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## Internal Jugular Valve and Central Catheter Placement

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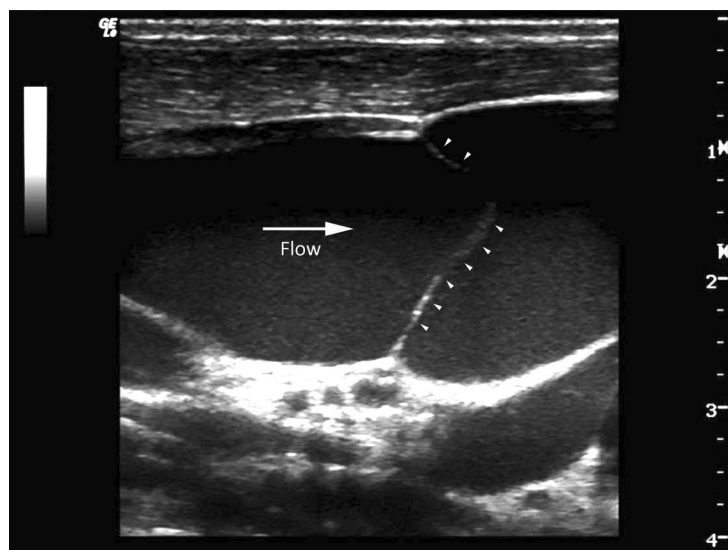


Fig. 1. Transcervical two-dimensional ultrasound long-axis image of the right internal jugular vein. Ultrasound image illustrates large venous valve (white arrow) in the right internal jugular vein. The flow direction is to the right of the picture. Note that a large venous valve is protruding into the lumen of the internal jugular vein.

**A** 27-YR-OLD male patient with a history of end-stage liver disease due to hepatitis C infection and a transjugular intrahepatic portosystemic shunt presented for orthotopic liver transplantation. We attempted to place a central venous pressure catheter *via* the right internal jugular vein (IJV), initially without ultrasound. An 18-gauge catheter was easily passed into the IJV using anatomic landmarks, but the guide wire could not be advanced more than 8 cm because of resistance. We then performed an ultrasound examination using a SonoSite TITAN® (SonoSite Inc., Bothell, WA) and detected a large venous valve protruding into the lumen of the IJV (fig. 1). To avoid damage, we then switched sides and placed a left IJV catheter instead, which was performed successfully under ultrasound guidance. After verifying catheter placement with a portable chest x-ray film, we proceeded to orthotopic liver transplantation without further complications.

We report a case of difficult central venous catheter placement in the presence of a large venous valve located in the right IJV. An IJV valve is present in 88–100% of cases, and its function is to prevent retrograde flow from the right atrium to the brain.<sup>1</sup> The anatomic location of these valves is usually in the distal portion of the IJV, just proximal to the jugular bulb.<sup>2</sup> Because the IJV valve is mostly located in the retroclavicular space, the ultrasound assessment of this valve is difficult with large ultrasound probes. In the majority of cases, the valve leaflet is bicuspid (77–98%), but tricuspid (0–7%) or unicuspid (1.4–16%) valves have been reported.<sup>2–4</sup> Normally, valve cusps are thin (100  $\mu$ m) translucent structures surrounded by a thickened ridge of tissue in which cusps attach to the vein.<sup>2</sup> Complete valve closure occurs during diastole when atrial contraction transmits pressure backward into the superior vena cava.<sup>2</sup> When intrathoracic pressure is increased, as in this patient (ascites and positive pressure ventilation), competent IJV valves prevent excessive backward flow to the brain.<sup>2</sup> IJV valves can be competent up to a static pressure of 100 mmHg, such as in cases of coughing or Valsalva maneuver.<sup>5</sup> However, the large venous valve might cause protrusion of the valve cusp into the lumen under increased venous pressure. In this circumstance, the large venous valve could potentially cause difficult central catheter placement, and if multiple or forceful attempts to overcome resistance are performed, the possibility of damage exists. In this case, ultrasound examination and guidance allowed us to visualize the exact location of the IJV. As a result, the procedure was aborted before any damage was done.

### References

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