Central venous catheter rotation malposition: An unusual presentation

INTRODUCTION

Central venous catheterization (CVC) via infraclavicular subclavian approach in neurosurgical patients is very common practice in view of prolonged surgery and related blood loss that may occur during surgery. The most common malposition related to subclavian vein catheterization is entrance into the internal jugular vein (IJV). Cannulation by the right subclavian vein is associated with the highest risk of malposition of approximately 9.1%. We report a case of malposition of central venous catheter which was internally rotated inside the vessel. We discuss the possibility of its occurrence at the time of cannulation and potential consequence of such an incident.

CASE REPORT

A 60-year-old, 70 kg male patient presented in emergency department with complaints of acute onset vertigo, headache and ataxia and was diagnosed to have a posterior fossa tumour on contrast enhanced computed tomography scan (head). He was subsequently worked up for elective craniotomy and excision of tumour the next morning. His routine investigations and vital parameters were found to be within normal limits. As part of pre-operative monitoring, a subclavian vein central venous cannulation by infraclavicular route was planned. A central venous catheter (16-18-18Ga, 7 Fr, 20 cm, triple lumen; certofix, B Braun) was inserted via right subclavian vein by Seldinger technique under aseptic precautions by the anaesthesia registrar in the operating theatre with HR, NIBP, SPO$_2$ and ECG monitoring. Passage of the catheter was smooth and unimpeded. There was a good central venous pressure (CVP) waveform and good back flow of blood on aspiration from all the three lumens. The rest of the general anaesthesia and surgery were uneventful. CVP readings were taken 30 min apart and each time a good waveform was noted. As part of routine protocol, a portable chest X-ray was performed before shifting the patient to the neuro-intensive care unit for further monitoring and observation. On reviewing the chest X-ray by the anaesthesiologist, the CVP catheter was found to be internally rotated inside the right proximal
internal jugular vein. However, it followed the normal path of right brachiocephalic vein to superior vena cava.

Since blood could be aspirated from all the three lumen ports, central venous pressure was measured with a normal CVP waveform and IV fluids/drugs could be infused via the same catheter, we intended to continue with the same central line for the further management of patient. Further course of the patient in the hospital was uneventful. CVC was removed from its site in the neurosurgery-ward when the patient was planned to be discharged after two weeks of surgery.

DISCUSSION

One of the commonest indications of central venous catheterization is to measure CVP for the purpose of adequate fluid replacement in place of blood and fluid loss in perioperative period. In neurosurgical patients preferred route of central line cannulation is via right subclavian vein because of ease of insertion, low complication rate and erroneous increased CVP related to the IJV route cannulation. A fairly common complication is malposition of the catheter. The most common site of malposition is at the entrance into the internal jugular vein. Lumley and Russell reported that neck compression is a useful test for diagnosing this complication because neck compression on the side of malposition will impede the flow in the vein. This will result in a rise of 10 cm H$_2$O or more in CVP reading.

In neurosurgical patients, perioperative monitoring of CVP is deemed necessary in view of anticipated prolonged surgery because of neglected third space fluid and blood losses consequently leading to sudden unanticipated hemodynamic instability (hypotension, tachycardia) that compromises cerebral perfusion pressure. In addition to this, CVC have also been used to aspirate air in case of venous air embolism during neurosurgical procedures in the sitting position particularly involving the posterior fossa and cranio-cervical region.

On the basis of a good CVP waveform and good blood back flow, the anaesthesiologist assumed that the catheter was in correct position. It has been suggested that clinical criteria may not be reliable enough for ascertaining satisfactory catheter tip position. Also, there was no radiological verification of correct placement in this patient until the postoperative period.

In our patient, central line was not exactly malpositioned into the internal jugular vein, but it was initially inserted in IJV proximally later eventually internally rotated to follow its normal course via right brachiocephalic vein into the superior vena cava [Figure 1]. The most probable explanation of its unusual course could be either that the J-tip of Seldinger wire might have been positioned cephalad and thus the catheter ‘went up a little bit’ into IJV before moving down the superior vena cava as originally intended. The second possible explanation could have been that the catheter followed the path of the already internally rotated guide wire in situ. Since in our case the whole perioperative period was uneventful with regular normal CVP monitoring and IV fluids/drugs access, we continued with our CVC and that there can be a possibility of such internal rotation of central venous catheter inside the vessel. We recommend directing the J-tip of Seldinger wire caudad might minimize or avoid this unusual presentation.

Ultrasoundography reliably detects the guide wire during CVC placement and visualization of the wire before dilation and catheter insertion with almost 100% sensitivity and specificity, may provide an additional measure of safety during central venous catheterization. Its now has been a standard practice in intensive care units and operation theatres.

CONCLUSION

To conclude, this case report aims to bring to attention the possibility of malposition and internal rotation of CVP catheter inside vessels at the time of insertion of central venous catheter. Although the continuous
or frequent (every 10-15 minutes) intraoperative CVP waveform monitoring is important in detecting catheter migration or malposition, (unfortunately not so frequent in our case) we reiterate the importance of radiological verification of CVP catheter position just after or at the time of cannulation of central line.

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