Malposition of Central Venous Catheter in Paediatric Patient : A Case Report

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Abstract :

Central venous access is increasingly becoming the domain of the radiologist, both in terms of the insertion of central venous catheters (CVCs) and in the subsequent management of these lines. Malposition (means catheter lies outside of Superior Vena Cava) may be associated with catheter insertion and may require immediate intervention. Despite careful placement using proper landmarks and technique, it might be associated with hematoma formation at insertion site, pneumothorax, inadvertent arterial puncture, hemothorax, chylothorax, extravasation of infusate, pleural effusions, sepsis, thrombosis and cardiac tamponades. This report highlighted a case of a malpositioned central venous catheter leading to extravasation of infusate in subcutaneous plane. Everyone should be aware of the complications and monitor consistently appropriate position of catheter tips.

Keywords : Central venous catheter, Extravasation, Malposition.

Case report :

An 11-year-old male patient, known case of acute lymphoblastic leukemia, was referred for the further treatment to Gujarat Cancer and Research Institute, Ahmedabad. The patient was having recurrent epistaxis and recurrent infection. His blood pressure was 110/74 mm Hg, pulse 90 beats/min and respiratory rate 18/min. On examination, there was weight loss and fever was present. Hickman's catheter was inserted through right subclavian vein for delivering life supporting fluids, parentral nutrition, potentially irritant drugs and blood products. His haemoglobin (Hb) was 10.8g/dl, WBC 13.6 x 10/uL, total platelet count 317 x 10/uL, total bilirubin 0.9 mg/dl, sodium 129.8 mmol / L, potassium 4.23 mmol / L, chloride 98.8 mmol / L, blood urea 9mg/dl and serum creatinine 0.6mg/dl. Bone marrow examination suggested normo-cellular marrow with 6% blast cells. CT thorax (Fig-1) showed Hickman's catheter coiled on itself with tip lying in right supraclavicular region. The contrast when injected through it was extravasated and collected in the subcutaneous region and superior mediastinum. SVC failed to opacify suggesting the catheter had displaced in extravascular compartment. Internal Jugular Vein(IJV) also appeared to be non opacified. Chest x-ray (Fig-2) of this patient immediately after CT scan showed opacification of right scapular region around the tip of catheter.

CVC was removed without resistance, and a new right IJV catheter was placed using landmark technique, all ports had free aspiration of blood. Chest X-ray(CXR) was done, which showed the normal placement of CVC with its tip noted in superior vena cava. Patient had no complaints after this procedure and was kept under observation.

Discussion :

Central venous access forms a vital part of the management of many paediatric conditions like those requiring long-term antibiotic therapy, chemotherapy or haemodialysis. The emergence of image-guided vascular access techniques has brought central venous access increasingly into the domain of interventional radiology (IR), with perceived advantages of shorter operating times, an increased likelihood of achieving access in difficult cases, fewer procedural complications, lower operating costs, and a probable improvement in long term venous patency rates.[1, 2] This shift from general surgery to radiology has, however, brought with it an increased demand on radiology departments to maintain and manage indwelling central venous catheters. In children,

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Figure 1 : CT thorax showing contrast extravasating into subcutaneous plane and superior mediastinum.

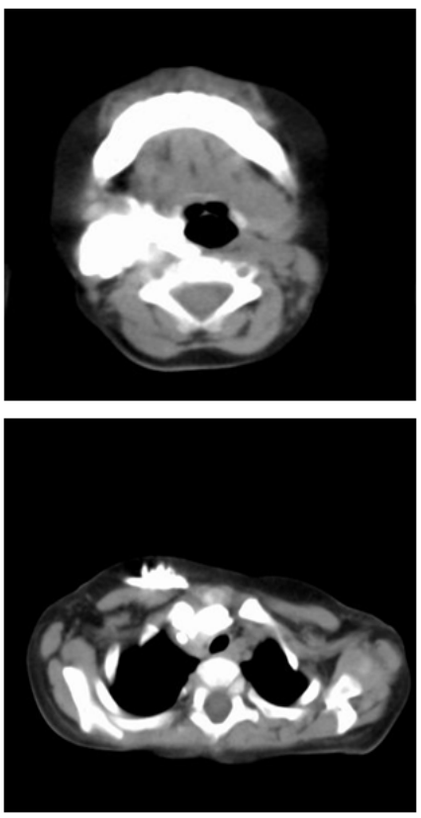
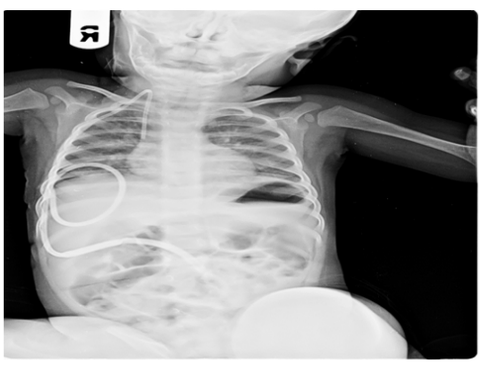


Figure 2: Chest X-ray showing extravasation of infusate after CT scan

Figure 3: Normal position of newly inserted Hickman's catheter



meticulous attention to catheter position is vital to ensure that CVCs are kept functioning for as long as possible in order to minimize the number of catheter replacements a child may have to undergo. In some practices, malfunctioning catheters are removed and replaced without investigation; in other centres, including our institution, it is recognized that there are a number of interventions available to salvage blocked or displaced catheters, allowing alternative access sites to be preserved for future use. Plain radiographs and fluoroscopic contrast examinations are central to the radiological investigation of malfunctioning catheters.[3, 4] Many radiologists, however, may be perplexed by the increasingly wide variety of venous access devices available and unaware of some of the potential CVC-related complications that develop in children or the catheter-salvage techniques available. Although it is a relatively safe procedure, multiple complications have been described both during its placement and in the maintenance of the catheter. Skill of the clinician and the use of the standard technique plays crucial role in preventing catheter related complications.[5]

The most accurate location of the tip of the catheter is at the junction of the superior vena cava and the right atrium. All radiologists and clinicians should have a very high degree of suspicion and should be able to diagnose misplacement of catheter and its complications on a radiograph. Early recognition of complications can avoid consequences. The introduction of ultrasound during the past few years as a common tool for venous catheter placement has shown marked improvement in complication rates as compared to traditional landmark techniques.[6] On the basis of recent studies, ultrasonography is used to detect the internal jugular vein and reduce the complications of catheterization. Therefore, it would be better to use ultrasound in a catheterization procedure. Time required for sonography was significantly shorter than for chest radiograph. [7] However, use of ultrasonography for CVC line insertion is not routine in all hospitals especially in resource poor settings.

Conclusion:

The insertion of CVCs is increasingly becoming the remit of the interventional radiologist that will require general radiologists to play some role in the subsequent management of these catheters. In institutions where the specific cause of catheter malfunction may alter subsequent management, radiologists need to be familiar with the catheter types used and their imaging appearances, both on plain radiography and on contrast investigations. Accurate diagnosis of CVC malfunction can significantly alter outcome for patients in whom repeated venous access procedures can often become a source of greater morbidity than their primary condition. CXR radiograph remains the gold standard to confirm the tip of catheter.

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