Internal Jugular Vein Occlusion Test For Rapid Detection Of Misplaced Subclavian Vein Catheter

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Citation

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Abstract

A 65 year old female patient underwent right pterional craniotomy for clipping of anterior communicating artery aneurysm. The subclavian vein cannulation was done after induction of anaesthesia 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 roentgenogram. The central venous catheter (CVC) was withdrawn to the 4 cm mark and reinserted after applying pressure over the ipsilateral IJV.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

Central venous catheters (CVCs) are important for long-term venous access and measurement of central venous pressure. The subclavian vein is often used for central venous catheterization. The catheter tip can be commonly misplaced at multiple sites[1,2] which not only leads to impaired CVP measurement but also increases risk of cardiac arrhythmias, chemical or bacterial thrombophlebitis and vascular erosion. Internal jugular occlusion test has been recently described for rapid detection of misplaced central venous catheter tip into the internal jugular vein [3]. We describe a case in which this test was successfully used for diagnosis of a misplaced central venous catheter through the subclavian route and it also helped in the identification of the subsequent correct placement of the same.

CASE REPORT

A 64 year old female patient with subarachnoid haemorrhage (SAH) grade IV was posted for left pterional craniotomy and clipping of the anterior communicating artery aneurysm. In the operation theatre, after starting standard monitoring (5 - lead ECG, non-invasive blood pressure and pulse oximetry), anaesthesia was induced with fentanyl (2 g/kg), thiopentone (5 mg/kg). Rocuronium (0.9 mg/kg) was used to achieve muscle relaxation.

Lignocaine hydrochloride (1.5 mg/kg) was administered two minutes prior to laryngoscopy and tracheal intubation to suppress the haemodynamic response. The left dorsalis pedis artery was cannulated for intraoperative monitoring of invasive blood pressure. As the patient was having widespread thrombophlebitis in the upper extremities and the surgical procedure required the head to be turned to the right side, which would have kinked a right-sided internal jugular catheter, central venous cannulation was planned through the right subclavian vein.

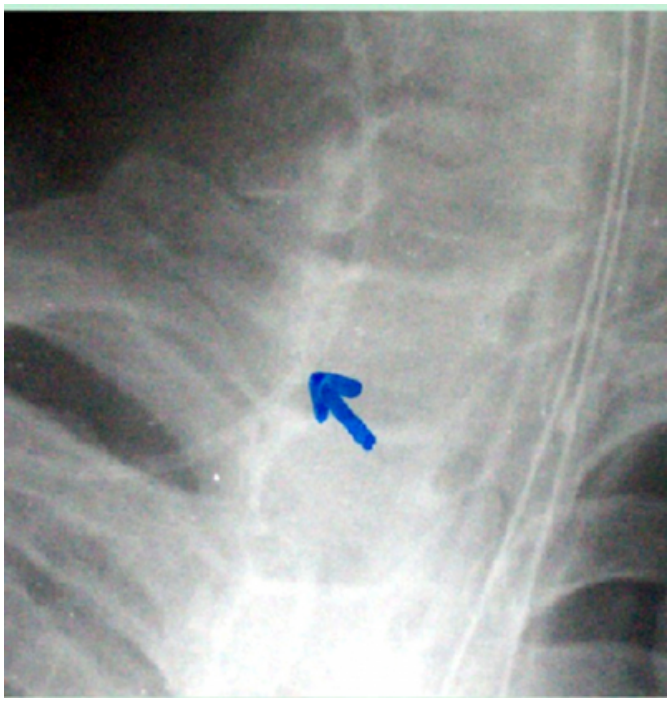
In supine position after aseptic preparation of the parts, a point at the junction of medial one third and lateral two thirds of the clavicle was selected as the puncture point. An 18G introducer needle was inserted at the puncture point directed towards the suprasternal notch rubbing the undersurface of the clavicle and constantly applying negative pressure through the syringe. Free aspiration of venous blood indicated successful venous puncture. A J - tipped guide wire was inserted and the needle was removed. 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 connected to the pressure transducer system to measure central venous pressure (CVP). But, the CVP trace was conspicuous by the absence of a typical waveform with a value of 5 mm Hg. The intraoperative period was uneventful.

Postoperatively, a x - ray chest was performed. Meanwhile, the IJV occlusion test was also performed by applying firm

pressure over the ipsilateral IJV in the supraclavicular region for approximately 10 seconds. Quick change in transducer pressure and waveform were noted, CVP increased by 5 mm Hg and flattening of waveforms occurred indicating jugular misplacement of the catheter tip. Later on, chest x ray also confirmed presence of the central venous catheter in the ipsilateral IJV (Fig 1.).

Figure 1

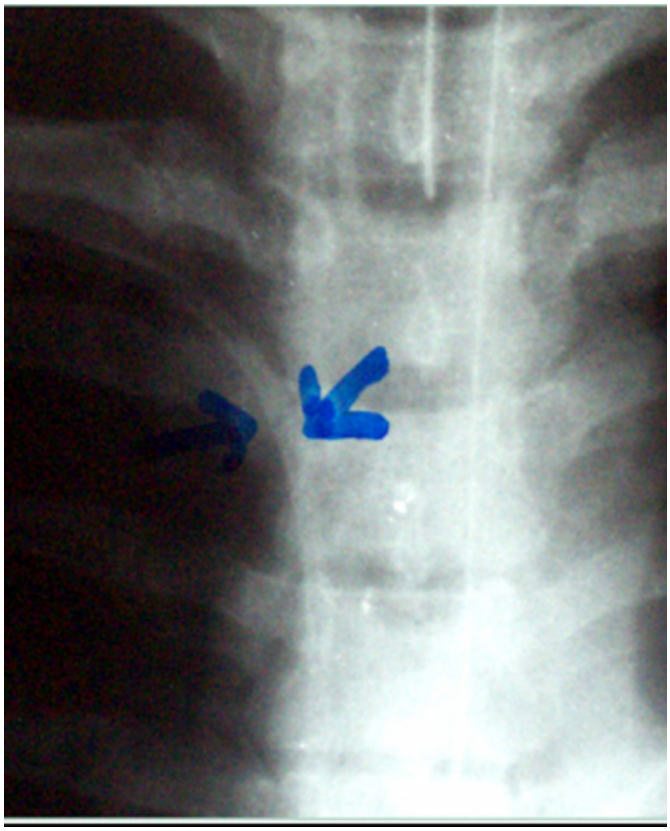
Figure 1: Subclavian vein catheter misplaced into IJV



The central venous catheter was withdrawn to the 4 cm mark and was reinserted after applying pressure over ipsilateral IJV in an attempt to correct the position of the catheter. The position of the catheter was checked by a connecting transducer to the central venous line and the IJV occlusion test was performed. This time the CVP trace was good and there was neither flattening of waveforms nor any change in CVP reading following pressure over the ipsilateral IJV. A repeat chest x – ray confirmed correct placement of the central venous catheter at the junction of the superior venacava and the right atrium. (Fig.2)

Figure 2

Figure 2: Correctly repositioned Subclavian vein catheter



DISCUSSION

Proper tip position of CVC is important not merely for correct CVP measurement and long-term venous access, but misplaced catheter may also enhance the risk of thrombus formation, chemical or bacterial thrombophlebitis, arrhythmia and vascular erosion. A wide range of CVC misplacement is described (1.4 - 30%)[1,2]. Highest rates of misplacement of CVC occur 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 side of insertion or with the head position during the procedure[4].

Misplacement may also occur into the contralateral IJV or brachiocephalic vein [1]. Ambesh et al (2001) [5], found a 6.2% incidence of misplacement of subclavian vein catheters through the right infraclavicular approach, 5.2% of these malpositioned catheters were located in ipsilateral IJV.

Malatinsky et al[1] described 5.5% incidence of misplacement through infraclavicular approach with subclavian vein cannulation, whereas, Dietel and McIntyre[2] found higher (24%) incidence of misplaced CVC through the same route. Misplacement of catheters in both these studies involved

ipsilateral IJV or loop formation in contralateral brachiocephalic vein.

Dubey and Pandey[3] described IJV occlusion test for rapid detection of misplaced subclavian CVC. into the ipsilateral IJV. Pressure exerted over the IJV in the supraclavicular area, by occluding the vein causes flattening of waveforms and fictitious rise in CVP reading. If the plastic catheter has slight curve, its reinsertion after slight withdrawal and a little twisting may direct it optimally. Chest radiography still remains the gold standard and most commonly used tool for detecting CVC location. We were able to correctly place the catheter tip in proper position after withdrawing the catheter up to about the 4 cm mark at the puncture point and reinserting the catheter after applying firm pressure manually in the ipsilateral supraclavicular area thereby occluding the ipsilateral IJV.

In conclusion, we report successful use of IJV occlusion test for rapid diagnosis and correction of the misplaced CVC through the subclavian route.

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References

1. Malatinsky J, Kudilic T: Misplacement and loop formation of central venous pressure catheters. Acta Anaesth Scand 1976; 20: 237-47
2. Dietel M, McIntyre J P: Radiographic confirmation of site of CVP catheters. Can J Surgery 1971; 14: 42-52
3. Pandey J C, Dubey P K: A method for rapid clinical diagnosis of misplaced subclavian vein catheter (Letter). Anesth Analg, 2000; 90: 229.
4. Sanchez R, Halck S: Misplacement of subclavian venous Catheters: Importance of head position and choice of puncture site. BJA1990; 64: 632-33.
5. Ambesh S P, Pandey J C: Internal Jugular Vein Occlusion test for rapid diagnosis of misplaced subclavian vein catheter into the internal jugular vein Anesthesiology, 2001; 95: 1377-1379.

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