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Case Report

Central venous catheter malposition into axillary vein

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ABSTRACT

Placement of CVC can lead to complications such as, malposition of the catheter and complications relating to perforation and/or injury of nearby blood vessels and structures. We present a case report is about malposition of central venous catheter (CVC) from right internal jugular vein (IJV) into right subclavian and axillary vein. It is advisable to check free venous outflow in all the ports of CVC, central venous waveform should obtained with transducer in place and following placement of CVC catheter, chest radiograph should be completed to confirm the position.

Keywords: Central venous catheter, Internal jugular vein, Subclavian vein

INTRODUCTION

Central venous catheters (CVC) are an essential component of modern critical care. Despite their utility, placement of CVCs is often associated with complications such as, malposition of the catheter and complications relating to perforation and/or injury of nearby blood vessels and structures.[1,2] Our case report is about malposition of central venous catheter (CVC) from right internal jugular vein (IJV) into right subclavian and axillary vein.

CASE REPORT

A 65 year old lady was shifted from ICU to operating room for emergency tracheostomy after her admission into ICU for progressive stridor. She was a known case of tumour arising from upper airway. She had a right internal jugular vein CVC placed in ICU just half an hour prior to shifting patient to operation theatre and check X-ray was sent with X ray film to get available within 30 minutes.

Upon shifting the patient to operating table it was noticed that out of three ports of CVC only through the proximal port, fluid was going freely and from other two ports it was somewhat intermittent. We made an attempt to check all the ports by aspirating with 5 ml syringe but blood could be aspirated freely from proximal port only while rest of two failed to yield blood on aspiration. Upon flushing the all the ports with 5 ml normal saline, we could administer saline freely from all ports but blood could be aspirated only from proximal port of CVC. Upon repeated attempts same result was obtained. So it was a situation where proximal port of CVC was intravascular while status of rest of the two ports was unclear.

Figure 1: Showing the CVC which failed to yield blood on aspiration from middle and distil port.

We then decided to withdraw the CVC 4-5 cm proximally while continuously aspirating from ports to rule out any possibility of adherence of catheter to vessel wall or catheter kinking. To our surprise it was noticed that upon withdrawing catheter 4-5 cm we could now aspirate blood from middle and distil port also but as soon the CVC was pushed back it again yielded same situation. We connected the CVC to the manometer which did not yield the CVC waveform. By that time the check chest X-ray got available to look for catheter position which showed that catheter instead of going into superior vena cava was curving towards right chest wall. The chest X-ray gave us a clue to explain the status of CVC that it was getting adherent to the axillary vein distally which failed to yield blood on aspiration.

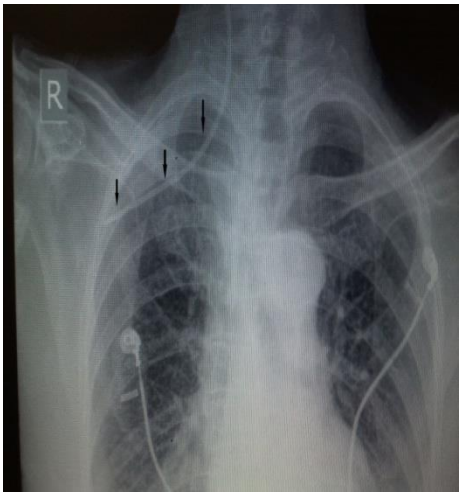

Figure 2: Chest X-ray on the left of the patient showing malposition of CVC (path highlighted by black arrows) from right IJV.

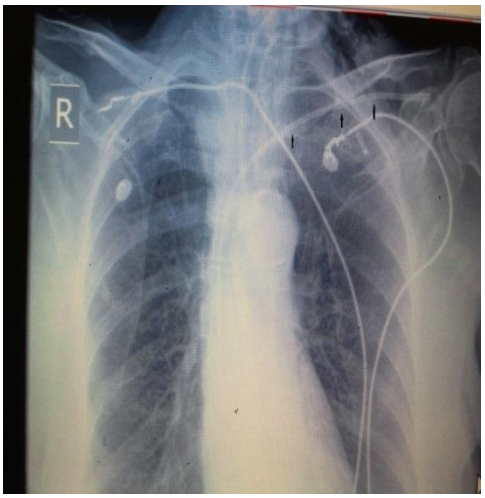

Figure 3: Chest X-ray on the right shows CVC that we later on put through left subclavian vein (path highlighted by black arrows); tracheostomy tube can also be seen.

The possibility of catheter going into right subclavian/axillary vein was supported by the path of CVC line on X-ray and non aspiration of blood from distil and middle ports because it getting stuck up distally. Also the aspiration of blood from middle port while withdrawing the CVC showed that CVC was intravascular. Then removal of the catheter was done from the right side and another CVC later on put through left subclavian approach and blood was be aspirated in from all the ports and CVC position was confirmed by check X ray. After this patient was shifted to ICU and closely monitored and followed for one week stay there. She had an uneventful course in ICU post tracheostomy did not develop any hemothorax or pneumothorax.

DISCUSSION

Central venous catheter (CVC) placement is a routine procedure in the management of critically ill patients. However, the placement of these catheters is not without risk. In the standard technique central venous cannulation is a blind procedure, which relies on the use of external anatomical landmarks. Correct placement of the CVC is an essential prerequisite for accurate monitoring of central venous pressure (CVP) and long-term use of the catheter.

Catheter malpositioning is a known complication of central venous catheterization.[3] The most common cause of early malfunctioning of the central venous catheter is related to its malpositioning[4] Central venous catheter tip placement at the junction of SVC and right atrium is important for accurate central venous pressure (CVP) measurement.[5] A misplaced catheter tip not only defeats the purpose of correctly measuring CVP but also predisposes it to the risk of obstruction to aspiration, clotting, thrombophlebitis, erosion of the venous wall, cardiac tamponade, and failure to aspirate air in the event of air embolism.[6,7] The complications of central venous cannulation are numerous and include malpositioning, a known complication with the reported incidence ranging widely from less than 1% to more than 60%.[8] Central venous catheter tip placement at the junction of SVC and right atrium is important for accurate central venous pressure (CVP) measurement.[9]

Paw[10] reported that the incidence of malpositioning following catheterization via the left IJV was more than the right IJV. Cannulation by the right subclavian vein is associated with the highest risk of malposition of approximately 9.1%.[11]

After any repositioning of the CVC, chest radiography is required for confirmation. One study reported that manual occlusion of the ipsilateral IJV during subclavian vein cannulation reduced the chances of advancement of the CVC into the ipsilateral IJV. The IJV occlusion test (applying external pressure on the IJV for approximately 10 seconds in the supraclavicular area and observing the changes in the CVP and its waveform pattern) successfully detects misplacement of a subclavian vein catheter into the IJV. However, it does not detect any other misplacement.[12]

so it was difficult to detect the misplacement of CVC into the subclavian/axillary vein from rt IJV. Some authors implicate excessive lengths of guidewire as the cause.[13] Other authors consider the length of the CVC inserted itself to be a risk factor. Studies have hypothesized that the final position of the catheter tip depends on the course that the guidewire takes. This may be influenced by the initial orientations of the J-type guidewire tip during the subclavian approach.[14]

However, determination of the catheter position by chest X-ray should be considered when mechanical complications cannot be excluded, aspiration of venous blood is not possible, or the catheter is intended for central venous pressure monitoring, high flow use or infusion of local irritant drugs.[15]

Most common of all intravascular misplacements is the cephalad insertion into ipsilateral IJV via subclavian approach. Retrograde malpositioning of CVC in axillary vein is very unusual presentation as in our case report.

In our case, the catheter up to the proximal port was free inside the vessel, through which we could aspirate blood, but rest of the catheter got blocked and stuck to vessel wall. Catheter placement is a blind procedure and misplacement of CVC remains a known but uncommon complication. In our case because the middle and the distal ports were got blocked and hence were not used for infusion of fluids after placement. But failure to aspirate blood from middle and distil ports lead to the suspicion of situation that was later confirmed by radiography. A post-procedural chest radiograph is generally considered essential in identifying malposition of the catheter.

CONCLUSION

We recommend from this experience that free venous outflow must be carefully checked in all the ports of CVP catheter, and following placement of CVC catheter, chest radiograph should be completed to confirm the position and should there be failure to obtain a proper central venous pressure waveform the possibility of catheter being malpositioned should be considered.

Abbreviations

CVC - Central venous catheter, IJV - internal jugular vein

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