

CATHETER MALPOSITION FOLLOWING SUPRACLAVICULAR APPROACH FOR SUBCLAVIAN VEIN CATHETERISATION

- Case Reports -

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Abstract

The supraclavicular approach of subclavian vein catheterization is associated with the lowest incidence of malposition. We report two cases of unusual malpositions seen during central venous catheterization of subclavian vein via supraclavicular approach. Literature search did not reveal such malpositions. The possible cause for the malposition and method to prevent it is discussed.

Keywords: subclavian vein cannulation, supraclavicular approach, malposition.

Introduction

An essential prerequisite for the use of central venous catheters is its proper placement. Lowest incidence (1.4%) of malpositioning has been reported with the use supraclavicular technique for subclavian

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vein catheterization¹. We report two cases of retrograde malpositioned catheter into the ipsilateral subclavian vein. The central venous catheters were inserted using supraclavicular technique for subclavian vein catheterization.

Cases 1

A 60 kg, 32 year old male patient was admitted to intensive care unit with head injury and cerebral contusions. His Glasgow Coma at admission was 12/15 (motor response 5/6). To obtain intravenous access subclavian vein cannulation was planned using supraclavicular approach.

The patient was placed in slight trendelenburg position with head turned to the opposite side. Procedure site was painted with betadine and draping done. Skin infiltration was done using 2% lignocaine. An 18 G needle was inserted at 30 degree angle to the skin directed towards opposite nipple from the entry point at the junction of lateral margin of clavicular head of sternocleidomastoid muscle and clavicle. After the subclavian vein was punctured the bevel of the needle was turned caudad. The guidewire was threaded through the needle with the 'J' curve pointing towards the bevel of the needle. Slight resistance was felt on passing the guidewire. A 7F double lumen catheter (Multicath, Vygon India Pvt Ltd.) was passed over the guidewire. Again slight resistance was felt while threading the catheter. However, there was free flow of blood on aspiration from both lumen and hence the catheter was fixed at 11 cm on the skin. A post procedure check chest radiograph was done which showed the retrograde position of the catheter into the ipsilateral subclavian vein (Fig. 1).

Cases 2

A 50 kg, 30 years old male, diagnosed case of right frontal glioma presented for emergency craniotomy and excision of the tumor. General anesthesia was induced with fentanyl 100 mcg and thiopentone sodium 250 mg. Rocuronium 50 mg was given to facilitate tracheal intubation with size 8.5 cuffed tracheal tube and the lungs were mechanically ventilated.

Subclavian venous cannulation was planned using the right

Fig. 1

Chest roentgenogram showing malpositioned catheter (white arrow) in case 1

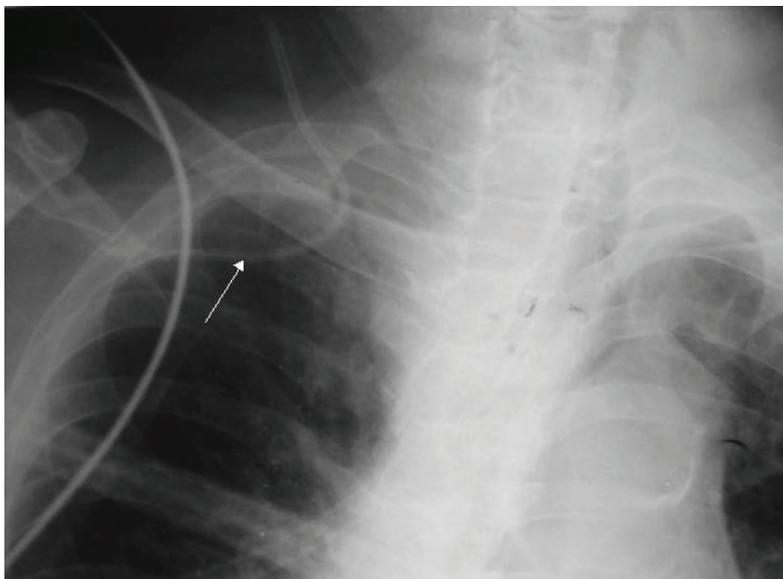
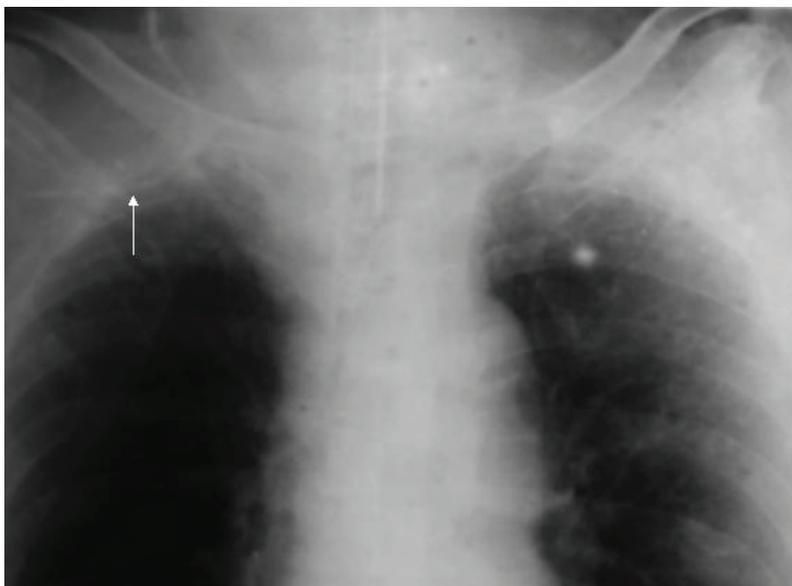


Fig. 2

Chest roentgenogram showing malpositioned catheter (white arrow) in case 2



supraclavicular approach. The technique followed was as described in the Case 1. Subclavian vein was punctured approximately at 1 cm from the skin entry point. The guidewire was threaded through the needle while the needle was kept steady with the other hand. The track was dilated and a 7F double lumen catheter (Multicath, Vygon India Pvt Ltd.) was inserted over the guidewire. The catheter was fixed at 12 cms at skin entry point. A check radiograph was done in the postoperative period which showed the retrograde placement of catheter into the ipsilateral subclavian vein, similar to that observed in Case 1 (Fig. 2).

Discussion

Supraclavicular technique for subclavian vein catheterization has a higher success rate and lower risk of complications than infraclavicular technique due to wider target area, reliable surface landmarks and more direct line to the superior vena cava in the right subclavian vein catheterization. From the standpoint of correct positioning, this technique has been found superior to other techniques of central venous catheterization¹.

After puncturing the subclavian vein, the bevel of the needle is often turned downwards to prevent catheter migration into the jugular veins. Though this maneuver prevents catheter migration into jugular veins, it can result in the catheter to turn retrograde into the ipsilateral subclavian vein. It is believed that the guide wire may have hit the opposite vessel wall and turned in retrograde fashion. This could explain the resistance felt during guide wire placement in Case 1. A similar resistance was felt while passing the catheter over guide wire. The acute angulation of the guide wire in the vessel could have been responsible for it. No such malpositions with supraclavicular technique is reported in the literature.

Intraoperative positioning of central venous catheter can be confirmed by free aspiration of blood, central venous pressure waveforms, internal jugular vein occlusion test², a negative flush test³ and imaging. The correct location of central venous catheter should always be ensured to avoid serious complications such as thrombosis, thrombophlebitis and perforation

of the myocardium.

In a study by Helmkamp et al, 87 of the 90 catheters were correctly placed while using supraclavicular approach. Two catheters migrated into the ipsilateral internal jugular vein and one in the contralateral internal jugular vein⁴. Dronen et al⁵ compared subclavian vein catheterization using supraclavicular and infraclavicular approaches by analyzing 89 venipunctures in patients requiring cardiopulmonary resuscitation and he found that inspite of inexperience with supraclavicular technique, it had a lower failure rate, higher percentage of properly positioned catheters and was easy to perform. There was a statistically significant difference in the incidence of improper catheter tip location with only 7% in the supraclavicular group as compared with 21% in the infraclavicular group. Location of malpositioned catheters were one each in internal jugular vein, innominate vein and subclavian artery (proved on post mortem contrast study), whereas, in the infraclavicular group majority of malpositions were in the jugular veins (50% of malpositions), one in innominate vein, one in contralateral innominate vein and one was kinked and formed a loop in the superior vena cava. Sterner et al⁶ also found significantly low rate of malposition with supraclavicular technique (one malposition in 245 patients) and a higher rate with infraclavicular approach (21 malposition in 255 patients).

The frequency of malpositioning is related to the anatomic approach and catheter type used, but not to the physician's experience. Misplacements are more frequent with soft silicone catheters than with semirigid catheters⁷. In our case it is likely that the angulation of the needle to the skin was more. A slightly horizontally placed needle could have prevented the turning of guidewire. Hence we suggest that using the supraclavicular technique for subclavian vein catheterization the needle should be kept more horizontally with bevel facing caudad at the time of passing the guidewire.

References

1. MALATINSKY J, KADLIC T: Misplacement and loop formation of central venous pressure catheters. *Acta Anaesth Scand*; 1976, 20:237-47.
2. AMBESH SP, PANDEY JC: Internal jugular vein occlusion test for rapid diagnosis of misplaced subclavian vein catheter into the internal jugular vein. *Anesthesiology*; 2001, 95:1377-9.
3. TOSHNIWAL GR, RATH GP, BITHAL PK: Flush test-a new technique to assess the malposition of subclavian central venous catheter position in the internal jugular vein. *J Neurosurg Anesthesiol*; 2006, 18:268-9.
4. HELMKAMP BF, SANKO SR: Supraclavicular central venous catheterization. *Am J Obstet Gynecol*; 1985, 153:751-4.
5. DRONEN S, THOMSON B, NOVAK R, TOMLANOVICH M: Subclavian vein catheterization during cardiopulmonary resuscitation. A prospective comparison of the supraclavicular and infraclavicular percutaneous approaches. *JAMA*; 1982, 247:3227-30.
6. STERNER S, PLUMMER DW, CLINTON J, RUIZ F: A comparison of the supraclavicular approach and infraclavicular approach for subclavian vein catheterization. *Ann Emerg Med*; 1986, 15:421-4.
7. MUHM M, SUNDER-PLOSSMANN G, APSNER R, ET AL: Malposition of central venous catheters. Incidence, management and preventive practices. *Wien Klin Wochenschr*; 1997, 109:400-5.