On table confirmation of the catheter tip: A requirement in times of multiple catheters in the same central vein

Sir,

For major surgeries like living donor liver transplantation (LDLT) wide bore, reliable venous access is a necessity. At our center, we routinely insert two catheters in the same internal jugular vein (IJV) to provide multiple ports for intravenous infusion. However, insertion of two catheters in a single vein carries its own risk.[1]

A 30-year-old male patient with acute on chronic liver failure was taken up for LDLT. As per our institutional protocol, after induction of general anesthesia, two guidewires were placed 1 cm apart in the right IJV, under ultrasound guidance. A 7-Fr triple lumen central venous catheter (CVC) was inserted over the distal guidewire, checked for backflow of blood and sutured in place. Next a 9-Fr advanced venous access (AVA) catheter was threaded over proximal guide wire and also fixed after checking for backflow of blood from all its ports. The pulmonary artery (PA) catheter was subsequently floated through the AVA sheath and wedged. Central venous and PA pressure tracings were monitored using PA catheter throughout the 15 h long surgery. Various drugs, inotropes and intravenous fluids were administered through the multiple CVC and AVA ports.

After surgery, a bedside chest radiograph (chest X-ray [CXR]) was taken [Figure 1], as per routine protocol, which showed that the tip of CVC was in the right external jugular vein instead of superior vena cava. There was no swelling, discoloration or crepitus in the neck or supraclavicular region. The CVC catheter was withdrawn under fluoroscopic guidance and repositioned over a new guidewire.

Living donor liver transplantation is a major surgical procedure and involves significant fluid shifts.[2] There is a need for intravenous infusion of multiple drugs and fluids along with real-time hemodynamic monitoring to guide fluid management. This necessitates for reliable wide bore venous access with multiple infusion ports. Since cannulation of bilateral IJV could predispose to bilateral neck vein thrombosis[3] and femoral vein cannulation is not preferred in these surgical settings, we prefer to place two catheters in the same neck vein.

Confirmation of catheter placement on the table is usually done by monitoring electrocardiogram,[4] pressure tracings using a transducer or when in doubt, by blood gas analysis. In our patient backflow of blood form, all ports were checked for, and samples for blood gas analysis were sent. However, throughout the intraoperative period, pressure tracings were monitored using the PA catheter. The routine postoperative bedside CXR, recommended for ruling out pneumothorax and visualizing catheter tip, revealed the malposition.

In the setting of multiple cannulations in the same neck vein and extensive and prolonged nature of surgery, perhaps confirmation of proper catheter placement needs to be done prior to commencement of surgery rather than by a postoperative CXR. Literature is rife with complications related to unsuspected malposition, looping and knotting of CVC and PA catheters.[5,6] In situations where three such catheters are inserted in the same vessel, the chances of complications would increase exponentially.[7]

In our patient, removal of the AVA guidewire probably pulled the CVC to a new position. Since the pressure tracing was not recorded using it, we did not suspect a malposition. It did not lead to subcutaneous extravasation or knotting of catheters, but an early on table fluoroscopy could alert us and enable corrective manipulation prior to surgery.

Figure 1: Postoperative chest radiograph showing malpositioned central venous catheter along with advanced venous access and pulmonary artery catheter
Based on our experience we recommend that on the table fluoroscopy should be the dictum for early confirmation of proper catheter placement, especially where multiple catheters are inserted in the same vein.

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Sir,
A 55-year-old female presented with headache and difficulty in walking. Magnetic resonance imaging showed right parietal meningiomas 8.5 by 6 cm obliterating occipital horn of the right ventricle. A right parieto-occipital craniotomy in right lateral position was planned. A preoperative chest radiograph revealed haziness on left lung with compensatory hyperinflation of the right lung [Figure 1] suggestive of interstitial lung disease. Baseline arterial blood gas (ABG) showed, partial pressure of oxygen of 50 mmHg and partial pressure of carbon dioxide (PaCO₂) of 30 mmHg.

Intraoperatively the more diseased left lung remained downwards receiving more perfusion with a relatively healthy right lung upwards receiving less perfusion. ABG after induction of anesthesia showed a baseline pH of 7.30 and PaCO₂ of 43 mm Hg and end tidal CO₂ (ETCO₂) of 31 mm Hg (arterial alveolar gradient of 12 mmHg). After 1 h of positioning, (in the lateral position), PaCO₂ increased to 52 mm Hg with a decrease in pH to 7.16. On increasing the minute ventilation there was a decrease in the ETCO₂ to 23 however the PaCO₂ increased to 52 mm Hg. Serial ABGs showed hypercapnia, resistant to increases in minute ventilation due to defect at alveolar capillary membrane.

Figure 1:
A preoperative chest radiograph revealing haziness on left lung with compensatory hyperinflation of right lung