An enigmatic complication after an uncomplicated insertion of a right subclavian central venous catheter

Sir,

Central venous catheter (CVC) insertion is associated with various complications.\(^1,2\) Haemothorax following the subclavian line placement\(^3\) and its removal\(^4\) are reported. In reported cases, the authors had difficulty passing guidewire/dilator/catheter, placed after multiple attempts or inserted by inexperienced personnel. Here, we report haemothorax and its proposed mechanism following an uncomplicated right subclavian CVC insertion.

A 51-year-old hypertensive woman underwent clipping of the anterior communicating artery (ACommA) aneurysm. After discontinuing ventilation, using Seldinger's technique, a right subclavian triple lumen (7-French, 10 cm) CVC was inserted (infraclavicular approach) in a single attempt by an experienced anaesthesiologist soon after induction. Catheter dilation and threading were performed smoothly. Dark, non-pulsatile free flow of venous blood was aspirated from all three lumens.

Anaesthesia was maintained with total intravenous anaesthesia. Intravenous fluids (IVF), vasopressors, propofol, and vecuronium were infused through CVC. The lungs were ventilated with the pressure control mode of ventilation, and there was no drop in the tidal volume/oxygen saturation during the surgery. The surgeon clipped the aneurysm successfully. The surgery lasted for 6 h. The patient had a significant cough at extubation despite taking preventive measures to obtund the cough reflex with lignocaine and fentanyl.

The preoperative chest X-ray is depicted in Figure 1a for comparison. Routine postoperative chest X-ray (anteroposterior [AP] view) taken 2 h after surgery in a semi-sitting position confirmed the proper placement of the line tip. A homogeneous right hemithorax opacity was noted with no tracheal/mediastinal shift [Figure 1b]. The patient was asymptomatic, haemodynamically stable with the peripheral oxygen saturation (SpO\(_2\)) 99% on room air. A repeat chest X-ray (2 h later) in sitting position revealed homogeneous opacity limited only to the right lower zone [Figure 1c]. The ultrasonogram (USG) of the chest showed mild to moderate fluid with thin septations in the right pleural cavity (suggestive of haemothorax). At that time point, we could freely aspirate blood from all three lumens of the CVC. Since she was asymptomatic, we decided to remove the CVC and observe her. A serial haematocrit revealed no drop and a repeat chest X-ray/USG of the lung showed a resolving haemothorax.

Haemothorax following a CVC insertion is associated with arterial,\(^5\) venous injury,\(^3\) or cardiac perforation by a catheter tip/guidewire.\(^5\) In our case, all IVF (total—4L) and medications were infused through the CVC during the surgery, and the patient responded to the fluids and vasopressors appropriately. The depth of anaesthesia was stable with the Patient State Index between 25 and 35 (SedLine Sedation Monitor). No change in the tidal volume/oxygen saturation ruled out moderate to severe haemothorax during surgery. The line position on postoperative chest X-ray and the free aspiration of blood from all lumens before its removal ruled out catheter migration.

![Figure 1: (a) Preoperative chest X-ray PA view (for comparison); (b) the postoperative chest X-ray (AP view) in the semi-sitting position and (c) in sitting position confirming the position of the line tip in the superior vena cava. (1a) - There is a uniform homogenous opacity of the right hemithorax in the semi-sitting position; (b) A significant decrease in the right hemithorax opacity, which is limited only to the lower zone obliterating the right costophrenic and cardiophrenic angle in the sitting position](image-url)
We hypothesise that a breach in the parietal pleura while inserting the needle (without puncturing the lung) caused communication between the subclavian vein and pleural cavity and led to this enigmatic complication. The 7-F, 10 cm CVC set (VenX™ CVC, BL life-sciences) is stiff and has a bigger dilator (8F) than the catheter (7F) (1.5 mm more) [Figure 2], which could have caused the pericatheter leak. The communication between the vein and the pleural cavity led to haemothorax. Another possibility could be venous injury at the entry site during dilation and its communication into the pleural cavity, leading to this complication.

The positive pressure ventilation creates positive intrathoracic/intrapleural pressure that might have reduced the pericatheter leak during the surgery. Once the patient attained spontaneous breathing, the negative intrapleural pressure might have increased the leak leading to mild to moderate haemothorax after the surgery. During extubation, the unusual cough which the patient encountered could be due to pleural irritation by the subclavian catheter.

If a patient with a non-reactive airway develops excessive cough during extubation despite all the preventive measures, one should suspect this complication. A USG-guided subclavian line placement or a central line placement through the external jugular vein[6] can reduce this complication. Postoperative chest X-rays should be interpreted as early as possible to diagnose and treat the unusual complications.

Figure 2: Measurement of the circumference of the dilator and the catheter using a thread showing the dilator is 1.5 mm more than the catheter

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Conflicts of interest
There are no conflicts of interest.

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