

Prodigious Valve: Ultrasound Will Surely Help!!!

Dear Editor,

The central venous cannulation (CVC) is an integral component of perioperative management when massive blood loss is expected during surgical procedures.

A 28-year-old, G₂ P₁₊₀ antenatal female with bleeding per vagina diagnosed as placenta previa, was brought for emergency Caesarean section (C-section). Two large-bore intravenous cannula were secured and general anaesthesia was planned. We cannulated the right radial artery with a 20G arterial cannula for continuous blood pressure monitoring. In order to administer fluid, blood and blood products, we planned to cannulate right IJV with 7 French triple lumen central venous catheter using landmark guided technique. Internal jugular vein was identified in the first attempt by the presence of free backflow of venous blood. Later, a guidewire was threaded through it. However, at around 6-8 cm, some resistance was felt. To overcome this resistance, the position was modified and the second attempt was taken, right IJV was again identified and resistance was felt at the same distance. Therefore, we abandoned the procedure on the right-side and left-sided IJV was cannulated. General anaesthesia was given and C-section was uneventful. After C-section, it was decided to analyze the right IJV using ultrasound. Ultrasonographic assessment of right IJV was done using a portable Sonosite machine with a 7.5 MHz linear array probe. First, a short-axis view of right IJV was acquired by keeping the probe in the sagittal plane at the level of the cricoid cartilage and then probe was moved in a caudal direction to assess its patency. Moving downward, we found a flap-like structure within compressible right IJV in the absence of echogenic mass [Figure 1]. USG probe was then kept in the longitudinal plane to obtain a long-axis view and a valve-like structure (with two cusps) was identified [Figure 2]. The location of the bicuspid valve in course of right IJV corresponded to the point of resistance during the threading of guidewire. Hence, presence of valves in the right IJV prevented further passage of a guidewire through it.

The right-sided internal jugular vein is a preferred major venous site for cannulation due to its consistent predictable anatomical location but valves in it can offer procedural difficulties. Valves are found in approximately 90% of the human beings in IJV and 96.7% have bilateral IJV valves.^[1] Physiologically, these valves form a bridge between the brain and the heart. They offer protection to the brain from a sudden rise in the intrathoracic pressure while coughing (spontaneously breathing individuals) and during positive pressure breathing (ventilated

patients) especially in neurologically compromised patients. Despite this much high incidence of the presence of valves in IJV, many perioperative physicians still lack knowledge about these valves. These valves are mostly located in the distal portion of the IJV, just proximal to the jugular bulb in the retro-clavicular space in 53.4% cases.^[2] These valves hang downward and prevent retrograde blood flow into the brain as quoted by Harvey in 1628.^[2] It has been observed in various anatomical dissections that 70-98% of cases have bicuspid valve leaflets (as was seen in our case), 0-7% and 1.4-16% have tricuspid and unicuspid valves respectively.^[2]

In our case, we found a large bicuspid valve in the right IJV which formed a barrier, offered resistance and prevented the passage of a guidewire through it. Undue force to pass the guidewire through valves might cause inadvertent injury to valves which may result in valve incompetence, thrombus formation over the injured valve and increase intracranial pressure in compromised neurosurgical patients. Also, these valves can result in 180° degree rotation of the catheter in an upward direction.^[3]

The valves in the IJV undoubtedly can obstruct the placement of a central venous catheter.^[4] Valvular damage during insertion of guidewire can act as nidus for thrombus formation. Therefore, it is suggested that the use of a J shaped, soft end of guidewire should always be preferred for insertion rather than a hard side of the straight end to avoid any valvular trauma.

However, during insertion if obstruction to passage of the guidewire is suspected with the patient in the Trendelenburg position, then the “head-up” position can be tried because the favorable gravitational gradient in the upright posture makes the IJV valve open for the entire cardiac cycle, facilitating easy passage of the guidewire.^[5]



Figure 1: Ultrasound Short Axis View showing Right Internal Jugular Vein



Figure 2: Ultrasound Long Axis View showing right Internal Jugular Vein and Right Subclavian Vein

Undoubtedly, the presence of valves in IJV in our case reinforces the need to scan major veins before cannulation as a routine protocol. Hence, use of USG should be recommended for cannulation prior to the procedure so as to evaluate (3P's) – preferred major vein (IJV or subclavian), position (anatomical location-right or left side) and patency (thrombus, stenosis, dissection, valves).

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

**Shalvi Mahajan, Shankey Garg, Sanjay Kumar,
Rajeev Chauhan**

Department of Anaesthesia and Intensive Care, Postgraduate Institute of Medical Education and Research, Chandigarh, India

Address for correspondence: Dr. Rajeev Chauhan,

Department of Anaesthesia and Intensive Care, Postgraduate Institute of Medical Education and Research, Chandigarh - 160 012, India.

E-mail: dr.rajeevchauhan@gmail.com

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Access this article online	
Quick Response Code:	Website: www.joacp.org
	DOI: 10.4103/joacp.JOACP_393_19

How to cite this article: Mahajan S, Garg S, Kumar S, Chauhan R. Prodigious valve: Ultrasound will surely help!!! *J Anaesthesiol Clin Pharmacol* 2022;38:169-70.

Submitted: 22-Nov-2019 **Revised:** 25-Apr-2020

Accepted: 14-Jun-2020 **Published:** 28-Mar-2022

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