

## **Volume Change Following Valsalva: A Valuable Tool to be Incorporated in the Stepwise Technique for Central Venous Catheter Placement Under Ultrasound Guidance: An Opinion**

The Editor,

Central venous catheter (CVC) insertion is one of the most frequently performed invasive procedures in ICU and operation theaters. The use of ultrasound (US) has helped reduce the number of complications.<sup>[1]</sup> The five-step approach for CVC placement under US guidance includes identification, confirmation of patency, real-time US guidance for vein puncture, confirmation of needle, wire, and catheter position in vein.<sup>[1]</sup> We share an interesting case and propose an additional step to US-guided CVC technique.

A 24-year-old female, known case of renal cell carcinoma, grade I American Society of Anesthesiologists physical status was planned for exploratory laparotomy for repair of cisterna chyli leak. The patient had developed chyle leak following previous surgery needing retroperitoneal node dissection. The patient had a history of bilateral internal jugular vein (IJV) cannulation for 15–20 days each, to administer total parenteral nutrition (TPN).

Postadministration of general anesthetic, decision to cannulate right IJV under US guidance (M-Turbo US system; Sonosite, Bothell, WA, USA) was taken in view of the need of TPN postsurgery. After identification and patency check, at the puncture site, the vein was punctured using linear probe ( $\times 38$  [13-6 MHz]) and out of the plane technique. Following free aspiration of blood, guide wire was introduced, but it could not be negotiated more than 10 cm. Following a similar unsuccessful attempt, the procedure was abandoned, and the screening scan was repeated. We could demonstrate compressibility of the IJV at the neck. However, the Valsalva maneuver failed to reveal a change in diameter of the IJV, suggesting a thrombus lower down in the thorax. Failure to visualize the thrombus in the neck, made us seek help from our radiologist colleague. On placing the linear probe in the supraclavicular fossa, a thrombus was found in the thorax at the confluence of distal right IJV with the right

subclavian vein. The decision to give peripheral TPN was taken, and the patient was started on appropriate treatment for upper limb thrombus.

Thrombosis of IJV, although a relatively rare condition, can lead to complications including pulmonary embolism.<sup>[2]</sup> Ultrasonography is the most frequently used objective test. The sensitivity of compression ultrasonography for diagnosing IJV thrombosis is approximately 96%, approaching 100% if color flow Doppler is used.<sup>[2]</sup> In this case, the thrombus was not picked by screening the IJV in the neck. A past report suggests that one must attempt to scan the IJV in the long axis,<sup>[3]</sup> however, distal thrombus can still be missed. In the absence of augmentation in IJV diameter with Valsalva, as seen in this case, one must attempt to visualize distal end of the internal jugular, subclavian, and brachiocephalic veins, before cannulation. One may argue that in view of the previous history of jugular venous cannulation, a preoperative “formal” thrombosis screening should have been done. However, since IJV thrombus is not limited to previous cannulation, and CVC cannulation may be needed in odd hours, we suggest incorporation of the Valsalva maneuver in the second step of US-guided CVC.

Response to augmentation maneuvers has been used to diagnose upper extremity thrombosis.<sup>[4,5]</sup> Due to its relative simplicity, easy reproducibility, and fair accuracy to diagnose distal thrombus; incorporation of this technique into a routine check of CVC, should be feasible. In conclusion, the Valsalva augmentation in IJV diameter is a valuable test which should be incorporated in addition to the compressibility test, to rule out thrombosis before attempting IJV cannulation.

#### Declaration of patient consent

The authors certify that they have obtained permission from Institutional Review Board for use of patient details and other clinical information to be reported in the journal.

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#### Conflicts of interest

There are no conflicts of interest.

## Vijaya P Patil, Sumitra G Bakshi, Harshita Singh

*Department of Anesthesiology, Critical Care and Pain, Tata Memorial Hospital, and Homi Bhabha National Institute, Mumbai, Maharashtra, India*


*Address for correspondence: Dr. Sumitra G Bakshi, Department of Anesthesiology, Critical Care and Pain, Tata Memorial Hospital, and Homi Bhabha National Institute, Mumbai, Maharashtra, India.*

*E-mail: sumitrabakshi@yahoo.in*

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