and neck veins. Considering a difficult venous access, central line was planned in the left internal jugular vein. Chest x-ray done after placing the central line showed displacement of catheter tip. (Fig. 1)

Where is the "ideal" catheter tip location and how do you place the catheter tip correctly?

The tip of the catheter should be in a central vein (Superior Vena Cava, SVC, or Inferior Vena Cava, IVC), close to the cavo-atrial junction.

- Ideally outside of the pericardial sac.
- Parallel with the long axis of the vein.

- The tip does not abut the vein or heart wall at an acute angle or end on.
- The ideal catheter position is the area between the lower third of vena cava superior and upper the third of right atrium.

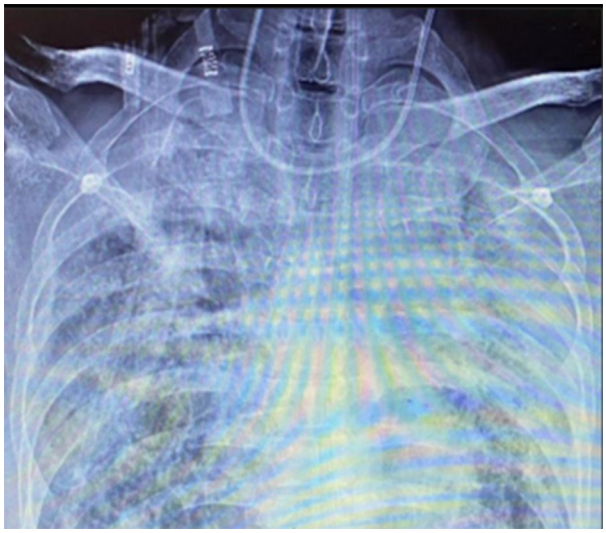

Fig. 1: Chest x-ray

How to prevent Malposition during the procedure?

The positioning of guidewire has a role. A randomized, controlled study, suggest that keeping the guide wire J-tip directed caudad increased correct placement of central venous catheters towards the right atrium.[1] It was also postulated that there is a relationship between the length of the guidewire and catheter malposition. Some authors implicate excessive guidewire length as cause for this complication and recommends a guidewire length of 18 cm which should be considered as the upper limit.[2] It is also seen that a steep head low to fill the central lines is associated with increased venous pressure which preferentially direct the floating guidewire to the neck vein.

How to detect Malposition while placing?

- Aspiration of blood; free flow should be tested using a syringe of at least 20mL in volume, and the aspiration of blood should be without resistance (or back flow into the infusion aided by gravity).

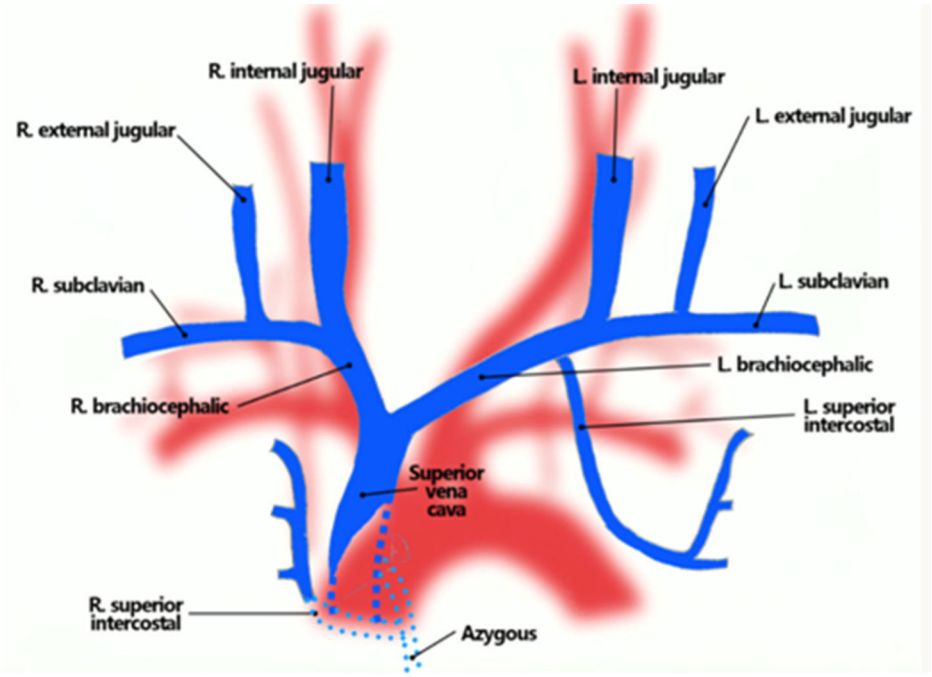

Fig. 2: Major Veins Superior to Heart

- Rapid infusion of saline, unobstructed flow.
- Observing the ECG tracings during guidewire placement, configuration of 'p' wave.
- Observing the classic central venous pressure tracings.
- Using the real-time ultrasound guided technique for puncturing and cannulating the internal jugular vein.[3] It has been shown that under ultrasound guidance, the jugular vein could be entered on the first attempt in 83.3% of patients.

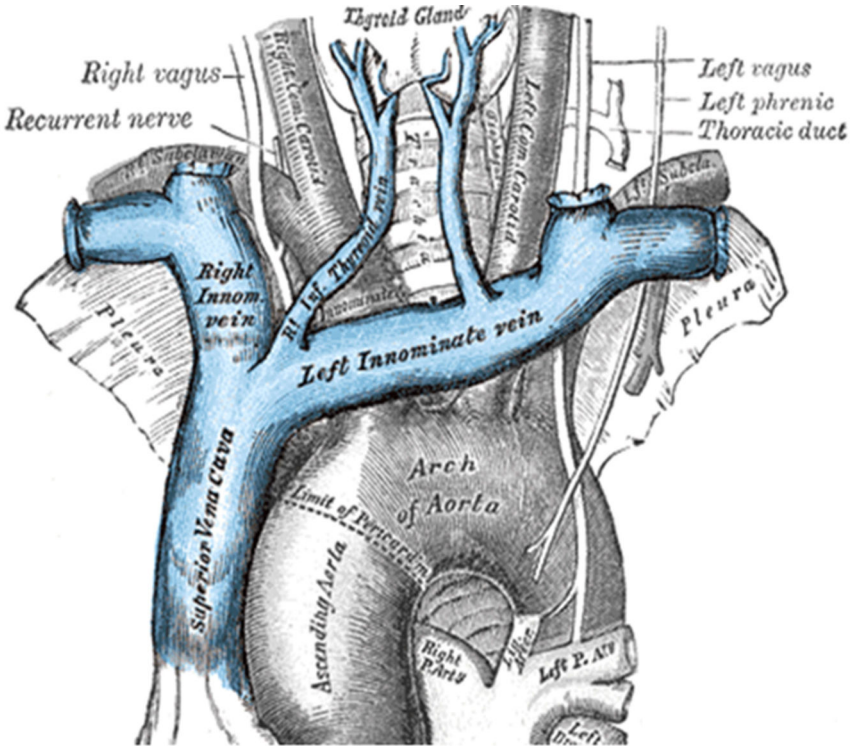

Fig. 3: *Major Veins Superior to Heart*

- Using a doppler probe (the one used by obstetricians for foetal monitoring may suffice).[4]
- Endocavitory ECG, can guide correct placement of catheter in superior vena cava. Here the catheter is connected to the ECG recorder wire to record ECG in Lead II, considered as an alternate method to check the position of the catheter. When the catheter enters the right atrium, there is a large increase in the amplitude of P wave. This technique is cheaper, and of similar efficacy to the radiological method. Endocavitary ECG can replace chest X-rays to check the position of the catheter in more than 90% of cases.[5]
- Fluoroscopic guidance during the procedure helps to assess the position of the catheter, any vascular abnormalities or stenosis and can be used to find out misplaced catheter.
- The simple technique for detection is called The IJV occlusion test: After placement occlude the IJV by external pressure over the neck(in the supraclavicular area for approximately 10 sec.A flattened trace and increase in CVP of approximately 5 mmHg suggests misplacement of catheter into IJV. This is especially useful for subclavian vein cannulation.[6]
- Another simple and sensitive bed side method for detection is the 'Saline flush test'. Used to detect subclavian catheter malposition in IJV. Flush test was performed by injecting 10ml of normal saline in the distal port of catheter, while anterior angle of ipsilateral neck was palpated by an independent observer. A thrill of fluid elicited on the palm of hand (positive test) was suggestive of catheter misplacement. This may be confirmed by fluroscopy.[7]

How to correct Mal positioning or Misdirection after placement?

The author prefers the following procedure. The patient may be positioned semi recumbent my minimal elevation of the head end of the cot. The central venous catheter (CVC) is withdrawn upto 4-5 cm mark A fresh guidewire is inserted through the catheter but advanced upto 12-14 cm only. The new CVC is then reinserted after applying pressure over the ipsilateral IJV. Always use a new CVC as guidewire can damage the previous catheter while insertion. Subsequently a flush test or IJV occlusion test may be performed to assess the positon. The CXR is now repeated. A risk of air embolism is there associated with minimal head up position but rare and all precautions should be taken.

CONCLUSION

On following up the patient further, we noted a thrombus in the Left Innominate Vein over which the central line catheter has been misdirected even after repeated attempts.

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