Meckel’s Diverticulum Preoperatively Diagnosed by Double-balloon Endoscopy

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Abstract

Symptomatic Meckel’s diverticulum is an uncommon diagnosis in adults, and bleeding Meckel’s diverticulum after childhood is even more infrequent. We present herein the case of a 22-year-old man with gastrointestinal hemorrhage secondary to Meckel’s diverticulum containing ectopic gastric mucosa. As the source of bleeding could not be identified by upper and lower gastrointestinal endoscopy and visceral selective angiography, the new methods of capsule endoscopy and double-balloon endoscopy were used. Capsule endoscopy showed oozing hemorrhage in the ileum, and double-balloon endoscopy demonstrated a large diverticulum in the distal part of the ileum. Tc-99m pertechnetate Meckel’s scan revealed an abnormal focus of uptake in the right lower abdomen. The diverticulum was resected laparoscopically. The postoperative course was uneventful, and the patient remains in complete remission as of this writing. Detecting Meckel’s diverticulum endoscopically is difficult prior to surgery, but a combination of capsule endoscopy and double-balloon endoscopy facilitates examination of the entire small intestine, making precise diagnosis of Meckel’s diverticulum possible.

Key words: Meckel’s diverticulum, lower gastrointestinal hemorrhage, capsule endoscopy, double-balloon endoscopy, laparotomy

(Intern Med 51: 1023-1026, 2012)
(DOI: 10.2169/internalmedicine.51.6594)

Introduction

Meckel’s diverticulum is the most common congenital anomaly of the gastrointestinal tract, with an incidence on autopsy of 0.3-4% (1, 2). This condition derives from incomplete obliteration of the yolk stalk (omphalo-mesenteric duct). Meckel’s diverticulum is a true diverticulum, with all of the layers of the intestinal wall present. The diverticulum is located on the antimesenteric border of the ileum, about 40-130 cm proximal to the ileocecal valve, and it is usually 3-5 cm long (3). Since cells lining the vitelline duct are pluripotent, heterotopic gastric mucosa (50%), pancreatic mucosa (5%), and, less commonly, colonic mucosa, endometriosis, and hepatobiliary tissue, may be present, and these are responsible for other complications like hemorrhage, chronic peptic ulceration and perforation (4-6).

An individual with Meckel’s diverticulum has a 4-6% lifetime risk of developing a complication (7). The most common clinical presentation is gastrointestinal bleeding, which occurs in 25-50% of patients showing complications (8). Colonoscopy cannot usually diagnose the bleeding from Meckel’s diverticulum, as the colonoscope cannot typically reach the part of the small intestine in which the diverticulum is located. Recent advances in diagnostic methods, including capsule endoscopy (CE) (9) and double-balloon endoscopy (DBE) (10), have enabled observation of the source of small-bowel bleeding. CE has proved to be of diagnostic value in some cases of bleeding Meckel’s diverticulum, but reports have been very few and no conclusive statement regarding the diagnostic value of this method can be made at this time (11). DBE enables examination of the entire small intestine (12). Although Tc-99m pertechnetate scintigraphy is useful, particularly in patients with ectopic gastric tissue, sensitivity was reported as ≤60% in a study of 235 patients with Meckel’s diverticulum and anemia (13).

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Received for publication September 21, 2011; Accepted for publication December 19, 2011

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Preoperative diagnosis of a complicated Meckel’s diverticulum may be challenging, because the clinical and imaging features overlap with those of other causes of acute abdomen (14). We were able to identify small bowel bleeding using CE and visualize Meckel’s diverticulum of the ileum using DBE. These procedures may thus prove useful in the preoperative diagnosis of bleeding Meckel’s diverticulum.

Case Report

A 22-year-old man presented to the emergency room with a 2-day history of massive melena. At 15, 19 and 21 years old, he had experienced similar episodes of bloody diarrhea that resolved immediately. Upper gastrointestinal endoscopy demonstrated no bleeding, while colonoscopy revealed blood clots but no source of bleeding was seen with the episode of bloody diarrhea at 21 years old. His family history was non-contributory. On admission, physical examination did not reveal pallor or severe hypotension, and he was anicteric with normoactive bowel sounds and a soft, flat abdomen without evidence of tenderness or masses. Hematological analysis on admission showed a red blood cell count of 320×10⁴/μl, a hemoglobin level of 8.6 g/dl and a hematocrit level of 25.9%. Platelet count, coagulation studies, and liver and renal function tests were all normal. Emergent upper gastrointestinal endoscopy and colonoscopy were performed, revealing blood clots in the colon. Colonoscopy likewise revealed that the bleeding was proximal, but did not identify a source. Abdominal contrast-enhanced computed tomography (CT) and angiography also failed to detect the source of bleeding. The patient continued to have massive melena, requiring transfusion of 8 units of packed red blood cells for correction of anemia. Further investigation with CE on hospital day 4 showed oozing hemorrhage in the ileum (Fig. 1). CE was able to detect small bowel bleeding with a rough region of origin. A secondary procedure was therefore considered necessary according to CE findings. DBE was performed on hospital day 5, revealing a large diverticulum in the distal part of the ileum (Fig. 2A, arrows). The oozing hemorrhage was already stopped, and no ulcers were apparent in the diverticulum. On urografin-contrast radiography of the small intestine from the endoscopy, the ileal diverticulum was evident (Fig. 2B, arrowheads). Tc-99m pertechnetate was helpful in determining the existence of Meckel’s diverticulum because of its reactivity with the gastric mucosa. On hospital day 8, a Tc-99m pertechnetate Meckel’s scan showed an abnormal focus of uptake in the right lower abdomen (Fig. 3).

The patient was taken to the operating room with a presumptive diagnosis of bleeding Meckel’s diverticulum. Laparotomy confirmed the findings of the DBE and Meckel’s scan, showing a 5-cm long, 2-cm wide Meckel’s diverticulum located approximately 90 cm proximal to the ileocecal valve (Fig. 4A). Resection of a short segment of the small bowel, including the diverticulum, with primary anastomosis was performed (Fig. 4B). The patient experienced no further hemorrhage and no postoperative complications, and was discharged 1 week postoperatively with complete resolution of symptoms. The pathological specimen revealed an area of ectopic gastric mucosa within the diverticulum (Fig. 4C).

Discussion

Meckel’s diverticulum is difficult to detect nonsurgically. We preoperatively detected the Meckel’s diverticulum in this case using DBE. When bleeding is massive and cannot be controlled using conservative methods, this represents an emergency situation that needs to be promptly resolved using surgical resection of Meckel’s diverticulum after initial resuscitation of the patient with blood transfusion. Making a precise diagnosis as soon as possible is thus important. In the present case, even though the patient continued to experience massive melena, CE was performed on hospital day 4. In retrospect, we should have performed CE and DBE earlier to determine the exact cause of the bleeding.

The new methods of CE and DBE have revolutionized the diagnostic approach to small intestinal bleeding in recent years. CE is a noninvasive technique that allows visualization of the entire alimentary tract (9). In the present case, CE was able to detect the source of bleeding in the ileum, but did not allow precise diagnosis. It is notable that DBE enabled preoperative diagnosis in this case. DBE can visualize the entire small intestine, allows detailed examination of specific areas of interest, and is quicker and less painful.
than previous endoscopic techniques (15). These results indicate that CE and DBE can play complementary roles in the preoperative diagnosis of bleeding Meckel’s diverticulum. Overall detection rates of abnormalities in the small bowel of CE (65%) and DBE (53%) are not significantly different, nor are overall diagnostic yields of CE (50%) and DBE (53%) (16). Since positive results on Tc-99m pertechnetate scintigraphy do not always indicate that Meckel’s diverticulum is responsible for the bleeding, if the source of small intestinal bleeding cannot be determined, subsequent DBE examination should increase the detection rate of Meckel’s diverticulum.

The diverticulum in the present patient contained ectopic gastric mucosa without ulcers or visible vessels. Shinozaki et al. investigated five cases of Meckel’s diverticulum and concluded that endoscopic observation of ulcers in Meckel’s diverticulum provides important evidence of bleeding (17). However, if no adherent blood clots or vessels are visible in ulcers within the Meckel’s diverticulum, confirming the ulcer as a bleeding source is difficult. The mechanisms of hemorrhage from Meckel’s diverticulum remain unclear; this report indicates that Meckel’s diverticulum without ulceration can cause bleeding. We conclude that DBE enables precise preoperative diagnosis and reasonable treatment of bleeding Meckel’s diverticulum.

The authors state that they have no Conflict of Interest (COI).
Figure 4. Extraction of Meckel’s diverticulum. (A) A Meckel’s diverticulum measuring 5 cm in length was found approximately 70 cm proximal to the ileocecal junction at laparoscopy. (B) Resection of the intestine containing the diverticulum. Arrows, the Meckel’s diverticulum. (C) Microscopic section of the pathological specimen. Arrows, ectopic gastric glands. The glands to the right represent normal intestinal glands.

References