Cavernous hemangioma of the ileum in a young man: A case report and review of literature

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Abstract

BACKGROUND
Small intestinal cavernous hemangioma is a rare disease, especially in the ileum. It is difficult to accurately diagnose due to its hidden location and nonspecific clinical symptoms. Here, we reported a case of ileal cavernous hemangioma with chronic hemorrhage in a 20-year-old man and review the literature to gain a better understanding of this disease.

CASE SUMMARY
The patient complained of intermittent melena and hematochezia for > 3 mo. The lowest hemoglobin level revealed by laboratory testing was 3.4 g/dL (normal range: 12-16 g/dL). However, the gastroscopy, colonoscopy and peroral double-balloon enteroscopy (DBE) showed no signs of bleeding. The transanal DBE detected a lesion at about 340 cm proximal to the ileocecal valve. Thus, we performed an exploratory laparoscopy and the lesion was resected. After the operation, the patient had no melena. Finally, the pathological examination identified the neoplasm as an ileal cavernous hemangioma, thereby resulting in gastrointestinal hemorrhage.

CONCLUSION
This report might improve the diagnosis and treatment of ileal cavernous hemangioma.

Key Words: Cavernous hemangioma; Ileum; Gastrointestinal hemorrhage; Anemia; Double-balloon enteroscopy; Contrast-enhanced computed tomography; Case report

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Core Tip: Small intestinal hemangiomas are rare benign tumors, and ileal cavernous hemangiomas are even rarer. Here, we reported a 20-year-old man with intermittent melena and hematochezia for > 3 mo. We successively performed colonoscopy, gastroscopy, contrast-enhanced computed tomography, transoral double-balloon endoscopy, and transanal double-balloon endoscopy, and finally found a lesion in the ileum. The lesion was resected by laparoscopy. Thus, to further improve the diagnosis and treatment of this disease, we collected cases of ileal cavernous hemangioma in the past 20 years and summarized its manifestations, complications, imaging features, endoscopic features, and therapeutic strategies.

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INTRODUCTION
Small intestinal hemangiomas are rare vascular malformations and account for 7%-10% of all benign tumors in the small intestine. Among them, 60% occur in the jejunum, and it is rare in the ileum[1,2]. Histologically, small intestinal hemangioma is a congenital vascular malformation that can be classified as capillary, cavernous or mixed-type, with cavernous hemangioma being the most prevalent[3]. It can be manifested as abdominal pain, gastrointestinal bleeding, intestinal obstruction, intussusception, and intestinal perforation in some patients[4-6]. Due to the lack of specific clinical symptoms and distinctive auxiliary examination characteristics, omission or misdiagnosis might occur. Recently, with the advancements in enteroscopy, the detection rates of small bowel diseases have increased, but rare cases of small intestinal cavernous hemangioma, especially cavernous hemangioma of the ileum, are still misdiagnosed. Here, we report a case of gastrointestinal bleeding caused by ileal cavernous hemangioma and summarize its manifestations, complications, imaging features, endoscopic features, and therapeutic strategies in the past 20 years.

CASE PRESENTATION
Chief complaints
On June 11, 2021, a 20-year-old man was hospitalized for intermittent melena and hematochezia that had persisted for > 3 mo.

History of present illness
For three months before hospitalization, the patient experienced intermittent melena between 50 and 200 g, up to twice daily, accompanied by dizziness and fatigue. He was admitted to the department of hematology of our hospital, and the laboratory testing revealed severe anemia (hemoglobin, 5.7 g/dL), with microcytic and hypochromic anemia. Thus, iron deficiency anemia was diagnosed. The treatment with blood transfusion and ferrous gluconate syrup improved the anemia-related symptoms and the hemoglobin levels increased to 6.0 g/dL. For diagnosis and treatment, he was admitted to our department 2 mo ago. His hemoglobin level was 6.2 g/dL, and the fecal occult blood test was positive. The gastroscopy, colonoscopy and contrast-enhanced computed tomography (CECT) examination suggested no specific abnormalities. Hence, small bowel endoscopy was recommended to determine the cause of bleeding, but the patient refused and was discharged. Nonetheless, the melena relapsed 9 d ago, averaging about 300 g each time, accompanied by dizziness and aggravated fatigue. He was sent to a nearby hospital and had a hemoglobin level of only 3.4 g/dL. After a blood transfusion, the symptoms of anemia were improved. Four days ago, the melena relapsed again, and the situation appeared to have significantly deteriorated and he returned to the department of gastroenterology of our hospital.

History of past illness
The patient had no past medical history.

Personal and family history
The patient did not present previous personal and family medical history.
Figure 1 Imaging, enteroscopy, surgery and pathology of the ileal cavernous hemangioma. A: No obvious lesion was found in the unenhanced phase; B: A high-density shadow was found in the arterial phase; C and D: A high-density shadow was found in the venous phase; E and F: The transanal double-
balloon enteroscopy reached the upper segment of the ileum. In the middle and lower segments of the ileum, the mucosa was rough and eroded, and the villi were absent. A submucosal bulge of about 1.2 cm × 1.0 cm was observed approximately 340 cm proximal to the ileocecal valve, where the ulcers developed. The surrounding mucosa was flushed, presented edema, hard in texture, and easily bleeding, with many thickened blood vessels supplying the lesion; G and H: Gross specimen of the ileal cavernous hemangioma; I-L: Hematoxylin–eosin staining showing a blood-filled sinus-like space in the ileum submucosa; I: Original magnification 20 ×; J-L: Original magnification 10 ×.

Physical examination
At admission, his heart rate was 92 beats/min and his blood pressure was 12.1/6.9 kPa. He was pale, and the other physical examinations were normal.

Laboratory examinations
The laboratory testing revealed moderated microcytic and hypochromic anemia (hemoglobin: 6.95 g/dL). The fecal occult blood test was positive. The liver and kidney function, coagulation function, carcinoembryonic antigen, carbohydrate antigen 19-9, and cancer antigen 125 were normal.

Imaging examinations
Endoscopy re-examination: Gastroscopy showed that the corpus had a spot of flushing and erosion, but there was no bleeding, and the stomach cavity was clean. The colonoscopy revealed dark red blood at the end of the ileum. After flushing with normal saline, there were no abnormalities in the mucosa, but dark red blood continued to gradually drip down from the ileum, indicating small intestinal bleeding. CECT re-examination (SOMATOM Definition Flash, Siemens, Germany) showed a lesion in the ileum that was enhanced in the arterial and venous phases (Figure 1A-D).

Peroral double-balloon enteroscopy (DBE): Mild inflammation of the upper jejunum was detected. Transanal DBE reached the upper segment of the ileum. In the middle and lower segments, the mucosa was rough and eroded, and the villi were absent. A submucosal lesion approximately 1.2 cm × 1.0 cm was found at about 340 cm proximal to the ileocecal valve with ulcer formation (Figure 1E and F). The surrounding mucosa was flushed, presented with edema, was hard in texture, easy to bleed, and had numerous thickened blood vessels supplying the tumor. The endoscopic diagnosis was: (1) Ileal submucosal bulge (stromal tumor? vascular malformation?); and (2) Ileal inflammation.

FINAL DIAGNOSIS
Our clinical diagnosis was small intestinal vascular malformation. The postoperative pathological diagnosis revealed ileal cavernous hemangioma.

TREATMENT
First, laparoscopic exploration was performed and a tortuous collection of irregular vessels was found at about 300 cm proximal to the ileocecal valve. Then, the intestine was longitudinally opened near the irregular vessels. A 1.3 cm × 1.2 cm submucosal lesion with an ulcer (0.3 cm × 0.5 cm) and pulsatile bleeding on the surface was found in the ileum. The lesion was completely resected (Figure 1G-L), and we have uploaded a video that helps in understanding the morphology of the lesion (Video 1). The optical microscopy showed twisted and dilated blood vessels in the submucosa, surrounding the bleeding onset. Finally, the pathological diagnosis was cavernous hemangioma of the ileum.

OUTCOME AND FOLLOW-UP
The patient quickly recovered and had no further episodes of bleeding after the operation. He returned to our hospital for a follow-up visit 1 mo after the operation and his hemoglobin levels increased to 10.7 g/dL (normal range: 12-16 g/dL).

DISCUSSION
Small intestinal bleeding accounts for 5%-10% of all gastrointestinal bleeding[7]. Hence, it should be considered for persistent or recurrent bleedings that are not detected by routine endoscopy, including upper gastrointestinal endoscopy and colonoscopy. The common etiologies of small intestinal bleeding in individuals younger than 40 years include Crohn’s disease, tumor, Merkel’s diverticulum, Dieulafoy
| Ref.          | Age (yr) | Sex | Manifestation                                                                 | Preoperative diagnosis study                              | Imaging                  | Endoscopic feature                     | Preoperative diagnosis | Size (cm) | Complications               |
|--------------|----------|-----|--------------------------------------------------------------------------------|-----------------------------------------------------------|--------------------------|----------------------------------------|------------------------|-----------|-----------------------------|
| Pinho et al  | 9        | F   | Fatigue, nausea, dizziness, growth retardation, melena                        | 99m-Tc-RBC-scintigraphy, CE                               | NM                      | A bluish polypoid mass with a dark spot| Y                      | 2 × 2.5   | None                        |
| Abdul Aziz et al | 6        | F   | Abdominal pain, pallor, vomit, lethargy, bloating, abdominal mass              | X-ray, US                                                 | NM                      | Submucosal hematoma                    | N                      | NA        | None                        |
| Huang et al  | 64       | F   | Abdominal pain, nausea, vomit, bloating, abdominal mass                        | MRI, colonoscopy                                          | Wall thickening          | Submucosal hematoma                    | N                      | NA        | Intussusception, perforation|
| Femandes et al | 58       | F   | Melena, syncope, melena                                                      | Colonoscopy, ileoscopy, CE, CT                           | NM                      | Y                                      | 14                     | None      | None                        |
| Purdy-Payne et al | 20      | F   | Abdominal pain, nausea, vomit, syncope                                     | CT, colonoscopy                                          | Calcification            | Annular growth nodular irregular mass  | Y                      | 4 × 3.5 × 3 | None                        |
| Ocampo Toro et al | 29     | M   | Chronic anemia                                                             | Small bowel study (SBS) with barium, CECT, X-ray         | Wall thickening, calcification | N                                      | Y                      | 10        | None                        |
| Kano et al  | 29       | M   | None                                                                         | CECT, DBE                                                | Wall thickening          | Multiple reddish-purple submucosal masses | Y                      | 15 × 6    | None                        |
| Magnano et al  | 13       | M   | Fatigue, malaise, weakness, pallor, anemia                                 | Gastroscopy, colonoscopy, technetium 99m-Tc-RBC-scintigraphy, mesenteric arteriography, CE | NM                      | A large polypoid erythematous lesion   | N                      | 2         | None                        |
| Chan et al  | 36       | F   | Dizziness, loss of consciousness, pallor                                    | Gastroendoscopy, X-ray, colonoscopy, 99m-Tc-RBC-scintigraphy, angiogram, Proctoscopy, DBE | NM                      | Two large hemangiomas appeared to be vascular and thrombosed | Y                      | 1 & 3, respectively | None                        |
| Quentin et al  | 32       | F   | Fresh red blood stool, anemia                                               | Gastroscopy, colonoscopy, CE                              | NM                      | A submucosal and circumferential lesion, blue-colored, with superficial red spots | Y                      | 2         | None                        |
| Chen et al  | 23       | M   | Fatigue, dizziness, chest pain, dyspnea on exertion, anemia                  | Gastroscopy, colonoscopy, small bowel barium, CT, CE      | Wall thickening          | A large violet-colored polypoid submucosal lesion | N                      | 8         | None                        |
| Guardiola et al  | 19      | M   | Anemia, melena                                                              | Gastroscopy, colonoscopy, small bowel barium, CT, CE      | Wall thickening          | A huge heterogeneous mixed mass        | N                      | 50 × 15   | None                        |
| Peng et al  | 47       | M   | Melena, anemia, weakness, dizziness                                         | CE, CECT                                                 | NM                      | A reddish-purple lesion                | Y                      | 5 × 3 × 3  | None                        |
| Hu et al   | 24       | F   | Melena, fatigue, anemia                                                     | Gastroscopy, colonoscopy, CE, DBE                         | NM                      | Obstruction                            | N                      | NM        | Obstruction                 |
| Majethia et al | 45      | F   | Vomiting, abdominal pain, loss of appetite                                 | CECT                                                     | NM                      | N                                      | N                      | NM        | Obstruction                 |

NM: No mention; CE: Capsule endoscopy; DBE: Double-balloon enteroscopy; US: Ultrasonography; MRI: Magnetic resonance imaging; CT: Computed
lesions, vasodilatory disorder, and polyp syndrome[7].

Small intestinal hemangiomas are rare vascular malformations that can cause small intestinal hemorrhages. They can occur in various segments of the small intestine, but are more frequent in the jejunum and rare in the ileum[8-10]. Pathologically, hemangiomas are classified into capillary, cavernous and mixed types, with capillary types being the most common[3]. Here, we presented a case of cavernous hemangioma in the upper ileum causing recurrent gastrointestinal bleeding.

Furthermore, a small intestinal hemangioma can originate from the mucosal, submucosa, muscularis propria, or even serosal layer[11]. Its most common manifestations include recurrent gastrointestinal bleeding and iron deficiency anemia, which might be accompanied by nonspecific symptoms such as dizziness and fatigue[12]. Generally, no specific findings are observed in the laboratory testing, making it difficult to diagnose. Thus, to analyze the clinicopathological features of ileal cavernous hemangiomas, we searched PubMed (https://pubmed.ncbi.nlm.nih.gov/) and Google Scholar (https://scholar.google.com/) databases between 2001 and 2021 using “hemangioma”, “ileum”, “intestinal”, and “cavernous” as keywords. The language was limited to English. Case reports were included if the final diagnosis was ileal cavernous hemangioma. The exclusion criteria were: Non-English literature; location of the hemangioma was not mentioned; and nonhuman ileal cavernous hemangioma.

A total of 15 cases (9 women and 6 men; mean age: 30.3 years) were retrieved and reviewed (Table 1) [1,13-26]. The most common symptoms (73.3%) were related to anemia, including fatigue, weakness, pallor, dizziness, loss of consciousness, and even syncope. Melena was the second most common symptom (40.0%). Nonspecific symptoms of the digestive system (33.3%) included abdominal pain, nausea, vomiting, bloating, abdominal mass and loss of appetite (Table 1). Among cases, a 6-year-old girl developed hemangioma hemorrhage after a mild abdomen blunt trauma, and a diagnostic cum therapeutic laparoscopy was performed[14]. Our current patient had melena as the main symptom, accompanied by anemia-related dizziness and fatigue, consistent with the literature.

Nine of the 15 lesions (60%) were diagnosed by endoscopy before surgery. Among them, five were detected by capsule endoscopy, two by DBE, one by both capsule endoscopy (CE) and DBE, and one in the terminal ileum by colonoscopy. In our current case, colonoscopy revealed dark red blood near the end of the ileum and the fecal occult blood was positive. However, Fernandes et al[16] performed a colonoscopy and ileoscopy during asymptomatic disease and discovered no sign of blood or bleeding lesions. Therefore, we hypothesized that conducting an emergency endoscopy during the active stage of the disease might improve diagnostic performance. Regarding the endoscopic characteristics of ileal cavernous hemangioma in the literature reviewed, five cases were represented as submucosal lesions, four as polyps, two as irregular nodules that can be easily misdiagnosed as cancers, and one as a large heterogeneous mixed lesion. Three case reports did not describe the morphology of the lesions in detail. The surface of the lesion can present as erythema, thrombosis or bleeding. The color of the lesion was mostly reddish-purple, blue, or purple-blue, indicating a vascular network. The patient reported here also had a submucosal lesion, but with ulcers on the surface and no blue-purple appearance, thrombosis, or bleeding, and could be easily misdiagnosed as a stromal tumor, especially a malignant stromal tumor. Therefore, we should strengthen our understanding of the characteristics of ileal cavernous hemangioma to prevent misdiagnoses. CT is a noninvasive examination but has limited significance in diagnosing small intestinal hemangioma. In contrast, CT can be helpful to initially determine the location and general shape of the lesion and guide the next step of endoscopy or surgery. Thus, we summarized the imaging features of these 15 patients: Five (33.3%) presented with intestinal wall thickening and three (20.0%) with calcifications. These results were different from those of Fu et al[12], in which 50% of patients had phleboliths. CT imaging of our patient revealed wall thickening and enhancement in the arterial and venous phases, consistent with previous reports[27]. Then, we investigated the hemangioma size of five patients with wall thickening of the ileum (one case did not mention the size[15]). The median hemangioma length of these patients was 4 cm, and the mean diameter was 9.5 cm. Besides, the lesions either originated from the submucosa or reached the submucosa. Thus, we suggest that the thickening of the intestinal wall might indicate the size and depth of the lesions. Furthermore, among the cases reviewed, one had secondary intussusception with perforation[15], consistent with previous reports[4].

In these 15 cases, various preoperative diagnostic methods were used, including CECT (46.7%), 99m-Tc-RBC-scintigraphy (20%), and magnetic resonance imaging (6.7%). CECT can clearly show the structures of the intestinal wall and extraintestinal lesions in multiple directions and angles, which can initially be used to determine the location and general shape of the lesions, contributing to more information for clinical diagnosis. Moreover, CE and DBE are used for diagnosing small bowel diseases and there is no significant difference in the overall diagnosis rate between these methods (50% and 53%, respectively)[28]. CE is noninvasive, painless, and tolerable[29]. However, disadvantages might also exist due to the inability of tissue biopsy or endoscopic treatment, inaccurate positioning, and being unsuitable for patients with massive bleeding or intestinal obstruction[30,31]. Meanwhile, DBE has
intuitiveness, operability, biopsy feasibility, as well as the efficacy of endoscopic treatment, which significantly improves the diagnosis and treatment of small bowel diseases. However, the high cost, invasiveness, and risk of acute pancreatitis or intestinal perforation in DBE should not be ignored[32, 33]. For better understanding, we summarize the advantages and disadvantages between CE and DBE in Table 2. Endoscopic treatments such as electrocoagulation and titanium clamp hemostasis are suitable for some small intestinal bleeding caused by vascular diseases. For hemangioma, endoscopic biopsy is not recommended, since it can easily lead to uncontrollable bleeding. In our current case, the patient presented with active bleeding, and the cause of gastrointestinal bleeding was highly suspected as vascular malformations. Thus, we selected DBE to diagnose and perform the endoscopic treatment.

Polidocanol injection using DBE is a safe, feasible and effective treatment method for small intestinal hemangioma[34]. A retrospective cohort study showed that 66.3% of individuals improved after receiving DBE polidocanol injections. Additionally, in younger patients, the effectiveness rate was 100% during long-term follow-up[35]. However, for large or diffuse hemangiomas, or lesions originating from the submucosa or deeper layers, the endoscopic procedure might result in perforation and uncontrolled bleeding. In this case, surgical resection might be safer[1] and was selected to finally treat our patient.

## CONCLUSION

Small intestinal cavernous hemangioma is a rare disease. Its most common symptoms are anemia and melena. CECT can initially be used to determine the location and general shape of the lesions. The wall thickening and high-density shadow in the CECT might have diagnostic value for small intestinal cavernous hemangiomas. CE and DBE can contribute to the identification of lesions, mostly represented as submucosal masses, polyloid or irregular nodules. A bluish-purple vascular network is generally visible on the surface of a typical lesion, and atypical lesions are easily misdiagnosed as stromal tumors and other cancers. Regarding the detection rate, there is no significant difference between CE and DBE, but, since CE is noninvasive, it is more recommended to detect the lesions. Both endoscopy and surgery are feasible for this disorder. However, for large or diffuse hemangiomas or lesions derived from the submucosa, surgical resection might be chosen. A detailed treatment plan for each case should be prepared to effectively manage patients with variable risks. Finally, more case reports or observational studies are needed to help in the diagnosis and treatment.

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## FOOTNOTES

**Author contributions:** Yao L designed the report, reviewed the literature, and wrote the paper; Li LW reviewed the literature and wrote the manuscript. Yu B analyzed and interpreted the imaging findings; Meng XD, Liu SQ, Wei RF, Xie LH, and Liang J assisted in the diagnosis and treatment of the case; Ruan HQ and Zou J assisted in the revision of the manuscript; Huang JA was the guarantor and corresponding author; all authors issued final approval for the version to be submitted.

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