Case Report

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Bilateral Pleural Effusion: An Unexpected Complication after Right Subclavian Venous Catheterization for Total Parenteral Nutrition

Rayees Najib*, Suhail Sidiq, Iram Ali***, Mohammad Akbar Shah**, Abdul Waheed Mir****

Abstract

Bilateral pleural effusion occurred after total parenteral nutrition was administered via a right subclavian venous line. The most likely explanation for the fluid passage into both pleural cavities was migration of the tip of the catheter from within the vein into the mediastinum. Fluid can pass into both pleural cavities via anatomical communications, yet to be described, which exist between the two pleural cavities1 Central venous catheterization can cause various complications, which are on the whole simple to explain with our current knowledge of anatomy. This case report, however, describes a complication occurring after subclavian venous catheterization, which is difficult to explain with our current knowledge of anatomy. Reports of ipsilateral pleural effusion following misplacement of a central venous catheter are not unusual. However, communications between the two pleural cavities are not known. A similar case of bilateral pleural effusion following a left internal jugular venous cannulation has been reported [1]. A second case of bilateral pleural effusions following an attempted right subclavian venous cannulation has also been reported [2]. No explanation was provided for the complication in either paper.

Keywords: Pleural Effusion; Subclavian Vein; Total Parentral Nutrition.

Case Report

A 55 yr old man an operated case of Ca Colon with a 2 day history of severe abdominal pain associated with vomiting was admitted to hospital as an emergency case of acute abdomen. He underwent an uneventful redo laparotomy on the same day. The operative findings were a 50 cm section of infarcted terminal ileum and 10 cm of ischaemic terminal ileum in continuity with the caecum. A small bowel resection and ileostomy were done. The patient was shifted intubated from the emergency OT to SICU for further management and electively put on ventilator in view of severe metabolic acidosis and haemodynamic instability. The patient had already been put with a triple lumen central venous catheter into the right subclavian catheter in the emergency OT. A portable anteroposterior chest X-ray confirmed the position of the line to be satisfactory and a good central venous pressure (CVP) trace was measured with a transducer. Because this patient had a complex surgical history of multiple laprotomies for intestinal obstruction and severe metabolic acidosis and a high ionotropic requirement, he was admitted to surgical ICU after the surgery.

On the third day of his hospital admission, a decision was made to start parenteral feeding as he was not expected to absorb enteral feed and total parenteral nutrition (TPN) was started through the already placed right subclavian vein. There was no reason to doubt the position of the catheter in the vein as it was already confirmed

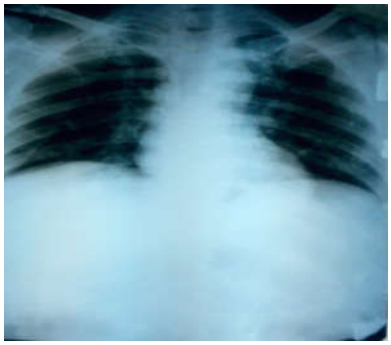

Fig. 1: Chest x ray AP view showing tip of the right subclavian line in a position consistent with placement within the superior vena cava on the ist day of admission to SICU

Author's Affiliation:
*Senior Resident, **Assistant Professor, Dept. of Anesthesia and Critical Care, Sher-I-Kashmir Institute of Medical Sciences (SKIMS), Srinagar, Jammu and Kashmir 190011. ***Senior Resident, Dept. of Paediatrics, Govt Medical College, Karan Nagar, Srinagar, Jammu and Kashmir 190010.

Corresponding Author:
Rayees Najib, Senior Resident, Department of Anesthesia and Critical Care, Sher-I-Kashmir Institute of Medical Sciences (SKIMS), Srinagar, Jammu and Kashmir 190011, India.
E-mail: rayeesnajib@yahoo.com

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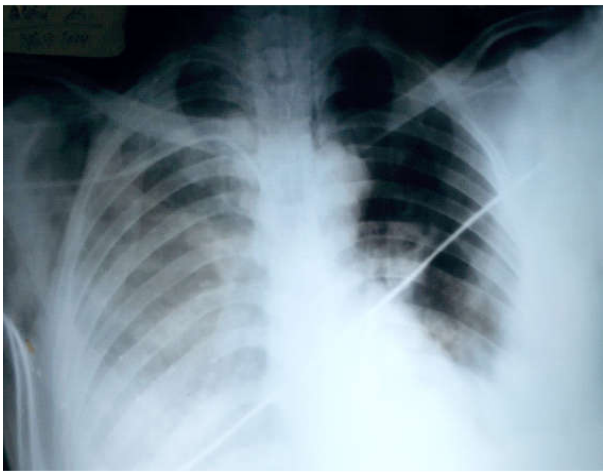

Fig. 2: Chest x ray AP view showing bilateral pleural effusion, more on the right side two days after commencement of the TPN.

from the chest x ray findings and the cvp tracing. The patient continued to be sick and could not be weaned from the ventilator in view of his haemodynamic instability and was treated as per our ICU guidelines for abdominal sepsis.

Two days after the commencement of TPN, the patient was noted to be worsening from the ventilation point of view. Both the Fio 2 requirement and the PEEP were increasing so as to maintain oxygen saturation above 90%. Arterial blood gas analysis showed a mixed pattern of worsening respiratory and metabolic acidosis. A repeat chest x ray showed b/l infiltrates and b/l pleural effusion with more effusion on the right side. Ultrasonography of the thorax confirmed large bilateral pleural effusions. The clinical picture was correlating with features of mild to moderate ARDS with unexplained pleural effusion. A 20 F chest drain was placed into each side of the chest. Over 500 ml of white, milky fluid was drained from the right hand side and another 300 ml of a similar milky coloured fluid was drained from the left hand side. As the fluid was suspected to contain TPN, the infusion was immediately stopped. It was not possible to aspirate blood, air or fluid from the venous cannula. Biochemical analysis of the drained fluid from both sides suggested that it was TPN. The two samples of drained fluid had glucose concentrations of 180mg/dl and 200mg/dl. The patient's blood glucose was 150mg/dl at the time. The glucose concentration of the TPN was 300mg/dl. The drained fluid was presumably a mixture of TPN and pleural fluid.

After placing the chest tubes the chest radiograph showed resolution of both pleural effusions and re expansion of both lungs. Antibiotic treatment with Ceftriaxone, Amikacin and metronidazole was continued, which had been started empirically after surgery. Over the next 3 days, further drainage from both chest drains was minimal. The ventilator parameters got improved with reduction in the Fio2 requirement and improvement in the Pao2 and PCO2, but the patient continued to be in severe abdominal septic shock. The antibiotics were changed as per the blood and peritoneal culture reports and the antibiotic sensitivity. But the patient succumbed to the severe sepsis and was declared dead after 8 days of ICU admission.

Discussion

This is a case of bilateral pleural effusions after attempted right subclavian venous cannulation. The most likely explanation of the bilateral effusions is the passage of TPN from the displaced catheter into the mediastinum and then into both pleural cavities via anatomical communications between them.

Reports of ipsilateral pleural effusion following misplaced central venous catheters are not unusual [3,4]. Possible channels communicating between the peritoneal cavity and the pleural cavity have also been reported [5]. However, no communications are known between the two pleural cavities. Hence, this case is unusual. Two similar cases of bilateral pleural effusions following attempted central venous catheter placement have been reported [1,2] although no explanations were suggested for the complication.

I.V. nutrition in patients who are unable to start enteral nutrition is a well established clinical technique. Because of their hypertonicity, these solutions must be given into a vessel with rapid blood flow and adequate mixing. This usually involves using a central venous catheter. Usual complications of central venous catheter placement include pneumothorax, pleural effusion, thrombophlebitis, brachial plexus injury, mediastinal haematoma and arterial cannulation [6].

Percutaneous insertion of central venous catheters are usually done by using surface anatomical landmarks (palpable or visible structures) with known relationships to the desired vein. The infraclavicular approach to the subclavian vein requires finding the correct location of the clavicle, suprasternal notch and sternocleidomastoid–clavicular triangle landmarks, proper positioning of the patient and operator and correct venepuncture point depth, direction and insertion angle. Similarly,

the various approaches to the internal jugular vein require thorough knowledge of this vein's course in relation to the sternocleidomastoid muscle and carotid artery.

Newer techniques, such as portable ultrasound devices, provide bedside imaging of the central veins during catheter placement [7,8]. The advantages of ultrasound guided central venous catheter placement include detection of anatomical variations, exact vessel location, avoidance of central veins with pre existing thrombosis that may prevent successful catheter placement and guidance of both guidewire and catheter placement after initial needle insertion. Although there is no doubt that these devices improve the safety of central venous catheter insertion, they may not prevent subsequent malposition or vascular perforation. Free aspiration of blood from the catheter, an appropriate pressure trace and the chest X- ray remain the routine methods of confirming the position of a catheter. Contrast studies are a gold standard for catheter position assessment.

Catheterization via the internal jugular vein may result in fewer malpositions than catheterization via the subclavian vein [6]. Generally, catheterization via the left internal jugular vein results in more malposition and vascular perforation than a catheter placed from the right internal jugular vein. This is because the right internal jugular vein runs into the right brachiocephalic vein in a fairly straight course whereas the left internal jugular vein forms a greater bend when it becomes the left brachiocephalic vein.

Catheter tip migration is a recognized phenomenon following central venous catheterization, occurring to some degree in approximately 17% of all percutaneously introduced catheters [9]. Poor position or aberrant location from catheter tip migration has been shown to occur in up to 6% of catheters [10]. However, only two similar cases of bilateral pleural effusions following central venous catheterization were found in the literature. This is a rare complication that is yet to be satisfactorily explained.

Refrences

1. Campagnutta E, Segatto A, Maesano A, Sopracordevole F, Viscentin MC, Scarabelli C. Bilateral hydrothorax and hydromediastinum after cannulation of the left internal jugular vein. Minerva Ginecol 1989; 41:479–83.
2. Simmons TC, Henderson DR. Bilateral pleural and pericardial effusions because of mediastinal placement of a central venous catheter. J Parenteral Enteral Nutr1991; 15:676–9.
3. Rudge CJ, Bewick M, McColl I. Hydrothorax after central venous catheterization.Br Med J 1973; 3:23–5.
4. Thomas CJ, Butler CS. Delayed pneumothorax and hydrothorax with central venous catheter migration. Anaesthesia 1999; 54:987–90.
5. Kanno T, Yoshikawa D, Tomioka A, Kamijyo T, Yamada K, Goto F. Hydrothorax: an unexpected complication after laparoscopic myomectomy. Anaesthesia 2001; 87:507–9.
6. Dunbar RD, Mitchell R, Lavine M. Aberrant locations of central venous catheters.Lancet 1981; 1:711–5.
7. Denys BG, Uretsky BF, Reddy PS. Ultrasound assisted cannulation of the internal jugular vein. A prospective comparison to the external landmark guided technique.Circulation 1993; 87:1557–62.
8. Gualtieri E, Deppe SA, Sipperly ME, Thompson DR. Subclavian venous catheterization: greater success rate for less experienced operators using ultrasound guidance. Crit Care Med 1995; 23:692–7.
9. Lang Jensen T, Nielsen R, Sorensen MB, Jacobsen E. Primary and secondary displacement of central venous catheters. Acta Anaesthesiol Scand 1980; 24: 216–8.
10. Vazquez RM, Brodski EG. Primary and secondary malposition of silicone central venous catheters. Acta Anaesthesiol Scand Suppl 1985; 81:22–6.