Case report

A Case of Single-Incision Laparoscopic Surgery for a Giant Meckel’s Diverticulum

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Abstract

A 44-year-old woman with a 10-year history of anemia presented to our hospital with anemia. At the Emergency Room, her initial hemoglobin and hematocrit levels were 10.9 g/dL and 33.4 %, respectively. A gastroscopy and contrast-enhanced computed tomographic scan of the abdomen did not identify any bleeding site. A colonoscopy showed a Meckel’s diverticulum (MD) with an ulcer, at about 60 cm proximal to the ileocecal junction on the antimesenteric side, and few blood clots in the terminal ileum. Therefore, we performed a diagnostic and therapeutic single-incision laparoscopic surgery (SILS). The diverticulum was resected using a gastrointestinal anastomosis stapler, without requiring small bowel resection. Histopathological examination revealed MD with ectopic gastric tissue. The patient was discharged on postoperative day 7 without any complications.

We report our initial experience from Japan with one patient who underwent SILS for MD.

Key words: Meckel’s diverticulum, single-incision laparoscopic surgery (SILS), anemia

Introduction

Meckel’s diverticulum (MD) is the most common anomaly of the gastrointestinal tract, occurring in 1–3 % of the general population according to an autopsy series

(63 %) than in women and 30 % of patients with MD have other anomalies as well. Most individuals with MD are asymptomatic, and MD is typically recognized when complications arise. Patients with MD can present with diverticulitis, gastrointestinal bleeding, intestinal obstruction, perforation, or invagination. Here, we report a case of a giant MD ulcer causing hemorrhage that was effectively treated with SILS.

Case Report

A 44-year-old woman with a 10-year history of anemia was found to have anemia a few days before admission at our hospital. Repeated endoscopies at other hospitals or clinics showed no evidence of bleeding in the bowels. Her vital signs included: blood pressure 120/80 mmHg, pulse rate 80 beats/min, respiration rate 16 breaths/min, and temperature 37.0℃. In the Emergency Room, her initial hemoglobin and hematocrit levels were 10.9 g/dL and 33.4 %, respectively, with normal electrolyte, creatinine, and amylase levels. On examination, the abdomen was soft and non-tender, with no guarding or rebound tenderness. Bowel sounds were present but were of diminished intensity. Subsequently, she was admitted to our hospital for severe anemia.

A gastroscopy did not identify the bleeding site. Contrast-enhanced computed tomographic scan of the abdomen revealed no evidence of luminal extravasation. A colonoscopy did not identify any bleeding sites in the colon, but showed a few blood clots in the terminal ileum. Through a careful colonoscopy of the lumen of the ileum, we detected a diverticulum with an ulcer located about 60 cm proximal to the ileocecal junction, which was thought to be the bleeding source (Fig. 1). Contrast medium
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Under a colonoscopy confirmed the diverticulum in the ileum (Fig. 2). We then performed explorative surgery for diagnostic and therapeutic purposes.

For SILS, the patient was placed in the supine position with an endotracheal tube under general anesthesia. A 3-cm vertical transumbilical incision was made, and a 5-mm port for introducing the scope was inserted at the umbilicus using the open technique, and 2 additional ports were placed at the umbilicus under direct vision. The giant MD was located at about 60 cm proximal to the ileocecal junction on the antimesenteric side. After mobilization and bowel transaction was completed, a wound retractor (AlexisTM, small size, Applied Medical, Santa Margarita, CA, USA) was introduced through the umbilical incision. The specimen was removed from the abdominal cavity. The diverticulum was resected using the gastrointestinal anastomosis (GIA) stapler (Covidien, Autosuture 3.5-mm thickness, Mansfield, Mass) without requiring small bowel resection. Following saline irrigation, the wound was closed. The resected diverticulum was 6 cm in size (Fig. 3). Histopathological examination revealed MD with ectopic gastric mucosa (Fig. 4A) (arrows) and ulcer lesion (Fig. 4B) (arrow) (HE, original magnification × 40). The patient was discharged in a stable condition without any complications 7 days after surgery. She was asymptomatic at 9 months follow-up.

**Discussion**

MD is suspected when failure of complete obliterate-
tion of the embryonic vitelline or omphalomesenteric duct occurs\(^6\). Histologically, all 4 intestinal layers are present within a MD, and the mucosa may contain ectopic gastric, pancreatic, jejunal, or duodenal epithelium in up to 50% of specimens\(^7,8\). MD is invariably found on the anti-mesenteric border of the ileum, with 90% of cases located within 90 cm of the ileocecal valve\(^9\). A giant MD is defined as those MDs larger than 5 cm; one recorded specimen measured 16 cm × 4 cm\(^9\). In our case, we report a case of a 6-cm giant MD that caused hemorrhage.

Hemorrhage is reported in the majority of symptomatic cases of MD in children, but is unusual in adult patients (only 11.8%)\(^10,11\). The bleeding is usually painless, and can be massive and rapid, presenting with bright red blood in the stool, or slow and occult, manifesting as guaiac-positive stools or anemia. Surgery was performed not only to confirm the diagnosis but also for therapeutic purposes, as this giant MD with the ulcer was hemorrhagic. Recently, laparoscopic surgery is increasingly being used for benign bowel disease and ileocecal intussusception\(^12-15\). SILS was described as early as 1992 by Pelosi et al.\(^17\) in a laparoscopic appendectomy, and in 1997 by Navarra et al.\(^18\), in a laparoscopic cholecystectomy. SILS currently provides comprehensive access for abdominal surgeries. SILS is an evolving field as reduced port surgery and enables the application of a wide range of already existing instruments using a single incision. At present, we perform SILS for intestinal or colorectal diseases, having 3 working channels within the umbilicus. Fagenholz PJ et al.\(^19\) reported that MD could be effectively treated laparoscopically, because laparoscopic approach decreased postoperative pain, quicker return of bowel function compared to laparotomy, and less adhesion formation. However to our knowledge, any patient who underwent SILS for MD had not been reported until now. Because the patient did not show intestinal dilatation, we performed SILS for diagnosis and treatment as the hemorrhagic source could not be identified clearly. The guiding principle is operating through a single transumbilical incision, and removing the resected MD by the same small incision. The major advantage of this method is improved cosmetics without any visible abdominal scars. Disadvantages of SILS include the conflict between the operative instruments, and the camera and the smaller working space compared to that of conventional laparoscopic surgery. Combination between the surgeon and the assistant for scope is essential and more important than standard multiport laparoscopic surgery. Through SILS, we could easily detect the giant MD at about 60 cm proximal to the ileocecal junction on the antimesenteric side.

Compared to classic laparoscopic surgery, the potential advantages of the SILS are believed to be decreased postoperative pain and improved cosmesis due to a decreased number of required incisions. Therefore, we suggest that SILS rather than conventional laparoscopic surgery might be the optimal approach for the treatment of MD and benign small bowel lesions.
References