Aneurysm of the Inferior Vena Cava: Case Report and Review of the Literature

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Aneurysms of the inferior vena cava (IVC) include a diverse group of anomalies with distinct anatomic and clinical characteristics. We report a diverticular aneurysm of the suprarenal IVC in a 45-year-old man who presented with extensive IVC and unilateral lower extremity thrombosis. A CT scan revealed an 8 cm smooth-walled mass containing thrombus to the right of the IVC and behind the second portion of the duodenum. At laparotomy a connection between the mass and the suprarenal IVC was established. Biopsy of the wall of the mass revealed vascular smooth muscle, thus establishing the diagnosis of a diverticular IVC aneurysm. MR angiography further disclosed interruption of the infrahepatic vena cava and return of renal vein flow via the azygous and hemiazygous veins. Twelve additional cases of IVC aneurysm are reviewed. A proposed classification of these aneurysms into four types consistent with their anatomic and embryologic characteristics is presented. (Ann Vasc Surg 1993;7:347-353.)

Aneurysms of the inferior vena cava (IVC) include anomalies with diverse anatomic and clinical characteristics. We report the case of a 45-year-old man with a diverticular aneurysm of the IVC who presented with extensive IVC and unilateral lower extremity thrombosis. Surgery confirmed the diagnosis. CT and MR angiography documented associated congenital abnormalities. This report and a review of 12 previously reported cases of IVC aneurysm form the basis for a proposed classification of this rare disorder.

CASE REPORT

A 45-year-old man experienced upper back and pleuritic chest pain following vigorous exertion. Two days later he noted massive swelling of the left lower extremity. A color-flow venous study documented extensive deep vein thrombosis of the left lower extremity. A CT scan of the abdomen revealed thrombosis of the right and left iliac veins as well as IVC thrombosis extending above the kidneys. Large azygous venous collaterals were noted. The renal veins were not identified. A smooth-walled mass, interpreted as a hematoma, was noted to the right of the vena cava behind the second portion of the duodenum (Fig. 1). A CT-guided needle biopsy of the mass confirmed clotted blood. The patient had normal hepatic and renal function. Heparin was started.

The mass remained unchanged in size after 1 month. Because an occult neoplasm remained a concern, the patient underwent transperitoneal exploration. The mass was partially mobilized. It was filled with dark thrombus. The inner wall was smooth except for a small channel superomedially. Frozen and permanent sections of the biopsied wall were consistent with vascular smooth muscle. A diagnosis of thrombosed IVC aneurysm was made.

MRI and MR angiography confirmed the CT scan findings and documented confluence of the IVC aneurysm and the IVC just distal to a total interruption of the infrahepatic IVC. Multiple renal veins drain directly into an extensive system of azygous and hemiazygous veins (Fig. 2). The hepatic veins enter the infrahepatic IVC above the interrupted segment.

The patient returned to work 3 months later. Six
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Fig. 1. CT image of a thrombosed diverticular aneurysm of the inferior vena cava (dark arrow) in a 45-year-old man. The anatomic IVC (white arrow) merges with this diverticulum just above this level and then is interrupted.

Fig. 2. MR angiogram of occluded IVC aneurysm. Subacute clot seen in a portion of the IVC aneurysm (large black arrow) is displayed as light gray signal by the time-of-flight technique. The left and right renal veins (open arrows) drain to ascending lumbar collaterals (small black arrows) and then to the azygous system (curved arrow). The hepatic veins (hooked arrow) drain to the intrahepatic inferior vena cava (arrowhead) and then to the right atrium.

months after the acute thrombotic event he had prominent abdominal collateral veins and mild edema of the left lower extremity controlled with a support stocking.

DISCUSSION

The 13 reported cases of IVC aneurysm (Table I) include five women and eight men whose mean age was 38.7 years (range 14 to 77 years).

The etiology of these aneurysms remains unknown. One patient with tricuspid stenosis followed from birth to age 14 demonstrated progressive enlargement of the suprahepatic IVC, probably secondary to increased caval pressure.

Five cases were associated with recognized congenital anomalies of the IVC. The embryology of the IVC is complex. Three paired sets of veins arise, interconnect, and regress in a precise fashion to form the normal adult IVC.

The postcardinal veins develop first, but persist in the adult only as the iliac veins.

The subcardinal veins develop next. Anastomoses form between the subcardinal and postcardinal veins on either side of the mesonephros. The