A Safe Surgical Approach to a Giant Intrarenal Arteriovenous Fistula and Aneurysm

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INTRODUCTION

Giant arteriovenous fistulas (AVF) pose a challenging management problem with respect to open surgery versus endovascular interventional techniques. Endovascular techniques may not be ideal for larger fistulas and may be associated with potential risks of embolism, whilst open surgery poses the risk of uncontrollable hemorrhage.[1,2] We describe a safe surgical technique for this challenging problem.

CASE REPORT

A 43-year-old woman presented with worsening hypertension that required increasing doses of antihypertensive drugs for control. She had no past history of surgery, kidney biopsy, or trauma. On clinical examination, an expansile pulsatile mass and an overlying thrill were palpated in her left loin. Angiography showed a normal right renal artery, vein, and kidney. On the left, the renal vein was as wide as the inferior vena cava and the tortuous renal artery was almost as large as the abdominal aorta. The high flow AVF showed simultaneous arterial and venous opacification (Figure 1). Renal scintigraphy showed 43% function on the right side and 57% function on the left. Cardiovascular assessment revealed neither cardiomegaly nor high-output cardiac failure. Nephrectomy was recommended since facilities for advanced interventional radiology were not available at that time. Moreover, the risks of these options are considerable if the AVF is large, as in this case.

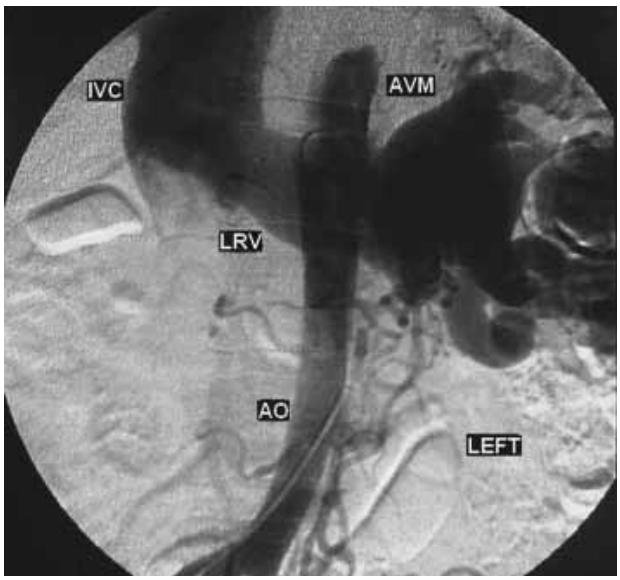

Figure 1. Angiography showed simultaneous arterial and venous opacification. IVC indicates inferior vena cava; LRV, left renal vein; AO, Aorta; and AVM, arteriovenous malformation.

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TECHNIQUE

Through a flank incision, the pulsatile left kidney was mobilized anteriorly by dissecting outside Gerota's fascia posteriorly, thus avoiding the enlarged veins. The aorta was approached posteriorly (well posterior to the left kidney), leaving only the fascia over the quadratus lumborum and psoas major behind. The tortuous huge renal artery was exposed without difficulty and ligated, prior to any attempt at dissecting the kidney or the veins. The renal pulsation immediately disappeared; it was then quite easy to dissect anterior to the kidney to expose and ligate the renal, suprarenal, and gonadal veins to complete the nephrectomy. The patient recovered uneventfully and her antihypertensive regimen decreased to single-drug therapy at a reduced dose.

RESULTS

Grossly, a 2.5-cm intrarenal aneurysm with atheroma was identified with a 4-mm communication with the renal vein (Figure 2). Histology revealed cystic dilatation of vascular malformation within the kidney including artherosclerotic degenerative changes of the vascular wall. Sections of renal parenchyma showed cortical atrophy, interstitial infiltrates of mononuclear cells, and medial hypertrophy of medium-sized arteries. The renal artery showed early myxoid degenerative changes of the media. Features were consistent with hypertensive changes in kidney.

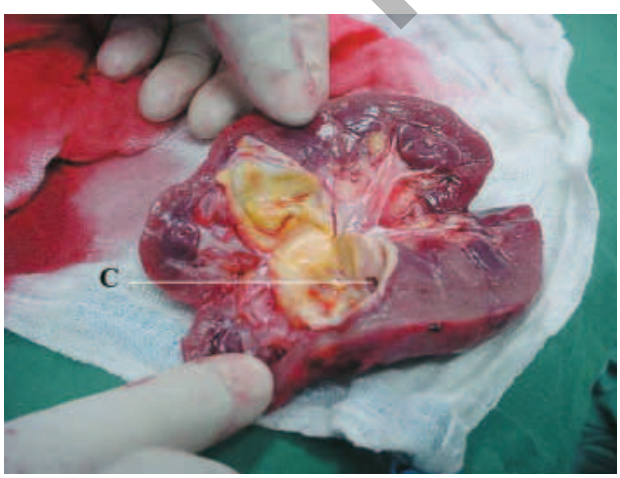

Figure 2. Gross appearance of the intrarenal aneurysm shows the communication. C indicates communication between aneurysm and renal vein.

DISCUSSION

Aneurysmal intrarenal AVFs are very uncommon. They are usually classified into 3 groups by etiology—congenital, acquired, and idiopathic.[1] Congenital malformations account for almost 20% of the presentations. Patients with acquired AVF may have a history of trauma, neoplasm, previous renal surgery, or biopsy done many years ago.[3] According to this classification, our patient could be categorized as idiopathic AVF.

Although usually asymptomatic, some patients may present with painless hematuria due to erosion of the AVF into the collecting system. Other common presentations include flank pain, worsening hypertension, and a palpable thrill in the lumbar region. The risk of spontaneous rupture is small; however, it may be sudden and dramatic, presenting as massive retroperitoneal hemorrhage requiring emergency intervention.[4] Cardiomegaly on the chest radiography is a corroborative finding which improves following treatment.[5] Our patient presented with refractory hypertension and palpable thrill, but did not have cardiomegaly. Diagnosis of intrarenal AVFs can be made by magnetic resonance angiography or duplex scan with color flow augmentation. Computerized tomography-angiography using 2.5-mm cuts through the collecting system with delayed imaging, gives good visualization of the feeding and draining vessels.[6] However, routine digital subtraction angiography is regarded as the gold standard. Our patient had a digital subtraction angiography and renal scintigraphy as preoperative imaging studies.

Currently, there are a number of treatment options available for AVFs. Endovascular techniques have been well documented, using staged methods such as metallic coils and various sutures which reduce flow and cause thrombosis of the fistula.[1] Releasable balloons mounted on a coaxial microcatheter can also be utilized to produce complete fistula occlusion, thus providing a relatively safe method of closure.[7] Although transcatheter embolization techniques have been reported for large renal AVFs, there is a significant risk of renal parenchymal infarction, postembolization fever and flank pain.[2,8,9]

The presence of a high-flow fistula with a large diameter increases the chance of coil migration, pulmonary embolism, incomplete occlusion, and outright failure to close the fistula. These may lead to unnecessary delay in recovery, prolonged hospital stay, excessive cost overruns, and probably, emergency salvage surgery.[10]

For high-flow intrarenal AVFs, surgery has been found to be a reliable method of treatment. However, during the surgery, it may be difficult to gain proximal and distal aortic control due to the tortuous nature of the renal artery, and injury may occur to the abnormally large renal veins.[10] Gralino and colleagues considered their case to be at excessive risk for nephrectomy because of anticipated technical difficulties in controlling inflow and hemorrhage.[1] We believe that this risk can be virtually eliminated if the initial dissection is carried out posterior to the Gerota's fascia and directed towards exposing the aorta from its left posterolateral aspect at the level of the renal artery. This plane, even with huge intrarenal AVF, is almost avascular; the only dilated vein that may be encountered in this plane is the lumbar vein, which communicates with the left renal vein. However, because the lumbar vein is closely apposed to the aorta, the tortuous, dilated renal artery will be encountered first and ligated far lateral to the aorta, thus minimizing or eliminating the risk of hemorrhage from this vein.

In summary, the surgical approach to the renal artery, as described, from the posterolateral aspect of the aorta behind the Gerota's fascia and retroperitoneal fat, leaving only the quadratus lumborum and the psoas muscles posteriorly, provides a safe and almost bloodless access in an otherwise highly vascular field.

CONFLICT OF INTEREST

None declared.

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