Laparoscopic Surgery for the Ascending Colon Cancer Associated with Malrotation of the Midgut

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Abstract Malrotation of the midgut is a congenital anomaly of the gastrointestinal tract that usually presents in neonates. Moreover, synchronous colon cancer has rarely been reported. In the present article, we report a preliminary experience with laparoscopic approach for intestinal malrotation with early colon cancer in a 68-year-old woman who presented with bloody stools. Colonoscopy revealed a lateral spreading tumor of the ascending colon. An air-barium contrast enema showed that the entire colon lay within the left hemiabdomen. A computed tomography revealed the superior mesenteric vein rotation sign. At surgery, a condition of malrotation of the midgut was observed: the third and the fourth part of the duodenum descended vertically without Treitz's ligament, and the small bowel and colon were located in the right and left side of the abdominal cavity, respectively. We mobilized the terminal ileum and the right colon with laparoscopic approach. A 3-cm abdominal incision was made via the umbilicus. Right colectomy with lymph node dissection was achieved following extracorporealization. Pathological examination revealed well-differentiated tubular adenocarcinoma without nodal involvement. The patient had an uneventful postoperative course. Laparoscopic surgery for colon cancer associated with malrotation of the midgut is feasible and a promising method because of its less invasiveness and its adaptability to the malrotation without extending the skin incision.

Keywords Malrotation of the midgut · Intestinal malrotation · Laparoscopic colectomy

Introduction

Malrotation of the midgut is a congenital anomaly of intestinal rotation and fixation that usually presents in the first month of life [1, 2]. An adult case associated with colon cancer is extremely rare [3]. Because of its rarity, the gold standard approach for this malrotation with colon cancer has not existed. In few reported cases, however, laparotomy approach has been preferred because of its safety and reliability [4]. Recently, laparoscopic surgery has become a practical treatment option for colorectal cancer, and the safety and efficacy of laparoscopic approach has been demonstrated in some clinical trials [5, 6]. Here we report a preliminary experience with laparoscopic approach for early colon cancer associated with malrotation of the midgut.

Case Report

A 68-year-old woman presented with bloody stools without previous episodes of abdominal colicky pain and distension. There was a medical history of hemorrhoid surgery. Colonoscopy revealed a 50-mm lateral spreading tumor of the ascending colon. An air-barium contrast enema showed that the entire colon lay within the left hemiabdomen with the cecum (Fig. 1). Computed tomography revealed the superior mesenteric vein rotation sign (Fig. 2), and a preoperative diagnosis of suspicion of malrotation of the midgut was made.

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Fig. 1 Air-barium contrast enema shows that the entire colon lies within the left hemiabdomen with the cecum

Surgical Procedures

The patient was placed in the modified lithotomy position under general anesthesia. First, a 12-mm trocar was placed with an open approach, and the abdominal cavity was explored with a 10-mm semiflexible laparoscope (LTFVH; Olympus). Pneumoperitoneum was induced and maintained at 9 mm Hg with carbon dioxide (CO₂). Two 5-mm ports and a 12-mm port were inserted. At surgery, a condition of malrotation of the midgut was observed: the third and the fourth part of the duodenum descended vertically without Treitz's ligament and the small bowel and colon were located in the right and left side of the abdominal cavity, respectively. The terminal ileum and the right colon were

Fig. 2 Computed tomography reveals the superior mesenteric vein rotation sign

attached to the retroperitoneum. We mobilized them using the Harmonic ACE (Ethicon Endo-Surgery, Cincinnati, OH, USA) with laparoscopic approach. A 3-cm abdominal incision was made via the umbilicus. A small wound retractor (ALEXIS wound retractor S, Applied Medical, Santa Margarita, CA, USA) was introduced for extracorporealization of the colon. Right colectomy with lymph node dissection was achieved following extracorporealization, and anastomosis was performed using staplers. The resected specimen included a lateral spreading tumor, measuring 5.3×3.8 cm of the ascending colon (Fig. 3). Pathological examination revealed well-differentiated tubular adenocarcinoma of the ascending colon limited to the mucosal layer without nodal involvement. The patient had an uneventful postoperative course, and postoperative follow-up did not reveal any umbilical wound complications or any recurrences.

Discussion

Intestinal malrotation can be defined as any deviation from the normal 270° rotation of the midgut in a counterclockwise direction during embryologic development. Malrotation of the midgut has been estimated to occur in about 1 in 500 of all live births [1] and 85% of cases present in the first 2 weeks of life [7]. Malrotation rarely occurs in adulthood, which often makes the diagnosis difficult for surgeons not familiar with the presenting signs and anatomy. There are some specific radiographic signs of malrotation of the midgut, such as superior mesenteric vein rotation, the perfusion cutoff sign, bowel infarction, and a left-sided superior mesenteric vein [3]. However, many cases of malrotation will only be discovered coincidentally at surgery for some other disease.

Another interesting finding from the case presented here was that synchronous colon cancer was associated with

Fig. 3 The resected specimen included a lateral spreading tumor, measuring 5.3×3.8 cm of the ascending colon

intestinal malrotation. Based on previous studies, there are only five cases of intestinal malrotation with synchronous colon cancer [3, 4].

As regards the surgical technique, the laparotomy approach was preferred for two reasons. First, the laparoscopic approach was not considered the gold standard for the treatment of the advanced colon cancer. Second, the laparotomy approach was considered safe and reliable [4]. However, in terms of the oncological outcomes, the UK Medical Research Council CLASICC trial concluded that the 5-year analysis confirmed the oncological safety of laparoscopic surgery for both colonic and rectal cancer and that the use of laparoscopic surgery to maximize short-term outcomes did not compromise the long-term oncological results [5]. To perform the surgery for intestinal malrotation safely, it is important to identify the exact abnormality and plan the anatomical dissection appropriately at surgery because malrotation is usually found coincidentally and has a different feature in each case. In laparoscopic approach, we can easily obtain the information of the entire abdominal cavity and perform many types of procedures without extending skin incision, but only adding a few ports. We believe these advantages of laparoscopic approach may bring safety and less invasiveness for the patient with colorectal cancer associated with intestinal malrotation.

Conclusion

Laparoscopic surgery for colon cancer associated with malrotation of the midgut is a feasible and promising method because of its less invasiveness and its adaptability to the malrotation without extending the skin incision.

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