
Pediatric Surgical Images

Edited by Geoffrey K. Blair, MD

Difficult Central Venous Access: Can Magnetic Resonance Angiography Help?

By James J. Murphy and Heather Bray

MAINAINING long-term central venous access in children can be difficult. Venous occlusion or stenosis following catheterization is common. This makes repeated use of the same vessel difficult, if not impossible. Because the number of access sites is limited, children who need long-term total parenteral nutrition or chemotherapy rapidly become a surgical challenge.

Preoperative assessment of vein patency has proven to be valuable in these patients. This can prevent unnecessary dissection that ultimately exposes an occluded or stenotic vessel. We initially used ultrasonography with duplex scanning for this purpose. Unfortunately, the accuracy of this technique was disappointing. It was especially poor in assessing vein stenosis and evaluating the mediastinal vessels.

Magnetic resonance (MR) angiography has proven to be a much more useful technique for assessing venous anatomy in such patients. In addition, it is noninvasive, does not involve radiation exposure, and can be performed in less than 1 minute.

Gadolinium-enhanced 3-dimensional MR venograms of the central venous system were obtained in three long-term oncology patients who previously had multiple central lines (Figs 1-3).

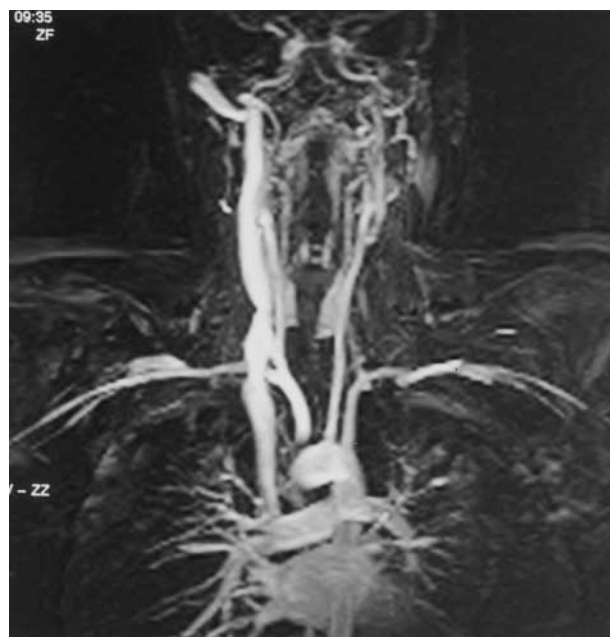


Fig 1. The coronal maximum intensity projection image of the subtraction venogram shows patency of the right internal jugular vein and superior vena cava. The left internal jugular vein, left brachiocephalic vein, and left subclavian vein are occluded. Flow is seen in the proximal (but not the distal) right subclavian vein. The catheter was successfully inserted via the right internal jugular vein.

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doi:10.1053/jpsu.2001.26586*



Fig 2. Patent left internal jugular vein, left brachiocephalic vein, and right and left subclavian veins are demonstrated. The distal right internal jugular vein is occluded and reconstituted by multiple collaterals. The central line was successfully placed via the left internal jugular vein.

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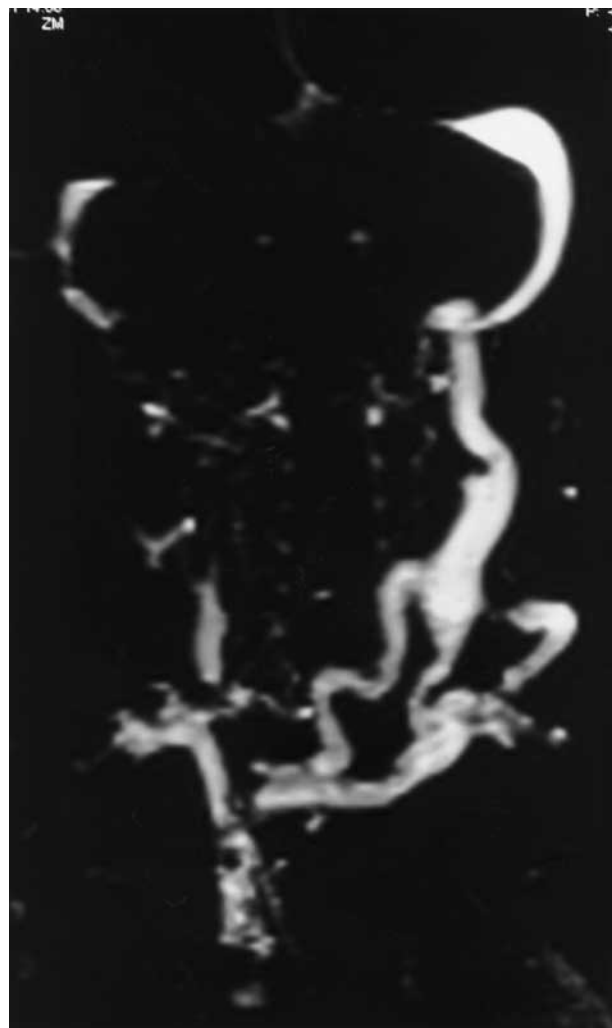


Fig 3. Occlusion of the right internal jugular vein, and the right and left subclavian veins, is shown. In addition, the distal left internal jugular vein is stenotic, with large collaterals. A nonocclusive thrombus is evident in the superior vena cava. Arterial and cardiac structures have been eliminated from the image. The catheter was subsequently placed via the right femoral vein.