Prediction of inadvertent internal mammary (thoracic) vein cannulation by CVP monitoring

Madam,

Inadvertent cannulation of the left internal mammary vein (IMV) is rare and is diagnosed only on a radiograph, which might delay diagnosis till the postoperative period. The radiograph raises an alarm, as it appears to cannulate the left atrium. We propose that an inappropriately high central venous pressure (CVP) with "giant waves" corresponding with positive pressure ventilation serves as a sign of left IMV cannulation and other extracaval, intrathoracic placement.

A 42-year-old male, with end-stage renal disease was scheduled for a living donor renal transplant. The patient had previous history of right internal jugular vein (IJV) cannulation with a hemodialysis catheter.

After administering general anesthesia, we suspected a stenosis in the right IJV and proceeded to cannulate the left IJV with a 7 French triple lumen catheter (VenX™) fixed at 13 cm on the skin. On aspiration, however, only two of the three lumens had an unobstructed flow. CVP tracing was established and put on continuous monitoring. The CVP tracing showed a high mean CVP in the range of 18 to 22 cms of H_20 which was at variance with the clinical picture. We also noted giant waves [Figure 1] appearing periodically and, therefore, raising the mean CVP. After careful observation, we noticed the giant waves to be coinciding with the advent of positive pressure inspiration breaths [Figure 1].

In the absence of any uremic cardiomyopathy and restricted intravenous fluid usage, the patient was unlikely to have elevated CVPs. Therefore, we suspected an extracaval but intrathoracic placement, likely a left IMV cannulation. Fluoroscopy inside the theater showed the catheter not crossing onto the right side which it should while traversing the left brachiocephalic vein [Figure 2]. We documented the event with a chest radiograph and removed the catheter. We then cannulated the right subclavian vein using landmark approach and proceeded with the surgery. The mean CVP of the patient was 6 to 11 cms Hg, and fluids were administered appropriately.

Central venous cannulation is an essential procedure for management of critically ill and perioperative patients. The left IJV needs to traverse the left brachiocephalic (innominate) vein and hence is prone for misplacement. The right IJV, having a shorter and straighter course, is thus preferred.

In one case, the position could not be ascertained in a symptomatic patient till a computed tomography (CT) was done.[1] Kela[2] also reported a persistently high CVP (18-22 cms H_2O) in a similar scenario but it was detected during left internal mammary artery dissection in a patient who was undergoing coronary artery bypass grafting and was subsequently removed.

To conclude, an inappropriately high CVP with giant waves corresponding with positive pressure ventilation serves as a sign of left IMV cannulation and other extracaval intrathoracic placement.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Figure 1: Giant waves on CVP waveforms corresponding to positive pressure ventilation

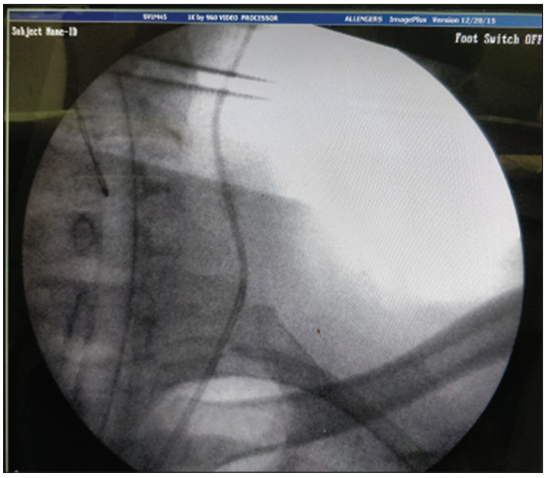

Figure 2: Fluoroscopic image depicting failure of the catheter to cross the midline

Conflicts of interest

There are no conflicts of interest.

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