



Rectal arteriovenous malformations with acute rectal hemorrhage: notable magnetic resonance imaging findings

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Introduction

Intestinal arteriovenous malformation (AVM) is an abnormal connection between arteries and veins, mostly involving feeding arteries, malformed blood vessel groups, and draining veins. The clinical symptoms mostly consist of painless repeated intestinal bleeding, although severe anemia may occur in severe cases. The incidence of rectal AVM with rectal bleeding is low (1,2). Colonoscopy is reliable for the evaluation of rectal bleeding, but rectal AVM manifests as submucosal raised lesions or bowel wall congestion, edema, erosion, and hemorrhage, similar to submucosal lesions or ulcerative colitis. Colonoscopy has the advantage of allowing the operator to perform biopsy, but histopathological examination of the rectal mucosa in rectal AVM often only shows chronic inflammation resembling enteritis. Transrectal endoscopic ultrasonography is useful for detecting malformed vessels involved in rectal AVMs (3), but it is often difficult to perform in patients with persistent heavy bleeding. Digital subtraction angiography (DSA) is the gold standard for diagnosis, but DSA is not a routine examination, which means that diagnosing rectal AVM is challenging. Computerized tomography (CT) is a commonly used examination method, but a plain CT scan can only show the thickening of the rectal wall, which is consistent with the manifestation of enteritis, and does not contribute considerably to a definitive diagnosis. Enhanced CT scanning and CT angiography (CTA) can detect malformed blood vessels to clarify the cause. However, the application of iodine contrast agents involves risks

and requires that patients be in a good physical condition. Magnetic resonance imaging (MRI) can show soft tissues in high resolution and has vascular flow void effects. The plain scan can clearly display the edematous bowel wall and malformed blood vessels in and around the bowel wall without the use of contrast agent. The aim of this paper is to characterize the MRI manifestations of rectal AVM via a case report and a review of the literature.

Case presentation

A 56-year-old male had a history of hemorrhoid surgery 20 years earlier. Hematochezia was noted 15 days prior to this admission. He was treated conservatively in another hospital for a week, but the response was poor, so he was referred to our hospital. Colonoscopy showed diffuse congestion, edema, erosion, and bleeding of the rectal mucosa (*Figure 1A*), and biopsy pathology showed chronic inflammatory infiltration in the intestinal mucosa (*Figure 1B*). During hospitalization, the patient experienced repeated massive rectal bleeding. Symptomatic and supportive treatment for hemostasis, blood transfusion, and anti-infective therapy were administered, but the response was also poor. Pelvic MRI was performed to determine whether there was a tumor or inflammatory lesion in or around the rectal wall. Diffuse thickening and edema of the rectal wall were observed (*Figure 2A-2D*). Diffuse, tortuous, and thickened empty blood vessels were observed around the rectum and in the rectal wall, suggesting the presence of rectal vascular malformation, particularly an AVM. We suspected that the patient's repeated massive

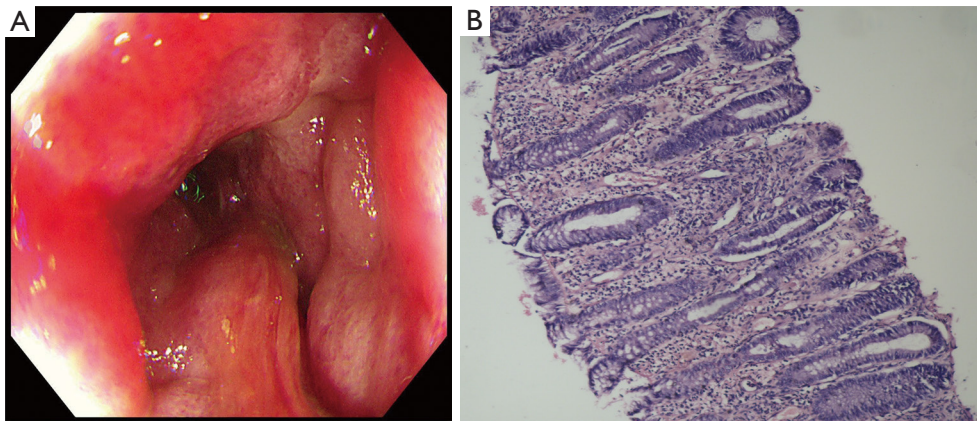


Figure 1 Images of colonoscopy and photomicrography. (A) Image from colonoscopy. (B) Image from photomicrography. A 56-year-old man with blood in the stool. Colonoscopy revealed diffuse congestion, edema, erosion, and bleeding of the rectal mucosa. Photomicrograph (original magnification: 100 \times ; hematoxylin-eosin staining) of a section through the rectal wall showed chronic inflammatory infiltration.

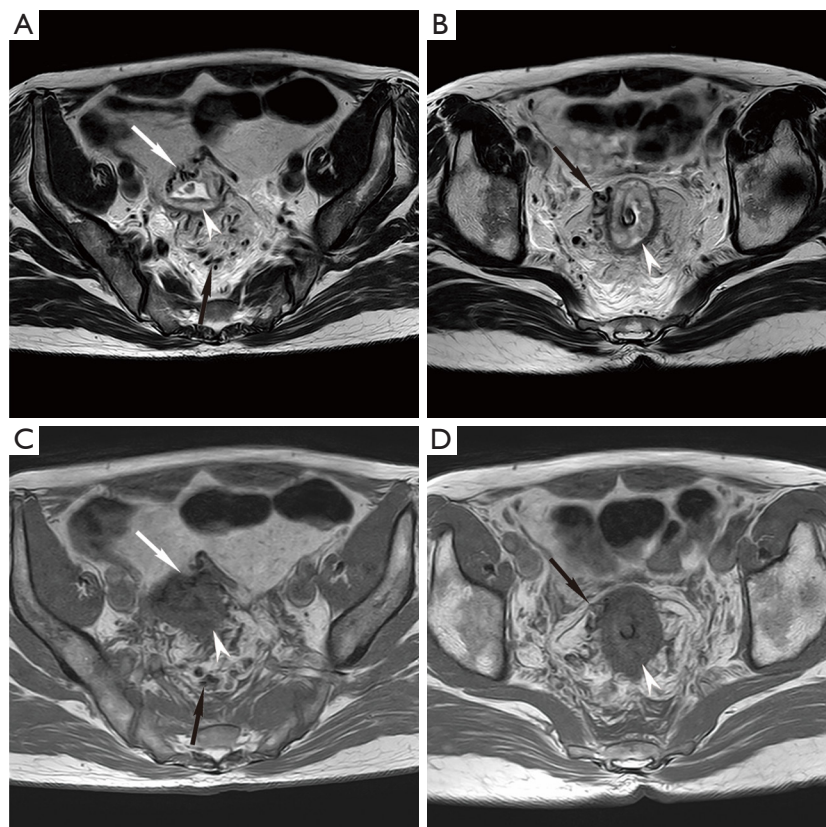


Figure 2 The same patient underwent MRI (A-D). (A,B) T2WI and (C,D) T1WI. The images showed thickening and edema of the rectal wall (arrowheads), as indicated by a higher signal on T2WI and a lower signal on T1WI. Diffuse, tortuous, and thickened blood vessels around (black straight arrows) and inside the rectum wall (white straight arrows) showed lower signals on both T2WI and T1WI. MRI, magnetic resonance imaging; T1WI, T1-weighted imaging; T2WI, T2-weighted imaging.

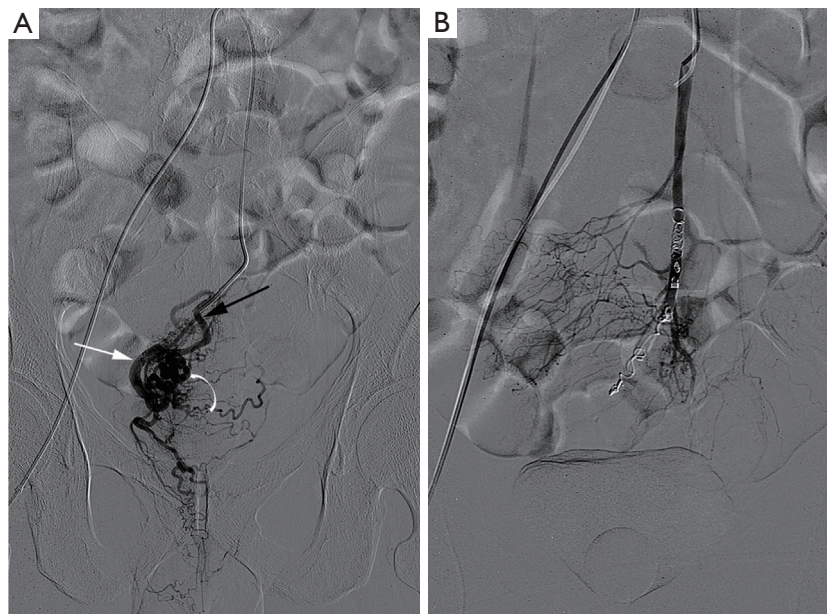


Figure 3 Images of DSA. (A) Before embolization. (B) After embolization. The same patient underwent DSA examination and embolization of the superior rectal artery. Before embolization: DSA image showed malformed blood vessels (curved arrow), with the feeding artery originating from the superior rectal artery (black straight arrow) and the draining vein being the superior rectal vein (white straight arrow). After embolization: the malformed blood vessels disappeared. DSA, digital subtraction angiography.

rectal acute bleeding was related to the AVM (*Figure 2A-2D*). Therefore, DSA was performed. DSA examination of the superior rectal artery revealed that in the tortuous malformed blood vessels, the feeding artery originated from the superior rectal artery, and the superior rectal vein was shown in advance and was the draining vein (*Figure 3*); therefore, the condition was treated with embolization of the superior rectal artery. The tortuous and dilated malformed vascular mass was not evident on contrast-enhanced imaging, and the remaining branches of the inferior mesenteric artery were well displayed. The patient's condition improved significantly, and the rectal bleeding stopped. After 1 year of telephone follow-up, the patient had no blood in the stool or other discomfort. Unfortunately, no colonoscopy or imaging data are available.

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

Discussion

Acute rectal bleeding in rectal AVM resembles hemorrhoidal bleeding (4). Studies have shown that hemorrhoids may be associated with rectal AVM or other vascular malformations (5,6). It is worth noting that the patient we reported had hemorrhoidectomy 20 years prior. Unfortunately, there was no relevant imaging examination, and it is impossible to confirm whether the hemorrhoids were related to the patient's rectal AVM. Rectal AVM is easily misdiagnosed as ulcerative enteritis (7) for several reasons. Firstly, its incidence is low. In our review of the relevant literature, a total of 29 articles on rectal vascular malformations combined with acute rectal bleeding were retrieved (*Tables 1,2*), including 12 articles on rectal AVM, with a total of 14 cases of rectal AVM being reported (*Table 1*) (8-17). Therefore, clinicians rarely consider this disease. Secondly, its clinical symptoms are nonspecific. Thirdly, the histopathological manifestations in the intestinal mucosa are similar to those of enteritis. Fourth, rectal mucosal colonoscopy findings are also similar to enteritis. Moreover, colonoscopy can only aid in the observation of the intestinal mucosa and not the situation inside or outside the intestinal wall.

Table 1 Cases of rectal arteriovenous malformation

Author	Year of publication	Diagnosis
Hirsch <i>et al.</i> (8)	1976	Anorectal arteriovenous malformation
Al-Humadi <i>et al.</i> (9)	1979	Arteriovenous malformation of the upper rectum
Yamanaka <i>et al.</i> (4)	1981	Arteriovenous malformation of the rectum
Ramírez Mayans <i>et al.</i> (10)	1994	Arteriovenous malformation of the rectum and sigmoid (3 cases)
Hayakawa <i>et al.</i> (11)	1998	Rectal arteriovenous malformation
McKevitt <i>et al.</i> (12)	2002	A polypoid rectal arteriovenous malformation
Pierce <i>et al.</i> (13)	2010	Perirectal arteriovenous malformation
Komekami <i>et al.</i> (6)	2016	Rectal arteriovenous malformation
Uchiyama <i>et al.</i> (14)	2017	Rectal arteriovenous malformation
Jubashi <i>et al.</i> (15)	2021	Rectal arteriovenous malformation
Fujinaga <i>et al.</i> (16)	2021	Rectal arteriovenous malformation
Krizzuk <i>et al.</i> (17)	2022	Rectal arteriovenous malformation

Table 2 Cases of other rectal vascular dysplasia

Author	Year of publication	Diagnosis
Pumphrey <i>et al.</i> (18)	1964	Bleeding hemorrhoids caused by arteriovenous fistulas
Alm <i>et al.</i> (19)	1980	Rectal angiodysplasia
Tisnado <i>et al.</i> (20)	1985	Angiodysplasia of the rectum
Boukheloua <i>et al.</i> (21)	1988	Complex angiodysplasia of the recto-sigmoid
Beguiristain Gómez <i>et al.</i> (22)	1989	Colonic angiodysplasia (6 cecal and 1 rectal)
Vogt <i>et al.</i> (23)	1990	Extensive angiodysplasia of the colon and rectum
Vorobev <i>et al.</i> (24)	1993	Congenital angiodysplasias of the large intestine
Ayadi <i>et al.</i> (25)	1994	Rectal angiodysplasia
Jacquier <i>et al.</i> (26)	2007	Perirectal venous malformations.
Yap <i>et al.</i> (27)	2013	Rectal arterio-portal fistula
Bozkurt <i>et al.</i> (28)	2014	Rectal arteriovenous fistula
Ushigome <i>et al.</i> (29)	2014	Rectal arteriovenous fistula
Maddah <i>et al.</i> (30)	2017	Cavernous hemangioma of rectum
Ganesanathan <i>et al.</i> (31)	2019	Multiple venous malformations in the left colon and rectum
Wen <i>et al.</i> (32)	2019	Rectal arteriovenous fistula
Bhattacharjee <i>et al.</i> (33)	2021	Rectal venous malformation
Varela Recio <i>et al.</i> (34)	2022	Rectal arteriovenous fistula

Diagnosing rectal AVM is challenging, and the choice of imaging examination method is critical. DSA is the gold standard for diagnosis, and enhanced CT and CTA examination can help aid in the clear diagnosis of rectal AVM, but the strict conditions for the application of contrast agents limit their application. Transrectal endoscopic ultrasonography is useful, but it is often difficult to perform in patients with persistent heavy bleeding. Under these conditions, MRI has obvious advantages in diagnosing rectal AVM owing to its high resolution of soft tissue and the presence of vascular flow voids. Bashir *et al.* reported that AVMs are high-flow vascular malformations, and distinguishing features include the presence of dilated tortuous vessels and flow voids on spin echo imaging, which manifest as signal voids on T1-weighted imaging and T2-weighted imaging (35). The same MRI findings were obtained in this case. Therefore, MRI is useful in diagnosing rectal AVM with acute rectal hemorrhage, especially in patients with contraindications to contrast agents. However, MRI also has disadvantages, namely, long imaging times, loud noise, and strict requirements for patient cooperation.

Conclusions

Given the typical MRI findings of rectal AVM, MRI has some advantages in showing the malformed vessels of rectal AVM.

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Footnote

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <https://qims.amegroups.com/article/view/10.21037/qims-23-609/coif>). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are

appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

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