Endovascular management of a pelvic arteriovenous malformation

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ABSTRACT

Aneurysmal pelvic arteriovenous malformations in male patients are exceptionally rare. Upon spontaneous or traumatic rupture, these aneurysms can cause severe hemorrhage and are often associated with high mortality. Given that most intact aneurysms are found after symptomatic presentation, other case reports have detailed an approach for elective endovascular treatment for concomitant arterial and venous embolization. We describe an incidental discovery of a 7-cm-high flow pelvic aneurysmal arteriovenous malformation and successful endovascular treatment strategy through staged arterial and venous embolization, reducing the risk of rupture owing to high flow collateralization. (J Vasc Surg Cases Innov Tech 2022;8:736-9.)

The prevalence of pelvic arteriovenous malformations (AVMs) is reported to be less than 1% of the general population; however, two-thirds of patients with pelvic AVMs are women.1 Of note, rupture of pelvic AVMs is quite lethal; spontaneous rupture or intraoperative hemorrhage has been shown to result in critical organ damage and mortality.2,3 Symptomology of pelvic AVMs have varied greatly, owing to their location within the peritoneal cavity, including patients that present with severe ischemic colitis to other patients that are asymptomatic.2,4,5 Many incidental findings of pelvic AVMs have been described secondary to neoplasm or pelvic trauma.6 A vast minority are identified as congenital in nature, especially in male patients, with a limited amount of case studies identified in the literature.3,6–11

Although surgical ligation of feeding arteries or excision of aneurysmal tissue around or within the AVM is an option, the preferred method of treatment of aneurysmal pelvic AVMs has been through endovascular coil embolization, with both venous and arterial embolization occurring in a single procedure.4,5,9,12 However, in this case study, we describe the incidental finding of a pelvic AVM that was treated with staged arterial and venous coil embolization. These staged procedures resulted in complete resolution of the aneurysmal flow on follow-up imaging, while preventing any possible rupture owing to remaining collateral arterial flow in a concomitant arterial and venous embolization procedure.

CASE REPORT

Institutional review board approval was not required for this report. The patient agreed to publish their case details and images. A 33-year-old male patient presented to the vascular clinic upon referral with an incidental finding of a vascular mass identified on computed tomography angiography (Fig 1, A). At the time of imaging, the vascular mass measured approximately 7 cm in maximum diameter. The patient experienced left lower quadrant discomfort and pressure, presumably owing to the location of the aneurysm in the peritoneum. The patient denied any history of abdominal trauma nor did he endorse any further abdominal symptoms. He was offered a diagnostic angiography with a possible intervention, to which he agreed.

Upon diagnostic angiography through a right common femoral retrograde access, it was determined that the inferior mesenteric artery and the left internal iliac artery were the main providers of the arterial blood supply to the aneurysm (Fig 1, B). As a result, the patient was offered a subsequent angiogram as well as outpatient duplex ultrasound examination (Fig 2). At the initial selective embolization of second- and third-order left internal iliac artery and inferior mesenteric artery was achieved with Nester coils and Gelfoam slurry. This initial treatment resulted in slower turbulent saccular flow; however, did not completely eliminate it, based on both postoperative angiogram as well as outpatient duplex ultrasound examination (Fig 2). As a result, the patient was offered a subsequent angiogram for selective arterial embolization of the left hypogastric artery with Nester coils and Gelfoam slurry, again through right common femoral artery access. This procedure resulted in a sluggish flow within the aneurysm, preventing full reduction in size, based on both postoperative angiogram and outpatient duplex ultrasound examination (Fig 3). Therefore, a third percutaneous procedure was offered to the patient for final embolization of the external iliac artery and vein, in the hopes of eliminating all sources of flow into the

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saccular structure. Subsequent highly selective embolization of the left external iliac arterial and venous branches using Nester coils was achieved through percutaneous right common femoral artery and vein access. This procedure proved to be successful for full embolization of the aneurysm, with complete elimination of collateral flow. This result was confirmed on the postoperative computed topography scan (Fig 4), as well as the 1-month follow-up abdominal Doppler ultrasound examination. After a surgical recovery of 6 months, the patient's previously reported left lower quadrant pain and pressure symptoms resolved and no additional abdominal symptoms were reported.

DISCUSSION

Intact saccular pelvic aneurysms developing from an AVM as indicated in this case report are rare, especially in male patients. \(^3\)\(^-\)\(^6\)\(^-\)\(^1\) Similar to contemporary literature, we opted to use an endovascular approach for full embolization, including a combined arterial and venous embolization approach to decrease high pressure flow responsible for maintaining the aneurysmal AVM size. Through this approach, we were effective in thrombosing the sac and allowing regression in size, while avoiding an open procedure, aneurysmal rupture, and concordant morbidity. Therefore, we advocate that a systematic stepwise endovascular embolization of the aneurysm be considered for future patients.

An initial concern with a stepwise endovascular approach as detailed in this case report would be the necessity of multiple operative sessions to achieve
complete obliteration of the aneurysm sac. This contrasts with previously published case reports that utilize a single endovascular procedure to embolize both arterial inflow and venous outflow of the AVM, as well as any open procedures that ligates the AVM and all collateral branches. Nonetheless, this step-wise approach allowed for a more conservative treatment plan, because we could be ensured that all arterial collateral vasculature was embolized before closing off outflow venous structures.

In addition, excessive tortuosity of the feeding vessels may make endovascular approaches much more laborious and difficult to accomplish compared with open procedures. In cases of aneurysms treated in an open procedure, there was very little to no follow-up after hospital discharge. These contrasts starkly with endovascular treatment, as follow-up outpatient visits and subsequent imaging studies may be required to ensure and reconfirm complete elimination of arterial flow and shrinking of saccular structure. We postulate that even though endovascular treatment should be considered as high valued care for treatment of aneurysms of this type, this approach may not be the best option for acutely symptomatic or ruptured aneurysms with intraperitoneal bleeding of unknown origin.

Fig 3. Postoperative angiogram from second procedure indicates a small amount of arterial inflow that is maintaining both aneurysmal size and patency.

Fig 4. Postoperative angiogram from third endovascular procedure indicates little to no inflow of the aneurysm.
CONCLUSIONS
We present a rare case of an intact aneurysmal pelvic AVM in a 33-year-old male patient, in which we treated with endovascular coil embolization. Notably, we used a staged strategy to eliminate high arterial flow initially, followed by occlusion of venous drainage to ensure little to no flow within the saccular structure. Upon recovery, the patient describes complete resolution of his abdominal symptoms that were attributed to the aneurysm. As such, we predict this strategy will be of great usefulness to future cases involving a similar location and presentation of intact aneurysms developing from AVMs. Further studies are warranted to better describe the behavior and best modes of management for this rare vascular entity.

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