Internal Jugular Valve and Central Catheter Placement

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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 \textit{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.\footnote{Wu X, Studer W, Erb T, Skarvan K, Seeberger MD: Competence of the internal jugular vein valve is damaged by cannulation and catheterization of the internal jugular vein. \textit{Anesthesiology} 2000; 93:319–24} The anatomic location of these valves is usually in the distal portion of the IJV, just proximal to the jugular bulb.\footnote{Lepori D, Capasso P, Fournier D, Genton CY, Schnyder P: High-resolution ultrasound evaluation of internal jugular venous valves. \textit{Eur Radiol} 1999; 9:1222–6} 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.\footnote{Midy D, Le Huec JC, Dumont D, Chauveaux D, Cabanie H, Laude M: [Anatomic and histologic study of the valves of the internal jugular veins]. \textit{Bull Assoc Anat (Nancy)} 1988; 72:21–9} Normally, valve cusps are thin (100 \(\mu\)m) translucent structures surrounded by a thickened ridge of tissue in which cusps attach to the vein.\footnote{Harmon JV Jr, Edwards WD: Venous valves in subclavian and internal jugular veins. Frequency, position, and structure in 100 autopsy cases. \textit{Am J Cardiovasc Pathol} 1987; 1:51–4} Complete valve closure occurs during diastole when atrial contraction transmits pressure backward into the superior vena cava.\footnote{Sum-Ping ST: Internal jugular valves: Competent or incompetent? \textit{Anesth Analg} 1994; 78:1039–40} When intrathoracic pressure is increased, as in this patient (ascites and positive pressure ventilation), competent IJV valves prevent excessive backward flow to the brain.\footnote{Wu X, Studer W, Erb T, Skarvan K, Seeberger MD: Competence of the internal jugular vein valve is damaged by cannulation and catheterization of the internal jugular vein. \textit{Anesthesiology} 2000; 93:319–24} IJV valves can be competent up to a static pressure of 100 mmHg, such as in cases of coughing or Valsalva maneuver.\footnote{Midy D, Le Huec JC, Dumont D, Chauveaux D, Cabanie H, Laude M: [Anatomic and histologic study of the valves of the internal jugular veins]. \textit{Bull Assoc Anat (Nancy)} 1988; 72:21–9} 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

5. Sum-Ping ST: Internal jugular valves: Competent or incompetent? \textit{Anesth Analg} 1994; 78:1039–40