

An Unexpected Left Hydrothorax after Left Internal Jugular Venous Catheterisation for Total Parental Nutrition and Antibiotics

Dear Editor

Introduction

Percutaneous indwelling central venous catheters are commonly used for a variety of medical and surgical indications. There are various complications associated with the insertion of central venous lines despite the advances made in the design, material of the catheter and the technique of insertion. Vascular erosion from the catheter is a rare complication that is identified late due to preexisting underlying pleural effusion or lack of awareness of this complication.

This case report describes a complication that had occurred after an antibiotic coated triple lumen 7F 20-cm Cook's® catheter was inserted into the left internal jugular vein in a cachexic patient with ovarian malignancy.

Reports of ipsilateral pleural effusion following misplacement of central lines are not unusual but it is, however, rarely reported in our institutions. Two cases were detected in 1 institution but they were not reported. The last known cases of similar complications were reported in other institutions more than 10 years ago. It accounted for about 0.5% of known complications related to the insertion of central line.¹

Other complications such as pneumothorax, malpositioning of lines and haemothorax are more commonly seen and occurred in up to 3% of all cases.¹⁻⁶

Total parenteral nutritional infusion was infused via the proximal port of the new central line. The tip of the old central line and blood culture grew MRSA (methicillin-resistant *Staphylococcus aureus*) and vancomycin was started and infused subsequently through the middle port. All infusion fluid was given via the triple lumen catheter due poor venous access.

Case History

A 55-year-old Chinese female presented to the hospital with acute abdomen. There was generalised abdominal guarding with some degree of rebound tenderness. She was hypotensive with a mean arterial pressure of 50 to 60 mm Hg and tachycardia of 120 to 140 per min.

A huge ovarian mass with metastasis to the peritoneum

and collection of pus was found in the pouch of Douglas during the laparotomy. The pus was due to abdominal sepsis from perforated small intestine.

Postoperatively her albumin level dropped to less than 20 g/dL and the patient became more oedematous. A computed tomographic (CT) scan of the abdomen was done and it showed distended bowel with ascites and bilateral pleural effusion.

She was seen by the infection physician who recommended a change of lines and blood culture before a change of antibiotics.

A Cook's 7F triple lumen antibiotic coated central line was inserted into the left internal jugular vein uncomplicated by an experienced senior medical officer in the presence of the registrar. It was a single attempt and blood was aspirated from all 3 ports. There was no reason to suggest that the pleura was punctured as the procedure was done smoothly via the Seldinger's technique. The catheter was anchored at 13 cm to the skin. Chest X-ray (CXR) confirmed that the tip was at the junction of the left brachiocephalic vein and the superior vena cava (SVC) (Fig. 1).

On the fifth postoperative, she had spikes of fever and her white blood cell count was significantly elevated. Blood culture was attempted from all 3 ports of the new central line.



Fig. 1. Chest X-ray (CXR) showing the tip of the catheter at the junction of the left brachiocephalic vein and the superior vena cava.

Blood could only be aspirated from the distal port. There was no blood aspirated from the other 2 ports but central venous waveforms were still detected from these 2 ports. A CXR was done but it did not show that the catheter had migrated out as compared to the previous CXR. It was felt that the catheter tip might have abutted against the venous wall. Hence, the TPN infusion was maintained through the proximal port.

Two days later, the patient was noted to be more breathless. Clinical examination showed that there was leakage of total parenteral nutrition fluid at the central line site. The catheter was still stitched at the same marking 13 cm to the skin. Air entry was significantly decreased in the left side. A significant level of dullness was noted. Blood could not be aspirated from all 3 ports subsequently.

Central venous waveforms were now unrecordable. CXR showed an increase in diffuse opacity in the left lung. The tip of the central catheter was noted to be significantly displaced (Fig. 2). A new central line was inserted into the right jugular vein and after the position of the tip of the central venous line was confirmed in the appropriate position; the old line was removed.



Fig. 2. Chest X-ray (CXR) showing an increase in diffuse opacity in the left lung and a displaced tip of the central catheter.

A left pleural tap was done under radiological guidance to avoid any lung and cardiac injury and 350 mL of milky white fluid was removed. A chest drain was placed to drain the hydrothorax. The differential diagnosis that was considered was chylothorax but the content of the fluid aspirated was analysed and confirmed to be of similar constitution to TPN.

She was ventilated for the next 2 days and as her condition gradually improved, she recovered uneventfully.

Discussion

This was a case of a left pleural effusion after cannulation of the left internal jugular vein and TPN infusion. There were no obvious clinical signs and symptoms to suggest that there was line migration and vascular erosion in the first 6 days after the line was inserted. A literature search showed more than 34 cases of reported catheter induced vascular erosions.¹ The incidence was higher among women and the route of catheterisation was left sided in most of the cases.

Bach¹ did a review of all the patients in the critical care ward from 1990 to 1991 and noted that there were 8 documented patients who presented with vascular erosion from central venous line insertion. It represented an incidence of 0.5% of all central lines delivered during the study period.

All catheters were made of polyurethane and placed with the Seldinger technique. Clinical features include cardiopulmonary symptoms and CXR showing progressive pleural effusion. The antibiotic coated Cook central line was coated with rifampicin and minocycline and it was also made of polyurethane. A literature search for antibiotic coated catheters did not show an increase incidence of complications.

The patients typically presented with symptoms of breathlessness or chest discomfort at about 2.9 ± 0.8 days (ranging from 1 to 7 days) after catheter insertion. The pleural fluid aspirated appeared transudative with variable glucose concentrations.

Diagnosis was often delayed for 3 ± 1.5 days, ranging from 0 to 11 days after vascular erosion.

Seven patients had the catheter passing through the left brachiocephalic vein and 6 abutted against the right lateral wall of the superior vena cava and was bent at an angle close to 45 degrees with the horizon at level of the azygos arch.

Other reviews confirmed the hazards of delayed diagnosis of hydrothorax from jugular vein cannulation. The left internal jugular vein is most commonly quoted as a high risk factor for vascular erosion.

Antibiotic coated catheters have never been mentioned as a risk factor but the author noted that the normal catheter (Arrowhead and Biosensor) was more pliable and softer than the antibiotic coated catheters though the manufacturer did not mention any difference.

The manifestations of vascular perforations usually occur around the 2.9 ± 0.8 days and it involves clinical cardiopulmonary symptoms or roentgenographic evidence of a new or rapidly progressive pleural effusion.¹

A combination of factors for wall erosion have been postulated:

- 1) The fixation of the catheter to the skin combined with head, neck and central line motions resulted in the back and forth movement of the tip against the venous wall.
- 2) A stiff catheter in the left internal jugular vein takes a curved course to the SVC bringing the catheter tip into close proximity of the wall of SVC.
- 3) The content of the infusion. High acidity or alkalinity may have contributed to the erosion, e.g., total parenteral nutrition, antibiotics infusion (vancomycin) and sodium bicarbonate.
- 4) Poor nutritional state resulting in poor tissue condition.
- 5) Higher incidence in female patients may be related to a smaller vein.

We recommend daily assessment of the central line for loss of waveform and leakage around the line. If these features are present, blood should be aspirated from all the ports. If there is absence of blood aspiration through any of the ports, catheter should not be used and a repeat CXR has to be done to confirm the position of the tip and the presence of a hydrothorax. If there is a high index of suspicion of catheter migration, a new line has to be reinserted.

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