

# Capsule Endoscopy and Laparoscopy for Small Intestine Arteriovenous Malformation in a Child

Mohamed Adam Shaban, MD, Gustavo Stringel, MD, MBA, Daniel Helfgott, Lynnette Cukaj, MD, Shilpa Sood, MD, Howard Bostwick, MD

Department of Pediatric Gastroenterology, NY Medical College, Westchester Medical Center, Valhalla, New York, USA (Drs Shaban, Cukaj, Sood, and Bostwick).

Department of Surgery, Division of Pediatric Surgery, NY Medical College, Westchester Medical Center, Valhalla, New York, USA (Dr Stringel).

New York Medical College, Westchester Medical Center, Valhalla, New York, USA (Dr Helfgott).

## ABSTRACT

**Introduction:** Vascular malformations remain a rare cause of gastrointestinal (GI) bleeding, and they can present a diagnostic challenge. The diagnostic utility of video capsule endoscopy in identifying these malformations in the pediatric population is not well documented.

**Case Description:** A 7-y-old male with chronic iron deficiency anemia had a clinical history of melena and occasional hematochezia of 1-year duration requiring multiple admissions to the hospital and blood transfusions. Ultrasound, Meckel scan, magnetic resonance imaging, and computed tomography (angiogram) did not demonstrate the source of bleeding. Upper and lower endoscopy studies showed no abnormalities. A video capsule endoscopy showed a lesion in the small intestine suggestive of an arteriovenous malformation. Diagnostic laparoscopy identified the vascular malformation in the mid jejunum. Laparoscopic-assisted intestinal resection including the malformation was successfully performed. After surgical resection, the anemia resolved, and the patient had no further episodes of bleeding.

**Conclusion:** This case illustrates the utility of video capsule endoscopy combined with laparoscopy in the management of a suspected GI arteriovenous malformation in a pediatric patient.

**Keys Words:** Anemia; Arteriovenous Malformation; Gastrointestinal Bleeding; Laparoscopy; Pediatric; Video Capsule Endoscopy.

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Address correspondence to: Mohamed Adam Shaban, MD, Department of Pediatric Gastroenterology, NY Medical College, Westchester Medical Center, Valhalla, NY 10595, USA. Tel: (760) 401-9525; Fax: (361) 200-6011; E-mail: adamshaban1@gmail.com

## INTRODUCTION

Lower gastrointestinal (GI) bleeding is frequently encountered in the pediatric clinical setting. Small studies have reported a 0.3% incidence in children seen in the emergency department.<sup>1</sup> Lower GI bleeding was pres-

ent in 30% of those patients with a 20% rate of hospitalization.<sup>2</sup> Most lower GI bleeding in pediatric patients is seen in children under one year of age. Small intestinal bleeding in children is commonly the result of Meckel's diverticulum. Vascular malformations such as hemangiomas and venous malformations remain a rare

cause of GI bleeding, and they can present a diagnostic challenge.<sup>3,4</sup> We present a case that illustrates the utility of video capsule endoscopy in combination with laparoscopy in the diagnosis and treatment of a small intestine arteriovenous malformation in a pediatric patient.

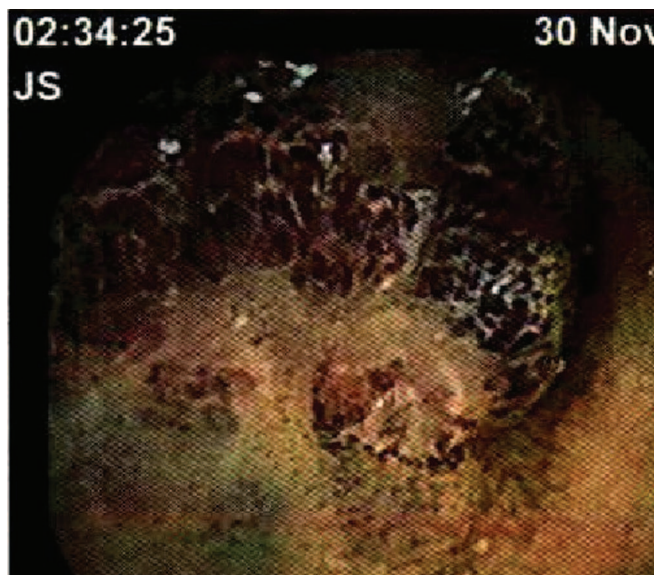
## CASE REPORT

A 7-y-old male with past medical history of iron deficiency anemia presented to the emergency department with syncopal episodes and increasing pallor, severe fatigue, sleepiness, weakness, and body pains. He also complained of chest pain. He was found to have a hemoglobin of 4.4 g/dL, mean corpuscular volume of 60 fL, and iron of 11  $\mu$ g/dL. He was seen by a hematologist 1 year earlier. He was treated with iron supplements. His hemoglobin usually ranged between 6 and 7 g/dL. As symptoms persisted, melena developed. The family initially denied any bleeding including blood in his stools, hematuria, epistaxis, easy bruising, or bleeding when brushing his teeth.

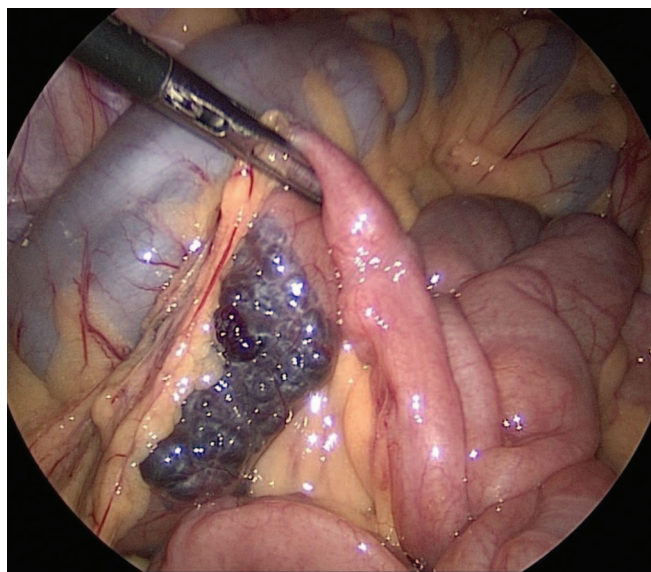
The patient required several admissions to the hospital and blood transfusions. Several investigations, including abdominal ultrasound, Meckel scan, computed tomography of the abdomen and pelvis (angiogram), magnetic resonance imaging with enterography, esophagogastroduodenoscopy, and colonoscopy, failed to demonstrate the source of the bleeding. Video capsule endoscopy demonstrated a lesion in the small intestine compatible with a vascular malformation; no active bleeding was seen during the test (**Figure 1**).

The patient underwent a diagnostic laparoscopy. A vascular malformation resembling a “bunch of strawberries” was found in the mid jejunum (**Figure 2**). Mesenteric involvement was initially suspected (**Figure 3**). All of the intestines were carefully examined, and no other lesions were identified. A laparoscopic-assisted intestinal resection was then performed. The affected bowel was exteriorized through a small McBurney incision (**Figures 4, 5, and 6**). It was removed, ensuring clear intestinal margins, and the intestine was reconstructed with an end-to-end anastomosis. We were prepared to proceed with intraoperative push endoscopy with a flexible scope if the lesion was not demonstrated with laparoscopy.

Pathology reported a 2.8-cm arteriovenous malformation involving the full thickness of the small bowel, with vascular congestion, focal thrombosis, and calcifications. The malformation was completely excised with



**Figure 1.** Video capsule endoscopy demonstrating a lesion in the upper small bowel.



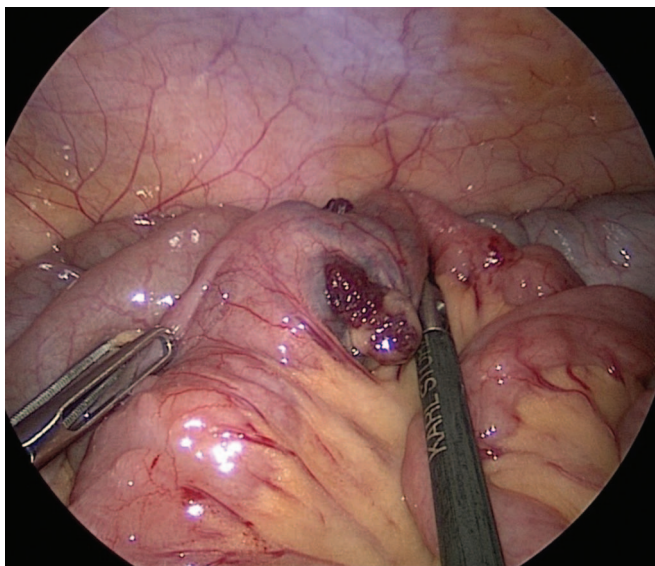
**Figure 2.** Vascular malformation found in the upper jejunum.

clear uninvolved margins. The mesentery was not involved. The procedure and postoperative recovery were uneventful. The patient was discharged home on postoperative day 4. He was doing well with no further bleeding after 1 year of follow-up.

## DISCUSSION

Vascular malformations can manifest at any time from infancy to adulthood, but they are more common in



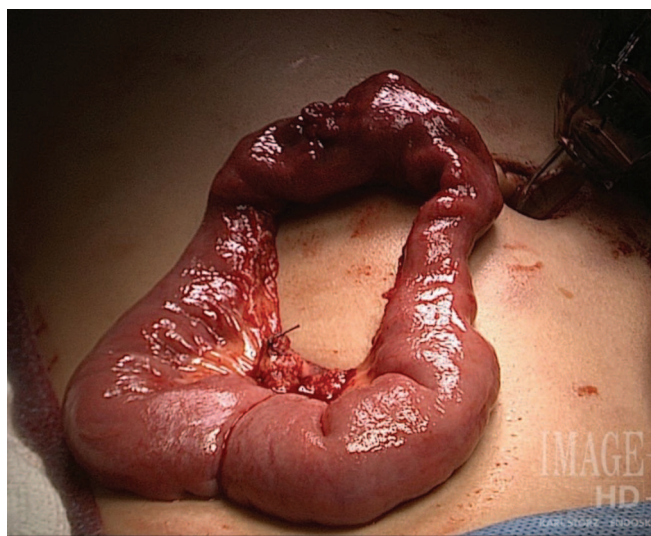


**Figure 3.** Vascular malformation involving the intestines. At surgery, mesenteric involvement was suspected.



**Figure 4.** Upper jejunum and vascular malformation delivered through a small McBurney incision.

older adults. They can present in a wide variety of locations.<sup>5,6</sup> The GI tract remains a relatively uncommon place of vascular malformations that can present with GI bleeding. GI vascular malformations typically present with symptoms of bright red rectal bleeding of unknown origin and iron deficiency anemia. Standard upper and lower endoscopies are unable to visualize



**Figure 5.** Small bowel resection.



**Figure 6.** Small McBurney incision in the right lower quadrant.

the small intestine, thus making diagnosis difficult. Cutaneous lesions can provide a clue to diagnosis, although they are not always present.<sup>5</sup> Venous malformations can typically be diagnosed with push endoscopy or video capsule endoscopy.<sup>4,6-8</sup> Studies have shown a similar yield of 40%.<sup>4</sup> Moreover, when bleeding is ongoing, the yield of video capsule endoscopy is increased.

In the adult population, argon laser is the main modality treatment, while it is commonly unavailable in the pediatric population.<sup>3</sup> Surgical resection through laparotomy is an alternative treatment when the lesion can be completely resected.<sup>5</sup> The risk of retention of the

capsule is low, and that generally occurs at the site of the lesion, allowing for surgery to both resect the lesion and retrieve the capsule.<sup>4,9</sup>

## CONCLUSION

The present case demonstrates the successful use of video capsule endoscopy to diagnose GI arteriovenous malformation in a patient with GI bleeding of unknown origin. Early use in the adult setting have shown its utility after an upper and lower endoscopy.<sup>10</sup> However, few previous case studies have shown its successful use in the pediatric setting for small bowel vascular malformations.<sup>11,12</sup>

The case we have described illustrates that video capsule endoscopy combined with laparoscopy may be very useful in the management of vascular malformations presenting with GI bleeding in the pediatric population, when other diagnostic modalities failed. The laparoscopic approach to treatment avoids the use of a more invasive open surgery.

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