

A convenient technique of rapid detection and correction of misplaced central venous catheter

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Abstract

A 71 year old male patient was treated conservatively for subarachnoid haemorrhage with septic shock. The subclavian vein cannulation was done after starting mechanical ventilation and a pressure transducer was attached but the absence of typical waveforms led to doubt of correct placement of the catheter. An internal jugular vein (IJV) occlusion test showed flattened trace and central venous pressure (CVP) rise of 5 mmHg indicating misplacement of the catheter into the IJV, later confirmed by chest radiography. The central venous catheter (CVC) was withdrawn under image intensifier guidance and reinserted after applying pressure over the ipsilateral IJV. The position of the CVC was rechecked by connecting a pressure transducer. This time after IJV occlusion, the CVP trace was good and there was no change in waveforms and CVP reading.

Introduction: In neurosurgical patients infraclavicular approach for central venous cannulation is most popular and acceptable and complications are also not uncommon. The catheter tip misplaced at multiple sites and lead to impaired CVP measurement, cardiac arrhythmias, thrombophlebitis and vascular erosion¹. On blood aspiration and pressure transducer system confirms partially about right placement. Postoperatively x - ray chest is more confirmatory. The Internal Jugular Vein (IJV) occlusion test has been found to be a simpler but fairly accurate method of verifying the position of the tip of CVP catheter². The test includes, applying firm pressure over the ipsilateral IJV in the supra clavicular region for approximately 10 seconds and an immediate change of approximately 5 mm Hg in transducer pressure as well as waveform flattening is indicative of catheter misplacement. Following is a reporting of a case of misplaced catheter tip in internal jugular vein through subclavian route was corrected under C-arm image intensifier in ICU.

Case report

A 71 year old male of subarachnoid haemorrhage (SAH) with septicaemic shock was treating conservatively with mechanical ventilation. In ICU, after following the usual protocol invasive mechanical ventilation was started. ECG, direct arterial blood pressure, and Central venous (CV) pressure were planned to be monitored and right subclavian vein planned for catheterization through infra clavicular approach.

Using all standard techniques, 3cm below the junction of medial one third and lateral two thirds of the right clavicle was punctured. Tri-lumen 16 cm 7Fr Arrow-Howes catheter was inserted by Seldinger's technique. An introducer needle of 18G size was inserted at the puncture point directed towards the suprasternal notch sticking close to the undersurface of the clavicle and constantly applying negative pressure through the syringe. After free aspiration of venous blood a J - tipped guide wire was inserted and the needle was removed. Dilator was used over the guide

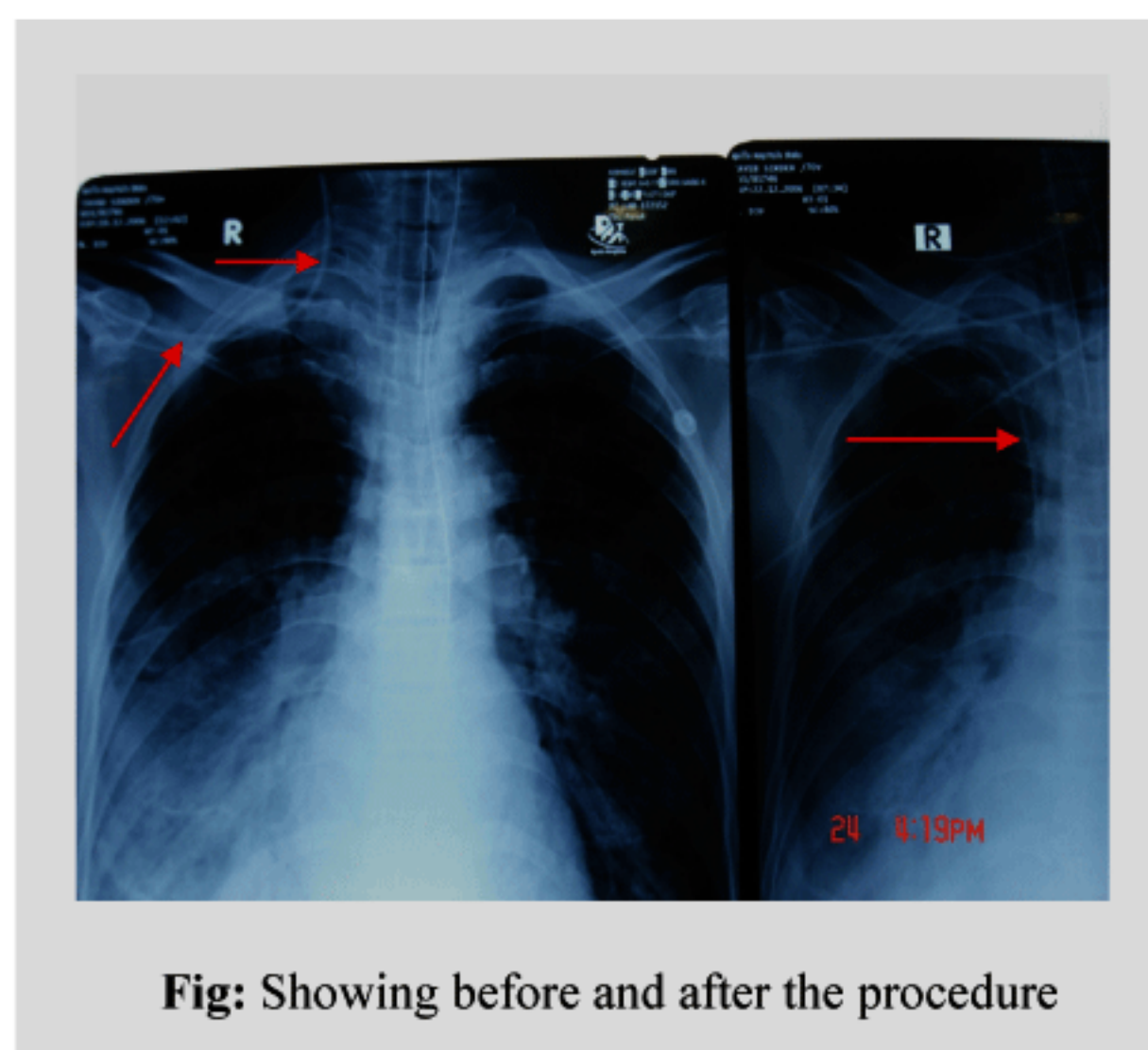


Fig: Showing before and after the procedure

wire to dilate the tract. The central venous catheter was threaded over the guide wire 12 cm into the Subclavian vein. On aspiration free flow of blood was confirmed through the central venous catheter (CVC). The CVC was then connected to the pressure transducer system to measure central venous pressure (CVP). But, the CVP trace was not recognizable for the absence of a typical waveform with a value of 5 mm Hg. The catheter, however, was kept in situ as there was free flow of blood and chest radiography was done immediately after the procedure to exclude the possibility of misplacement. Meanwhile, the internal jugular vein (IJV) occlusion test was also performed and the test suggested misplacement. Later on, chest x-ray also confirmed presence of the central venous catheter in the ipsilateral IJV.

For correction and relocation of catheter tip into superior vena cava (SVC) the whole procedure was done under C-arm image intensifier and J wire was again passed through CVC. Fixing J wire negative aspiration was started in middle port of CVC along with withdrawing of CVC using

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A convenient technique

partially heparinized solution till disappearance of blood through middle port, the CVC again was reintroduced very slowly upto the point of just appearance of blood through it. After fixing the catheter, J wire was withdrawn to the level of the tip of the catheter and then reintroduced by changing the direction. With newly relocated J wire in superior vena cava, the CVC was slid over the J wire. Although it was done under image intensifier, the IJV occlusion test was also performed to verify the accuracy of this particular 'easy to do' test which also indicated correct placement. A confirmatory CXR was done.

Discussion: Among CVC misplacement (1.4 - 30%)^{1,3} the highest rates through the cubital, external jugular and femoral veins. CVC through subclavian route is most commonly misplaced into the ipsilateral IJV (5.4%) and the incidence does not vary with site of insertion or with the head position during the procedure⁴.

Ambesh et al (2001), found a 6.2% incidence of misplacement through the right infraclavicular approach in ipsilateral IJV⁵.

Dubey and Pandey⁶ described IJV occlusion test where pressure exerted over the IJV in the supraclavicular area, causes flattening of waveforms and fictitious rise in CVP reading. If the catheter has slight curve, its reinsertion after slight withdrawal and a little twisting may direct it optimally but may fail due to flexibility of the catheter alone. So without catheter alone we used J wire as well as image intensifier⁷.

Though the image intensifier is very helpful but it may be unavailable in most of the hospitals in a third world country. The incidences of misplacement reports suggest

that there is need for a quick, inexpensive but accurate test to verify the position of the tip of the catheter. In the present case report, the IJV occlusion test has promptly alarmed the performer to relocate the catheter. Even in the absence of image intensifier it would have been possible to relocate with the IJV occlusion test as it was possible in this report.

In conclusion, it is felt by the authors that as there is a fair chance of misplacement of CV catheter in patients', this needs an urgent & quick method to verify the right placement. IJV occlusion test seemed to be quite useful under the circumstances.

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