



Vascular Interventions Case Report

Endovascular treatment of unique colonic arteriovenous malformation with dual supply from superior and inferior mesenteric arteries

Lucas Richards¹, Aaron Rohr¹, Adam Alli¹, Steven Lemons¹

¹Department of Radiology, University of Kansas Medical Center, Kansas City, Kansas, United States.



*Corresponding author:

Lucas Richards,
Department of Radiology,
University of Kansas Medical
Center, Kansas City, Kansas,
United States.

richards3@kumc.edu

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ABSTRACT

Colonic arteriovenous malformations (AVMs) are well recognized in the literature and commonly manifest as colitis, abdominal pain, and rare cases have been reported of liver congestion. Dual-supply superior artery/inferior mesenteric artery (SMA/IMA) colonic AVMs have never been reported and only one case of treating portal hypertension due to an AVM with an endovascular approach has been reported. We present a case of dual-supply SMA/IMA colonic AVM manifesting as hepatic venous congestion and demonstrate an endovascular approach to treatment. Level of evidence: Level 4, case series.

Keywords: Arterial intervention, Arteriovenous malformation, Embolization, Endovascular intervention, Interventional radiology

INTRODUCTION

Arteriovenous malformations (AVMs) are described in the literature and may present throughout various organ systems. However, dual-supply superior artery/inferior mesenteric artery (SMA/IMA) colonic AVMs are extremely rare. These types of AVMs may be congenital or acquired and often present with some form of colitis or abdominal pain; given the malformation associated with adjacent bowel.^[1,2] Treatment varies, including surgical, percutaneous, and endovascular measures. Specifically, a case of portal hypertension secondary to sigmoid colonic AVM has been described with surgical intervention.^[2,3] On extensive literature review, there has only been one case of a colonic arteriovenous shunt presenting with hepatic venous congestion successfully managed with endovascular embolization.^[4] To the best of our knowledge, a case of dual supply to a colonic AVM from the SMA/IMA has never been reported or managed with endovascular embolization. Additional radiographic findings of this case make it unique when considering approach to treatment.

CASE REPORT

We present a 72-year-old male with large SMA/IMA (dual supply) AVM resulting in cirrhotic features, ascites, and portal hypertension. The patient initially presented with hematemesis/melena; subsequently admitted to the intensive care unit for gastrointestinal bleeding and ascites

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in the setting of presumed cirrhosis. He had been thoroughly evaluated by hepatology identifying portal hypertension with an estimated portosystemic hepatic gradient of 17 mmHg. A contrast-enhanced computed tomography examination demonstrated a large AVM surrounding the sigmoid colon with dual supply through the SMA and IMA. The IMA was notably engorged to near the same size of adjacent aorta. The large, tortuous draining vein (sigmoid colonic) encompassed the majority of the left hemiabdomen, eventually draining to the main portal vein (MPV) [Figure 1]. No discernible AVM nidus was identified given the convergence of the SMA/IMA AVM to the adjacent colon. These findings were responsible for the presentation of cirrhotic features and portal hypertension. The patient's workup included MELD-Na score of 9, hemoglobin of 7.3 g/dL (down from 11.7 g/dL on previous workup), and systolic blood pressures ranging 60–90 mmHg. After blood transfusion, he underwent esophagogastroduodenoscopy with variceal banding, given the associated varices from the large AVM. No pertinent enlarged esophageal varices were present. The patient continued to have melena and hematemesis. Interventional radiology was consulted for possible intervention, as he was deemed non-surgical. Before a planned superselective SMA/IMA arterial coil embolization to decrease flow to the AVM, a liver biopsy was pursued, demonstrating no significant fibrosis.

The patient then underwent superselective SMA/IMA coil embolization. Careful consideration was given to the risk of bowel ischemia while performing extensive embolization, to “debulk” the arterial supply of the AVM. During the planning process, transhepatic portal venous access and intervention were discussed. Given the tortuosity and extent of the large left hemiabdomen draining vein, this was determined to be a likely unsuccessful pursuit while adding an additional risk to the patient. SMA angiography demonstrated an engorged Arc of Riolan communicating with both the IMA and the large sigmoid AVM. Superselective coil embolization (Penumbra, Alameda, CA) of the distal vessel was completed [Figure 2]. Given the length and tortuosity of the vessel, a neurointerventional base catheter (Navien, EV3, Plymouth, MN) was utilized with associated microcatheter (Progreat, Terumo, Somerset, NJ).

Next, the IMA was selected, and arteriography demonstrated multiple engorged vessels supplying the AVM. There was a dominant feeder contiguous with the SMA and previous site of coil embolization. Superselective coil embolization was then performed, and arteriography demonstrated marked reduction in flow to the AVM. Finally, an additional prominent vessel from the IMA supplying the AVM was embolized in similar fashion [Figure 3].

After embolization, the patient remained an inpatient for the ensuing 2 days. He was stable (Hgb 8.9 g/dL), not requiring

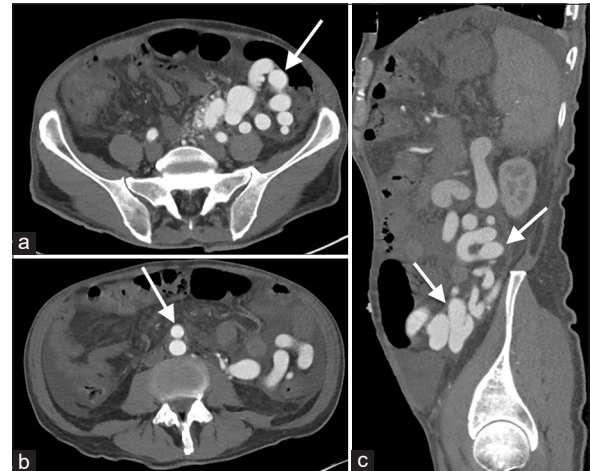


Figure 1: A 72-year-old male with a colonic arteriovenous malformation (AVM) who presented with ascites. Contrast-enhanced CT shows (a) a large AVM (arrow) surrounding the sigmoid colon, (b) the inferior mesenteric artery (arrow) significantly dilated to near the same size of the adjacent aorta, and (c) a large, tortuous sigmoid colonic vein filling most of the left hemiabdomen (arrows) eventually draining into the main portal vein.

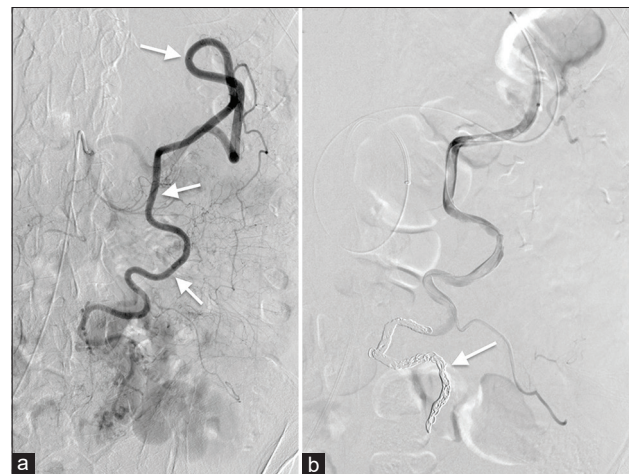


Figure 2: A 72-year-old male with a colonic arteriovenous malformation (AVM) who presented with ascites. Intraoperative angiography of the superior mesenteric artery (SMA) shows (a) an engorged Arc of Riolan (arrows) communicating with both the inferior mesenteric artery and the AVM and (b) superselective coil embolization (arrow) of the distal portion of the SMA, proximal to the AVM.

transfusion or additional intervention. Post-procedural contrast-enhanced CT demonstrated nearly absent opacification of the draining vein next to the clearly opacified aorta following treatment suggesting marked reduction in arterial supply [Figure 4]. Furthermore, a 30-day follow-up revealed no persistent symptoms and had not required paracentesis for ascites.

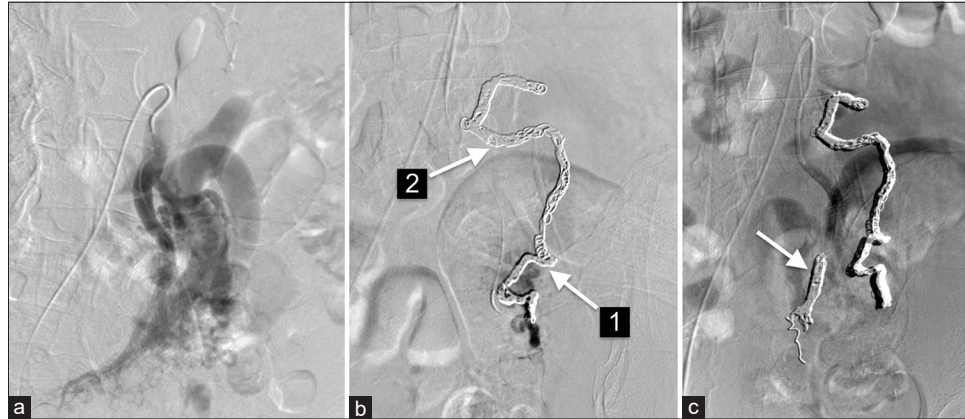


Figure 3: A 72-year-old male with a colonic arteriovenous malformation (AVM) who presented with ascites. Intraoperative angiography of the inferior mesenteric artery (IMA) shows (a) multiple engorged vessels supplying the AVM, (b) significant reduction of flow into the AVM after the placement of embolization coils, coils were placed through both the IMA (arrow 1) and the superior mesenteric artery (arrow 2), and (c) an embolization coil (arrow) placed in an additional prominent vessel that connected the IMA to the AVM.



Figure 4: A 72-year-old male with a colonic arteriovenous malformation who presented with ascites. Contrast-enhanced CT image of the abdomen in arterial phase demonstrating the contrast enhance aorta (red arrow) and the draining portal vein nearly absent of contrast (blue arrow) suggesting marked reduction in arterial blood supply post-procedurally.

DISCUSSION

Rare case reports have been described of similar AVM morphology regarding the colon, likely secondary to congenital anomalies, which have been treated with surgical or endovascular management.^[3,4] This case is unique regarding the presentation of hepatic venous congestion, dual supply through the SMA/IMA, and the sheer size and robust flow of the outflow vein draining to the MPV.

CONCLUSION

In the case of AVM with dual-supply from both IMA and SMA presenting with hepatic venous congestion, selective endovascular coil embolization of the arterial inflow can provide a safe approach to symptomatic treatment.

Declaration of patient consent

Patient's consent not required as patients identity is not disclosed or compromised.

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Conflicts of interest

There are no conflicts of interest.

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