

Short- and long-term follow-up after transarterial embolization of a giant inferior mesenteric artery aneurysm

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ABSTRACT

Among the cases of visceral artery aneurysms, those that involve the inferior mesenteric artery are the most uncommon, with a prevalence of <1%. This study reports a giant symptomatic inferior mesenteric artery aneurysm and its endovascular treatment by means of percutaneous embolization with the implantation of pushable coils. After complete occlusion of the aneurysm, adequate maintenance of arterial supply of the left colon and resolution of the symptoms were observed. In the 2-year follow-up, a significant reduction in the aneurysm's volume and maintenance of the clinical condition were observed. (*J Vasc Surg Cases and Innovative Techniques* 2018;4:315-8.)

Keywords: Aneurysm; Inferior mesenteric artery; Digital subtraction angiography; Multidetector computed tomography; Therapeutic embolization

Visceral artery aneurysms (VAAs) develop in vessels that perfuse the intra-abdominal organs, such as the superior mesenteric artery, inferior mesenteric artery (IMA), celiac trunk, gastroduodenal artery, and splenic artery,¹ and have a prevalence of 0.1% to 2% in the general population.² Of these, 25% may progress to rupture, which may have mortality rates of 25% to 70%.³ IMA aneurysm (IMAA) is a rare condition in relation to other VAAs, with an estimated prevalence of 1% of all VAAs.⁴ IMAAs may be associated more commonly with atherosclerotic degeneration but also with other rarer causes. Given the low prevalence of IMAAs, there is no standardized treatment. In general, asymptomatic VAAs larger than 2 cm in diameter and symptomatic VAAs or those that evolve rapidly in size require intervention.⁵ The treatment of this condition ranges from open surgery to endovascular therapy.

Open repair with IMA resection and reimplantation has been considered the standard treatment, especially in cases in which maintenance of arterial supply by this vessel is mandatory, as in stenosis or superior mesenteric artery occlusion (high-flow aneurysms).⁶ In turn, when the risks of a transperitoneal surgical approach are

high, with the possibility of injury to adjacent structures, endovascular treatment may be an option. However, it is necessary to make sure that colonic perfusion can be adequately supplied by the Riolan arc and the marginal artery of Drummond.⁷ Embolization with the implantation of coils into the lumen of the aneurysm is one possible treatment; however, a covered stent, provided it is adequately sized for the ostial caliber and extension of the IMA, is an option that preserves intestinal flow. Liquid agents may lead to inadvertent distal embolization, which is why their use is limited. Few cases of endovascular treatment have been described for IMAA to date.

The objective of the study was to report a rare case of a carrier of multiple visceral aneurysms, one of which was a giant and symptomatic IMAA that was treated by transarterial embolization, and the long-term outcome. Written informed consent to publish the case and images was obtained from the patient.

This report was approved by the research ethics committee of the Faculty of Medicine of Itajubá/Brazil, registered under Plataforma Brasil (No. 043567/2017).

CASE REPORT

A 59-year-old woman, with no comorbidities, with a family history of aneurysmal disease (her father died of a ruptured thoracic aortic aneurysm) was referred to the vascular and endovascular surgery department of a quaternary hospital with a complaint of moderate-intensity acute periumbilical pain for approximately 2 weeks. At the examination, a nonpulsatile abdominal mass was observed in the left lower quadrant. The patient was clinically stable, without clinical or laboratory signs of internal bleeding. Her blood pressure was 130/75 mm Hg, and her heart rate was 75 beats/min. She did not use any medication. A 128-channel helical computed tomography (CT) angiography study revealed a normal celiac artery, ectasia of the splenic and right gastroepiploic arteries, thrombosed and aneurysmal segmental dissection of the middle third of the superior

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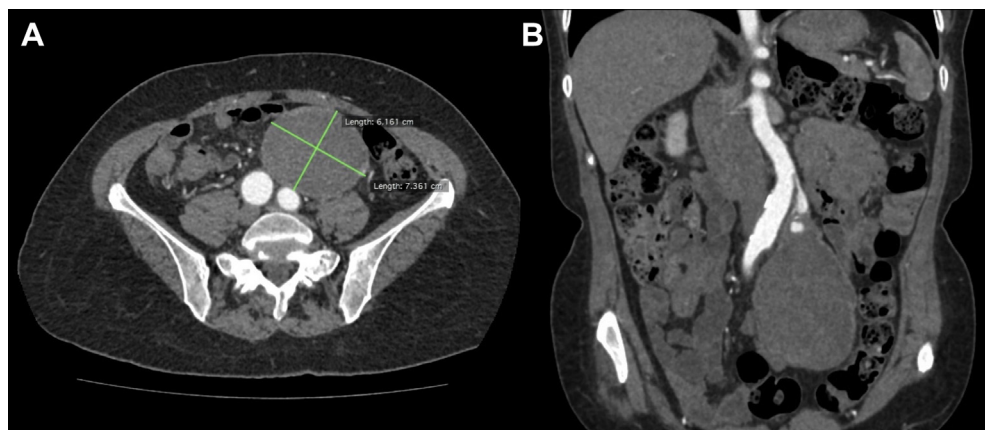


Fig 1. A, Computed tomography (CT) angiography in axial view revealing the partially thrombosed inferior mesenteric artery aneurysm (IMAA) in direct contact with the common iliac arteries, psoas muscle, and large intestine. **B,** CT angiography in oblique reconstruction revealing the partially thrombosed IMAA.

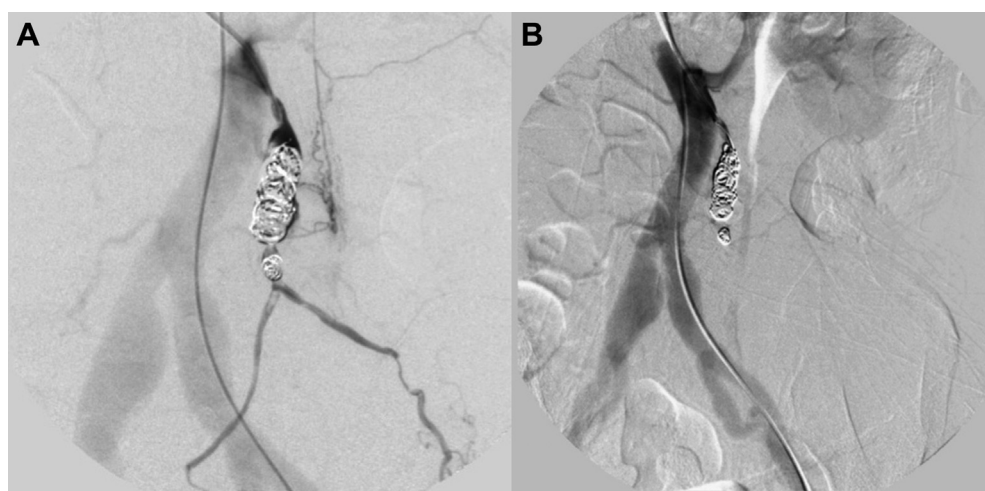


Fig 2. A, Intermediate angiography showing the set of coils in the inferior mesenteric artery (IMA) and patency of the left colic and superior rectal arteries. **B,** Final angiography showing complete occlusion of the aneurysm lumen of the IMA.

mesenteric artery, fusiform aneurysm of the right common iliac artery with segmental dissection (24 mm of maximal cross-sectional diameter), and partially thrombosed giant IMAA (73 × 62 × 100 mm; volume, 1895 cm³), with patency of the left colic and superior rectal arteries (Fig 1) in close contact with the left colon.

Because of the large size and intimate contact with the colon, with the possibility of intestinal resection in the case of open surgery, a minimally invasive treatment was chosen, which was consented to by the patient. IMA catheterization was performed with a Simmons II catheter, followed by implantation of two Interlock-18 pushable microcoils (Boston Scientific, Marlborough, Mass) in a small dilation before its outflow branch and five Interlock-35 pushable coils in the aneurysm lumen. There was not enough artery length or catheter support to deploy a coil at the IMA origin. Complete occlusion of the aneurysm was obtained (Fig 2). We performed selective angiography of the superior mesenteric artery, which showed opacification of

the marginal artery of Drummond and the sigmoid artery, and left internal iliac angiography showed opacification of the superior hemorrhoidal arteries (not shown). The patient's pain was resolved without visceral ischemia, and she was discharged on the first postoperative day. Four months later, she underwent endovascular treatment of the right common iliac artery aneurysm with fully percutaneous implantation of an iliac extension of a Gore Excluder abdominal aortic endoprosthesis (16 × 14.5 × 100 mm; W. L. Gore & Associates, Flagstaff, Ariz). In an outpatient follow-up, after 2 years, there was no recurrence of the symptoms. An overall reduction in the IMAA's size was observed, with no recanalization of the IMA (55 × 44 × 80 mm; volume, 811 cm³), corresponding to a 57% volume reduction (Fig 3).

The patient was referred to a geneticist for etiologic investigation, and Ehlers-Danlos syndrome, neurofibromatosis, and vasculitis were not confirmed by antineutrophil cytoplasmic antibodies. Loeys-Dietz and aneurysm-osteoarthritis syndromes,

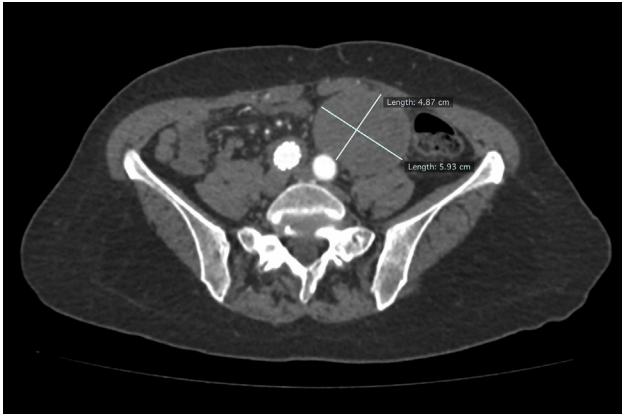


Fig 3. Computed tomography (CT) angiography 2 years after the embolization procedure, in axial view, revealing an overall decrease in the dimensions of the inferior mesenteric artery aneurysm (IMAA).

which may be associated with widespread aneurysms, were not studied because they were not compatible with the patient's completely asymptomatic clinical picture. She had no history of infection worthy of note and was vaccinated from childhood against tuberculosis. Transesophageal echocardiography excluded the presence of cardiac valvular vegetations. The erythrocyte sedimentation rate, leukocyte count, and C-reactive protein level were normal. Follow-up with the surgical team has been maintained, and she remains asymptomatic.

DISCUSSION

IMAA are extremely rare. Until 2018, only 65 true IMAA cases had been published in the English-language medical literature; patients ranged in age from 9 to 84 years, and 51 men and 14 women have been affected.^{4,7-13} However, no reported case presented with the dimensions described here. With the great availability of Doppler ultrasound, CT angiography, magnetic resonance imaging, and arteriography, many VAAs are being identified during investigations of abdominal pain or gastrointestinal bleeding, although most diagnosed cases are asymptomatic.^{14,15}

In the case described here, in the 2-year follow-up, it was observed that despite the large amount of aneurysm mural thrombus, there was a considerable volume reduction (57%). This fact makes the increasing use of embolization without aneurysmal resection promising for the treatment of aneurysms with a mild to moderate mass effect. However, there has been no description in the literature of the rate of volume reduction after embolization of IMAAs. In addition, if the anatomy is favorable, the minimally invasive treatment may reduce the length of hospital stay and the risk of injury to adjacent organs.

In the case of large-volume aneurysms, we consider that CT angiography is the best option to detect volume reduction or recanalization. We believe that Doppler ultrasound may be a useful tool for monitoring minor aneurysms. Conducting examinations every 6 months

in the first year and yearly thereafter appears to be reasonable and should be performed until stabilization of the aneurysm size.

The patient in question had multiple aneurysmal dilations in several visceral segments. Although most of the reported cases are of atherosclerotic origin, other causes should be addressed, such as neurofibromatosis,¹⁶ mycotic aneurysms including endocarditis,¹⁷ vascular Ehlers-Danlos syndrome,¹⁸ polyarteritis nodosa, Behçet disease,¹⁹ mutation in the *SMAD3* gene,²⁰ and transforming growth factor β receptor mutations.²¹ However, none of these conditions were confirmed by the genetic and inflammatory marker workup.

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