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A Case of Central Venous Line Insertion in Severe Scoliosis

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Case Report

Abstract: We are presenting a case of central venous catheter (CVC) malposition which was introduced under ultrasound (USG) guidance and its tip position was evaluated by transesophageal echocardiography (TEE), in a patient with severe scoliosis posted for cardiac surgery. CVC insertion is difficult and complications are more common in such cases due to distorted anatomy. Our aim was to avoid major complications related to central venous catheter insertion. We recommend USG guided insertion of central line in scoliosis which decreases complications during insertion, number of attempt, and failure rate.

Keywords: Central venous line, malposition, scoliosis, transesophageal echocardiography, ultrasound guidance.

Introduction

Incidence of malposition during insertion of central line is as high as 3.3% and it is the most common complication of central line insertion.[1] Scoliosis causes severe chest wall deformity which in turn contributes to both difficulty in insertion and malposition of central venous catheters.[2] In cases of abnormal anatomy USG guided insertion of central venous catheter (CVC) is recommended to avoid cannulation related complications.[3,4] Till now 2 cases were reported regarding complications and difficulties while inserting central line in scoliosis and kyphoscoliosis.[2,5] Other Complications of CVC placements include cardiac perforation leading to tampanode , haemothorax, pnuemothorax, inadvertent arterial placement and neuronal injuries, which can be avoided.[6] Malpositions are difficult to avoid in cases of chest wall deformity because of anatomical variations.[5]

Case Report

18 yr (32 kg) old female was posted for total correcton of Tetralogy of fallot (TOF) .Vital parameters and other systemic examination excluding Cardio vascular system were within normal limits but the patient was noted to have chest wall deformity due to severe scoliosis with convexity to right involving thoracic and cervical region. Base line blood investigations including Complete blood count, Renal function test, and coagulation profile were within normal limits except slightly elevated liver enzyme (3 times). Pulmonary function test (FEV1 - 1.5L - 78%, FVC-1.68L - 81%, Ratio - 88.9) showed restrictive lung defect due to scoliosis. Room air saturation was 92% and Echo report revealed subaortic VSD 11 mm, Infandibular pulmonary stenosis with 50% overriding of aorta.

Total correction – VSD closure and augmentation of Main pulmonary artery with pericardial patch was planned. Difficulties for securing CVC and malposition were anticipated due to distorted anatomy. Ultrasound guided insertion CVC along with TEE probe insertion to asses position of catheter tip was planned. We wanted to place Central venous catheter tip at SVC and Right atrial junction using TEE to know exact central venous pressure. On the day of surgery following induction and intubation, TEE probe was inserted. Position was given to cannulate right internal jugular vein under ultrasound guidance but failed due to distorted anatomy resulting in arterial puncture, followed by haematoma formation. Subsequently right subclavian vein was cannulated successfully; under USG guidance using seldinger technique and 7 fr triple lumen CVC was secured. There was a good back flow of blood on aspiration from all 3 lines along with good CVP wave form. TEE probe could not locate catheter tip which was expected at the junction of Right atria and SVC due to Malposition. Insertion was a difficult procedure for our team and we decided to proceed with surgery. Surgical procedure was initiated and it was uneventful throughout. Patient was shifted to post operative room for elective ventilation. Post – operative chest X-ray was done immediately which showed malposition of catheter into ipsilateral internal jugular vein.

X ray malposition of central line in scoliosis.

X-ray showing misplaced right subclavian venous catheter into right internal jugular vein. Note the severity of scoliosis which is involving thoracic and cervical spine

Discussion

TEE and Central venous catheter are often used during cardiac surgeries. Central line is required for measuring or monitoring CVP, infusing large volume of fluids/blood, infusing Ionotropes. TEE can be used to guide central venous catheter placement [6] Ultrasound guided CVC insertion technique is required to achieve the reduction of complications in difficult venous access and abnormal anatomy.[3,4] Determination of catheter position by x ray or USG should be considered when mechanical complications cannot be excluded ,aspiration of venous blood is not possible ,or catheter is intended for Central venous pressure monitoring.[1] Placement of central venous catheter in dysmorphic individuals can be difficult because of distortion of normal anatomical landmarks.[2] Incidence of radiographic catheter tip malposition defined as extravascular or ventricular positioning is around 3.3%. Cannulation by right subclavian vein was associated with the highest risk of malposition (9.1%), compared with right internal jugular vein (1.4%)[1] . Leung S et al reported a case of vascular access challenge on a patient with severe kyphoscoliosis and joint contracture. Multiple attempts to cannulate internal jugular vein was done under USG guidance but all resulted in malposition. They attributed it to severe chest wall deformity, a narrow thoracic inlet (C T scan) and inadequate positioning of patient.[5] Andropoulos S et al recommended preoperative TEE to guide depth of insertion, and confirming SVC cannulation, in patients undergoing congenital cardiac surgery.[6]

Randolph et al observed that USG guidance significantly decreases both Internal jugular and subclavian vein catheter placement failure, attempts and complications.[7] Fraqou M et al found that USG guided cannulation of subclavian vein in critical care patients is superior to the landmark method in terms of complications except malpositions.[8] Most possible explanation of CVC malposition, could be due to distortion of normal anatomy in scoliosis. We succeeded in avoiding major CVC insertion related complications by using USG and TEE but not malposition. Anaesthetist should be cautious about possible malposition even after successful CVC cannulation in cases like scoliosis.

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