

CONTRALATERAL HAEMOTHORAX: A LATE COMPLICATION OF SUBCLAVIAN VEIN CANNULATION

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Since its introduction, subclavian vein cannulation [1] has gained popularity. Critically ill patients in Intensive Care Units (ICU) need long-term venous access for parenteral nutrition, haemodynamic monitoring and haemofiltration.

Laceration of the subclavian or innominate vein by a central venous catheter or its introducing device, often results in life-threatening complications. The occurrence of mediastinal haematoma or haemothorax, although rare, can be recognized readily and reduced to an acceptable frequency by fixed policy, meticulous technique and supervision [2-4]. However, late complications may be difficult to recognize and contralateral manifestations may compound diagnostic difficulties. The following case report highlights such a problem.

CASE HISTORY

A 69-year-old woman was admitted to the ICU following laparotomy for drainage of a splenic abscess and peritonitis. She was suffering from septicaemia, and renal and respiratory failure. She was established on IPPV and antibiotic therapy commenced. It was decided to treat her renal failure with haemofiltration. A dual-lumen polyurethane central venous catheter (Vaccess 4000, VasCath, Canada) was inserted via the *left* subclavian vein using an infraclavicular approach. Although the patient's condition was aggravated by multiorgan failure in addition to diabetes mellitus, she made a good recovery in the early postoperative period.

On the 5th day after operation she developed intestinal bleeding for which a left hemicolectomy

SUMMARY

Contralateral haemothorax developed as a late complication of subclavian vein cannulation following gradual erosion of the wall of the superior vena cava by the tip of the catheter. The use of a relatively rigid catheter and a left-sided approach may have contributed to this rare, but potentially fatal complication.

was performed. Two days later her cardiovascular system became unstable. A flow-directed pulmonary artery catheter was inserted via the *right* subclavian vein for haemodynamic monitoring. A day later, a right pleural effusion appeared on chest x-ray, for which a chest drain was inserted. Three litre of blood was drained from the right thoracic cavity. It was thought that the haemothorax was caused by, or during, insertion of the flow-directed catheter, although the position of the catheter was previously confirmed by radiography. The patient was treated conservatively. Cardiovascular stability was restored after she was given 12 units of blood. At that time, however, her renal function recovered and the left subclavian dual lumen catheter was used only for administering parenteral nutrition and drugs. Blood sugar concentration, however, was persistently increased (greater than 30 mmol litre⁻¹) despite large i.v. insulin increments and her high arterial pressure failed to respond to sedatives and hypotensive drug therapy. Although the bleeding stopped within 24 h, a considerable amount of fluid (3-5 litre day⁻¹), similar in appearance to her parenteral feed, was draining from the right pleural cavity. This fluid was later analysed and found to have a high glucose content (130 mmol litre⁻¹).

Finally, it was noted that the patient did not respond to methohexitone and suxamethonium

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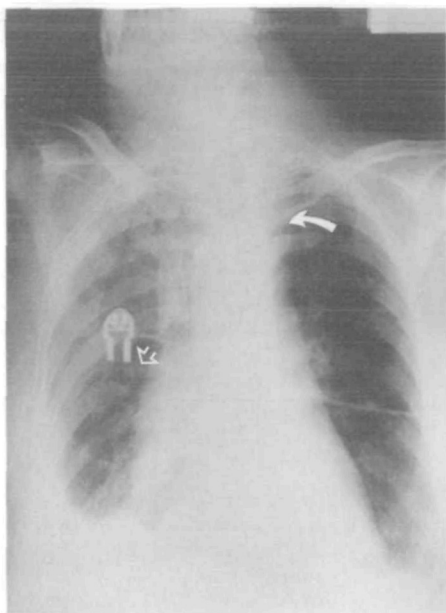


FIG. 1. Chest radiograph showing the tip of the dual-lumen catheter (open arrow) in the pleural cavity.

when they were administered via the same catheter to facilitate the change of her tracheal tube. The Vaccess catheter was, therefore, suspected to have eroded the wall of the superior vena cava (SVC). Injection of contrast media followed by a radiograph confirmed that the tip of the catheter was lying in the right pleural cavity (fig. 1).

Infusions via the catheter were discontinued; the lumina were filled with tetracycline and the injection ports were capped. Three days later it was withdrawn without further complication. Unfortunately, the patient died 1 month later, from septicaemia and cardiac failure. No other sign of mediastinal complications was found at autopsy.

DISCUSSION

Ipsilateral pulmonary complications following subclavian vein cannulation are well documented [2, 4]. Contralateral haemothorax caused by guide wires is rare and manifests itself soon after the cannulation procedure [5–7]. Delayed perforation of the vessel wall is associated with a high incidence of hydrothorax, in contrast to haemothorax [8, 9]. Diagnosis and treatment of this complication is often delayed [8]. Although lateral chest radiographs were not taken, periodic radiography indicated satisfactory position of both

Vaccess and flow-directed catheters. Furthermore, haemofiltration and haemodynamic measurements were carried out successfully for 8 days and 1 day via each catheter, respectively.

The appearance of haemothorax following right subclavian vein cannulation made the diagnosis difficult. The tip of the Vaccess catheter was suspected to lie outside the superior vena cava when the patient failed to respond to anaesthetic drugs and fluid resembling chyle was recovered from the right chest. Chest radiographs showing satisfactory positioning of a central venous catheter within the vein appears to be no guarantee against its secondary migration. It may also be possible to aspirate blood from a multi-lumen catheter even though its tip is no longer within the vessel [2, 9]. Secondary migration of unsecured catheters may occur during cardiorespiratory motion. This may be sufficient to cause erosion of the vessel wall [2, 10, 11].

Chest radiographs of this patient (fig. 1) in addition to other patients (fig. 2) whose central veins were cannulated by similar catheters were reviewed. Because of the horizontal orientation of the left brachiocephalic vein and its 90° junction with the SVC, left subclavian vein cannulation allows the catheter to acquire a transverse course. This course tends to bring the catheter tip in opposition against the vessel wall and increases the risk of erosion of the vessel wall. In eight out of nine reported SVC perforations [9] the catheter was inserted on the left side. Furthermore, the appearance of a gentle curve at the tip of

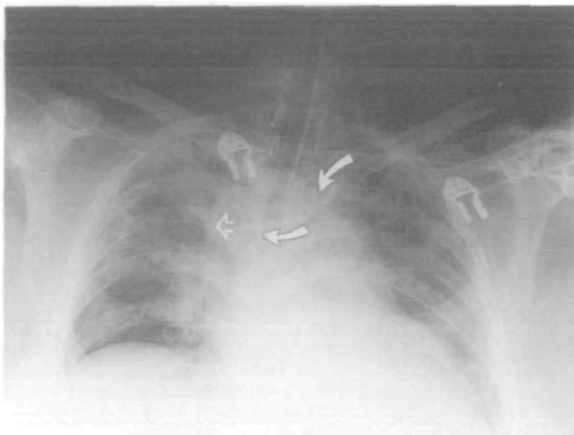


FIG. 2. Chest radiograph showing the curve taken by catheter (closed arrows) inserted from the left side and its tip (open arrow).

the catheter was claimed to be a radiographic sign of threatening perforation.

Soft catheters with blunt tips have reduced the frequency of vascular perforation [12, 13]. However, the use of relatively rigid catheters such as those for temporary haemofiltration are likely to increase this hazard. The large diameter of dual-lumen catheters (14-gauge) may cause a sizeable tear in the vessel wall. It may cause severe haemorrhage at the time of perforation, as in the present patient, or upon withdrawal of the catheter.

This case history illustrates a potential hazard of the increasing use of relatively rigid dual-lumen haemofiltration catheters. However, their use remains valuable in the management of ICU patients who are in renal failure. Whenever possible, these catheters should not be inserted via the left subclavian vein. Unexplained pleural effusion of high glucose content or resistance to drugs administered via the catheter should immediately raise the suspicion of vein perforation. Perforation may be prevented by catheter withdrawal if a gentle curve of its tip is recognized during periodic chest radiography, particularly in lateral views. All lumina of a multilumen catheter must be checked to ensure its appropriate position.

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