



## Case Report

### Coiling of shaft of the central venous catheter inside left subclavian vein- a case report

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#### Abstract

Central venous catheterization is one of the common procedures used for gaining vascular access for various indications. Sometimes, the catheter can take unusual course inside the vein that can lead to erroneous pressure measurement, increase the risk of thrombosis or trauma to the vessel. Any resistance during insertion of the guide wire or catheter and absence of blood aspiration are some alarming signs that help to detect malposition at the earliest moment. We report a case of coiling of the shaft of the central venous catheter inside left subclavian vein in a patient with head injury. Technical expertise, sound knowledge of anatomical landmarks and use of real time ultrasound can minimize malposition of the catheter. We suggest at any moment if there is resistance during insertion of guide wire or catheter or if there is absence of blood aspiration from any of the lumen, the catheter should be removed immediately suspecting malposition.

**Key words:** central venous catheter, coiling, malposition, subclavian vein

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#### Introduction

**P**ercutaneous central venous catheterization is one of the common procedure done at acute care setting for infusion therapy, chemotherapy, blood transfusion, total parenteral nutrition and less frequently central venous pressure measurement.<sup>1</sup> The internal jugular vein, subclavian vein and femoral vein are the most commonly used veins for this purpose. Ideally, it is recommended to place the tip of the catheter at the level of mid-lower superior vena cava (SVC) to cavoatrial junction.<sup>2</sup>

Occasionally, the central venous catheter can take a coiled course inside the vein which should be detected immediately. The coiling or knotting of the catheter inside the vein can lead to increased risk of catheter breakage and embolization, no free aspiration of the blood and erroneous or falsely high central venous pressure measurement.<sup>3, 4</sup> Besides, this can cause trauma to the vessel wall and can increase the risk perforation and thrombosis.<sup>4</sup> The coiling of the shaft of the central venous catheter inside the subclavian vein is not a common finding. Most of the literatures have

reported coiling of the tip of the catheter inside the vein.<sup>5,6</sup> The malposition of the catheter can be suspected and detected early if at any moment during the procedure, resistance of the guide wire insertion, catheter insertion or absence of blood flow from any one the lumen of the catheter is encountered. We describe a case where the shaft of the central venous catheter was unexpectedly coiled inside the left subclavian vein with the tip positioned at superior venacava.

**Case**

28 years male presented with alleged history of road traffic accident sustaining head injury with frontal brain contusion was admitted to intensive care unit of Birat Medical College and Teaching Hospital. His trachea was intubated for mechanically ventilation due to low GCS. Central venous catheter insertion was planned for infusion therapy. As the patient had cervical collar, the left subclavian vein was chosen. A seven french triple lumen central venous catheter was inserted by blind anatomical landmark technique under all aseptic precaution by a duty doctor. The free flow of the blood was noticed during the needle insertion. The guide wire was threaded freely up to 12 cm followed by a slight resistance, which was overcome by applying some force. The operator felt some resistance railroading the catheter also over guide wire. The guide wire was then removed. There was free flow of the venous blood from the central port of the lumen but it was absent from the two peripheral ports. The catheter was fixed at 15 cm and immediately, a chest X ray was done to confirm the position of the catheter. Surprisingly, the catheter had coiled inside subclavian vein with the tip locating at the upper part of the superior vena cava (Fig: 1 & 2).

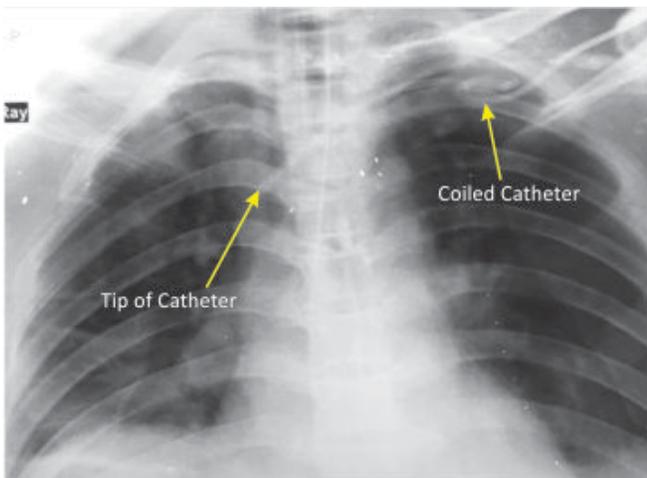


Fig 1: Chest X ray with coiled central venous catheter inside subclavian vein

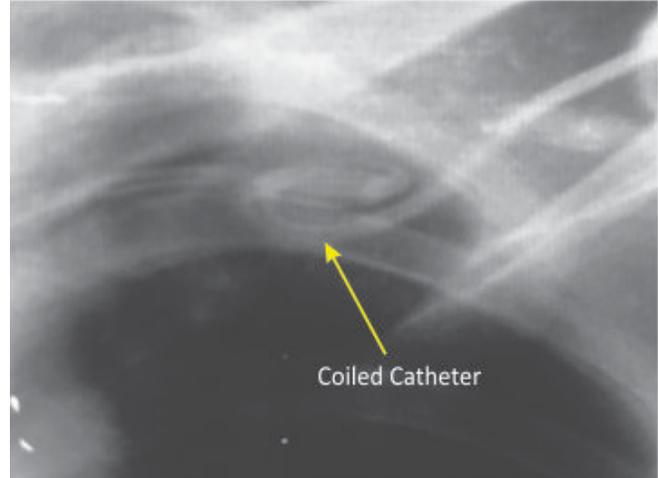


Fig 2: Chest X ray with coiled central venous catheter inside subclavian vein

The catheter was pulled out approximately 2 cm and fixed at 13 cm but on repeat chest X ray, the catheter was still in the same position. Finally, the catheter was removed and a new catheter was placed from the right subclavian vein.

**Discussion**

The subclavian vein has a fixed course and has larger diameter, which makes it a common choice for central venous catheterization. The vein runs below the inferior surface of the clavicle.

The coiling of the catheter inside the vein is rare and unique presentation of catheter insertion. In our case there was slight resistance during the initial insertion of the guide wire. Though, the tip was found to be located in the superior vena cava, there was no free aspiration of the venous blood from the peripheral ports. It showed that the coiling of the catheter inside the vein might have contributed absence of blood flow from the ports.

Technical problems like incorrect method during procedure, anatomical variation or inter-operator variability are mainly responsible for various malpositions including coiling of the catheter.<sup>7</sup>

We postulated that the valves present in the subclavian vein could have possibly obstructed the guide wire and made it coiled inside the vein. As excessive force was applied to insert the guide wire, it then took the usual course a head up to the superior vena cava. The catheter followed the same course as the guide wire. It is well mentioned in various literatures that the excessive force applied during guide wire or catheter insertion can cause the complications like malposition, vessel wall erosion and bleeding, piercing the pleura and pneumothorax, mediastinal rupture.<sup>8</sup> Any resistance to passage should raise suspicion of a problem. At this moment, resistance felt during insertion of the guide wire and absence of blood aspiration from the two lumen were the two

alarming signs that should have been detected earlier and ideally catheter should have been removed at the very beginning.

The length of the guide wire inserted inside the vein can also determine the course inside the vein. The possibility of malposition of the catheter increases as the length of the guide wire increases inside the vein during guide wire insertion. Some authors have recommended 18-20 cm as an appropriate length for guide wire insertion that minimizes the knotting or other malposition of the catheter.<sup>9,10</sup>

The threading of the guide wire can be obstructed by the presence of the bottleneck between the clavicle and first rib. This can cause looping or knotting of the guide wire and can be the possible reason for coiling of the catheter in our case.<sup>11</sup>

The chest x ray immediately after the procedure can be easy and cost effective tool to diagnose malposition of the catheter as in our case. The use of real time ultrasound can be helpful to detect these technical complications earlier. The needle, guide wire and the catheter insertion can be directly monitored in a long axis view of the subclavian vein and even the tip of the catheter can be located correctly, thus detecting any malposition of the catheter immediately.<sup>12</sup> However, the technical expertise, knowledge regarding sonology and availability of ultrasound limits its use during the procedure. As in our case, the coiled or knotted catheter should be gently removed taking care of not to feel any resistance during removal. Forceful removal should be avoided and in case if there is any resistance during removal, it is suggested to remove the catheter by fluoroscopy under the guidance of interventional radiologist or vascular surgeon.

### Conclusion

Coiling of the central venous catheter inside vein is a rare finding. The complication may not be clinically evident but there is always a risk of venous thrombosis, vessel wall erosion and bleeding. Any resistance during guide wire or catheter insertion or absence of blood from any of the lumen of the catheter should raise the suspicion of catheter malposition and it should be removed immediately. Technical expertise in the procedure and sound anatomical knowledge and use of real time ultrasound are essential to minimize such complication. Chest X ray is suggested immediately after the procedure to detect any malposition of the catheter.

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