

Massive pleural effusion following central venous catheter migration: tips to remember.

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Keypoints

Delayed catheter migration into the pleural space possibly due to erosion of vessel leading to massive pleural effusion in a one and a half year old child with 32% burns.

Abstract

Central Venous cannulation is a routine procedure done for major surgeries in the operating room, in intensive care setting for the purpose of fluid administration and hemodynamic monitoring, chemotherapy administration. Ultrasound, ECG guidance, real-time X-ray imaging, and other aids have dramatically increased the successful placement of needles, guidewires, and catheters, but significant numbers of catheter misplacements can still occur.

Possibility of a CVC migrating from its position leading to complications, though often reported, is still not well recognized by clinicians. It can occur in patients with normal anatomy with potentially disastrous consequences.

We report the case of massive pleural effusion due to migration of central venous catheter tip in a one and a half year old patient with burns.

Keywords: central venous catheter, pleural effusion, complication, child.

Introduction

Central venous catheters have become an integral part of paediatric intensive care as well as perioperative care in major surgeries. The complications of CVC insertion

include arterial injury, injury to the pleura, looping or kinking of catheter, thrombosis, infection, migration, embolization, etc. We report the case of delayed intrapleural migration of CVC in a one and a half year old patient with burns leading to massive pleural effusion. Though the correct placement was confirmed with USG and intra atrial ECG technique, this case emphasizes the need for precautions each time the CVC is to be used.

Case report

A one & half year old child weighing 9 kg with 32% burns over trunk and lower limbs was posted for central venous catheter (CVC) insertion in view of long term fluid and antibiotic administration and difficult peripheral IV access. 4.5 French triple lumen CVC was inserted under ultrasonographic guidance in the right internal jugular vein and fixed at 4.5 cms with help of intra-atrial ECG. Free flow of blood was confirmed through all the three ports of CVC. Post procedure chest X-ray was advised prior to fluid administration and patient was shifted to burns ward. The patient was given 450ml of fluid through the CVC on the first day out of which 130ml was fresh frozen plasma and the rest was antibiotic and Isolyte P. On the second day, 150ml of fluid was given which was antibiotic.

On the second day post procedure, patient developed tachypnea, for which chest X ray was done which showed right sided massive pleural effusion with mediastinal shift (Figure 1). Serous fluid was aspirated through one of the ports of CVC and other two were negative for aspiration of blood.

Approximately 180 ml of serosanguinous pleural fluid was drained under USG guidance following which there was clinical and radiological improvement (Figure 2). The CVC was removed and adhesive pressure dressing applied. The pleural fluid report showed red blood cells 96500/cu.mm, WBCs 640/cu.mm and sugar 123mg/dl which confirms presence of blood in the fluid.

Discussion

Various imaging modalities can be used for confirmation of appropriate intravenous placement of the CVC but each has its own limitations. X ray imaging gives us only a two dimensional projection. Ultrasound is useful for initial vessel puncture, but has limited value for confirmation of tip position.



Figure 1. Chest X ray 48 hours after central line insertion



Figure 2. Chest X ray after drainage of pleural effusion.

Transoesophageal echocardiography, though confirmatory, depends on availability and requires expertise. CT scan with contrast is the gold standard in diagnosing misplaced CVC, but is expensive. The position of catheter tip may change with respiration, blood stream flow dynamics, postural rotation, and neck movements. This mechanical friction may lead to vascular erosion and perforation. This is also more common with left-sided vessels because catheters are more likely to abut the right wall of superior vena cava at a sharp angle. Female gender may be another risk factor for erosion because of smaller size of the vessels.^[1] Various explanations given for extravascular exudation of fluid include hyperosmolar parenteral infusate causing endothelial damage and subsequent increase in vascular permeability leading to an effusion. Phlebitis as a result of infection could weaken the vessel wall and lead to perforation.^[2] There is a reported case of migration of the tip of CVC into the pulmonary venous system with subsequent pleural effusion probably secondary to increased hydrostatic pressure.^[3]

The right border of the superior vena cava, azygous, hemiazygous, and internal thoracic veins are immediately adjacent to the pleura. Damage to these or adjacent arteries by guide wire or catheter erosion can cause significant bleeding into the low-pressure pleural space. If the catheter tip lies in the pleural cavity, then even without major bleeding, haemothorax or pleural effusion may result from the infusion of blood or fluids through the catheter. If the catheter has been misplaced into the pleural/pericardial space and bleeding has occurred or citrated blood transfused then this blood may not clot and low-pressure blood may be aspirated freely back from the line.^[4] In our case, there could have been an injury to the vessel wall due to guide wire or dilator through which the catheter could have eroded into the pleural space over a period of 48 hours.

To prevent such complications it is essential to note the following every time the CVC is used:

- Aspiration of blood through all ports.
- Colour of the aspirated blood.
- If transducer present, waveform consistent with intravenous placement.
- Chest radiograph (prior to first time use, and whenever there is a suspicion of migration)

Misplaced catheters need careful consideration before these are pulled out as it may lead to torrential hemorrhage if a vessel has been traversed. It is generally safer to leave the device in situ and consult a vascular surgeon or interventional radiologist in such a case rather than a hasty removal with pressure applied to the access site.^[4]

Conclusion

Though various imaging modalities are available for guiding puncture of vessel and placement of CVC, misplacement and migration of catheters can still occur with potentially disastrous consequences. All health care personnel handling the CVC should be aware of the precautions to be taken before its use. In a case where the CVC is suspected to have traversed a vessel and migra-

ted, it is wise to consult a vascular surgeon or interventional radiologist before removing the line.

References

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