



3D-Laparoscopic Total Mesorectal Excision in a Rectal Cancer Patient with Situs Inversus Totalis: A Case Report

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Abstract

Situs inversus totalis (SIT) is a rare anomaly in which the abdominal and thoracic cavity structures are located opposite to their usual positions. Occasionally, patients with this condition are diagnosed with malignant tumors. We report a case of a 58-year-old woman with rectal cancer and SIT. 3D-Laparoscopic total mesorectal excision (TME) was performed successfully in a rectal cancer patient by careful consideration of the mirror-image anatomy. The operation required 150 min, and no intraoperative complications occurred. The final pathology showed a $5.0\text{cm}^2 \times 4.5\text{cm}^2$ adenocarcinoma with whole layer invasion. Sixteen lymph nodes were examined, and 7 regional lymph nodes metastasis (pT4aN2a, LN7/16), according to the American Joint Committee on Cancer 7th edition staging guidelines. The postoperative course was uneventful, and the patient was discharged on postoperative day 10. We believe that this is the first case of 3D-Laparoscopic TME reported in a SIT patient with rectal cancer.

Keywords: Situs inversus totalis; 3D-laparoscopic; Total mesorectal excision; Rectal cancer

Introduction

Situs inversus totalis (SIT) is a rare autosomal recessive congenital anomaly, occurring at an incidence of one in every 5,000 to 20,000 people. It is characterized by the transposition of the abdominal and/or thoracic organs, but it does not affect health or life expectancy. It is detected accidentally during a radiological examination. Laparoscopic total mesorectal excision (TME) in SIT patients with rectal cancer was first reported in 2010 [1]. However, to the best of our knowledge, there has been no report of 3D-laparoscope surgery for rectal cancer in SIT patients. We here report a case of 3D-laparoscopic TME for rectal cancer in a patient with SIT.

Case Presentation

A 58-year-old woman was admitted to our gastroenterology ward on March 14, 2016, with bloody stool for 6 months. Colonoscopy revealed an ulcerative tumor in the upper rectum, 16 cm from the anal verge; biopsy confirmed that it was a poorly differentiated adenocarcinoma. She was a married woman. She was 155 cm tall and weighed 60.5 kg. Regarding the laboratory findings, she had no anemia (red blood cell count, $4.49 \times 10^12 \text{ L}$; hemoglobin, 139 g/L; hematocrit, 42%) and no hepatic, renal, or electrolyte dysfunction. The serum carcinoembryonic antigen was elevated (25.10 ng/mL; reference value, < 5ng/mL). The serum carbohydrate chain antigen199 (CA199) was elevated (35.50 ng/mL; reference value, < 35ng/mL). Chest radiography showed dextrocardia and a right subphrenic gastric bubble (Figure 1). Abdominopelvic computed tomography showed complete transposition of the abdominal viscera, confirming situs inversus totalis is (Figure 2).

In March 22, 2016, a 3D-laparoscopic anterior resection with a radical lymphadenectomy was performed. After general anesthesia was induced, the patient was placed in a lithotomy position. The surgeon stood on the left side of the patient (opposite the usual side for surgery at our hospital). A 10-mm supraumbilical port was placed, and a 3D-telescope was introduced into the peritoneal cavity. Additional trocars included a 12-mm trocar in the left flank and a 5-mm trocar in the left iliac fossa as working ports for the operator, and a 12-mm trocar in the right iliac fossa and 5-mm trocar in the right flank for traction.

The laparoscopic view showed that the sigmoid colon was observed on the right side, along with the spleen. The liver was in the left upper quadrant. The sigmoid colon was mobilized using ultrasonic dissection. The right ureter was clearly identified and was avoided during dissection (Figure 3). The inferior mesenteric artery was isolated and divided at its origin (Figure 4). And then the operator and endoscopist positioned themselves on the right with the first assistant on the left to

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Figure 1: Chest X-ray showing dextrocardia and a right subphrenic gastric bubble.

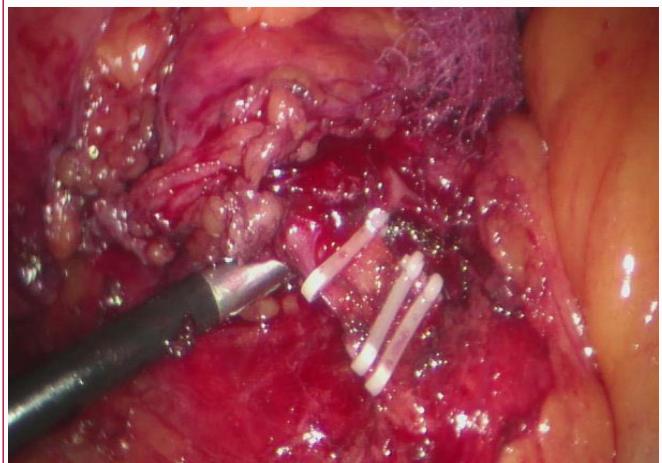


Figure 4: Division of the inferior mesenteric artery at its origin.

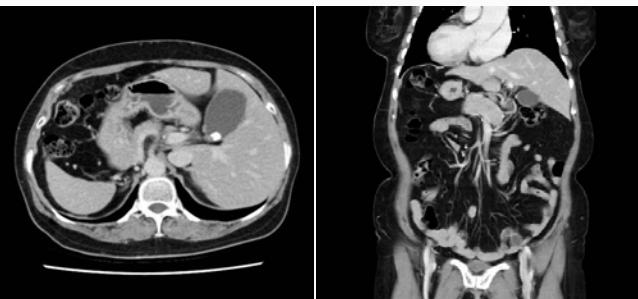


Figure 2: Computed tomography disclosing complete transposition of the abdominal viscera (A) coronal view and (B) axial view.



Figure 5: The rectal cancer specimen.

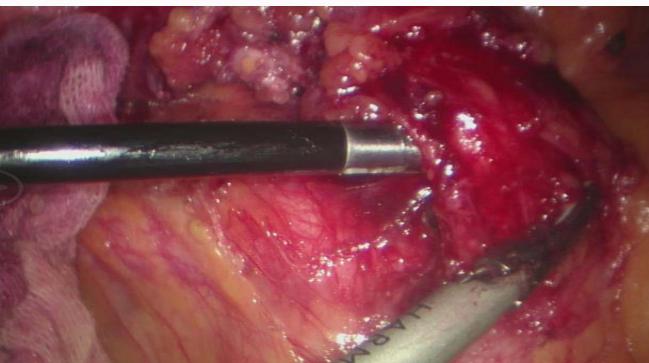


Figure 3: Origin of the inferior mesenteric artery (IMA) from the right side of the abdominal aorta. CIA, common iliac artery.

mobilize the rectum and make the anastomosis, because the operator was right-handed. The TME was performed, and the distal rectum was divided using articulating endoscopic linear stapler. Using an extension (about 5 cm) to a trocar site in the right iliac fossa, the specimen was extracted and amputated. A purse string suture was used to hold the anvil of a circular stapling device in the proximal colon. The colon was returned to the abdomen, and the abdominal incision was closed. After restoring the pneumoperitoneum, a 29-mm end-to-end anastomotic stapling device was inserted anally, and the anastomosis was completed.

The operating time was 150 min, and the blood loss was 50 mL. Macroscopically, the tumor was a $5.0\text{cm}^2 \times 4.5\text{cm}^2$ ulcerated lesions in the rectum (Figure 5). Histological examination of the resected specimen disclosed adenocarcinoma with whole layer invasion. Sixteen lymph nodes were examined, and 7 regional lymph

nodes metastasis (pT4aN2a, LN7/16), according to the American Joint Committee on Cancer 7th edition staging guidelines. The postoperative course was favorable, and the patient was discharged on postoperative day 10.

Discussion

Three-dimensional (3D) high-definition (HD) laparoscopy has brought a new direction for minimally invasive surgery, which has been gradually applied to laparoscopic hernia repair surgery, colorectal surgery, hysterectomy, urology, cardiothoracic surgery and so on [2]. Depending on the 3D laparoscopy, stereo image can be associated with augmented reality and offers the advantage of improved depth perception and accuracy [3].

Situs inversus totalis (SIT) is a rare anomaly in which the abdominal and thoracic cavity structures are located opposite to their usual positions. The etiology of SIT remains obscure, and this condition does not influence normal health or life expectancy; however, it has important surgical implications. Laparoscopic surgeries in SIT patients have documented greater technical difficulties due to the altered anastomotic orientation [4-8].

Recently, a successful laparoscopic surgery for rectal cancer in a SIT patient has been reported [1]. A 41-year-old woman with SIT who developed rectal cancer was successfully treated by laparoscopic total mesorectal excision (TME). The surgeon had performed more than 500 laparoscopic colectomies at the time. This case suggests that laparoscopic TME is an alternative technique for the treatment of malignancies in patients with SIT. However, many anatomical variations are possible in the procedure, which can complicate this goal. The lack of depth perception and spatial orientation when using traditional 2D imaging is a recognized limitation of minimally

invasive surgery in comparison with open surgery. Conversely, 3D vision offers the advantage of improved depth perception and accuracy comparable to open surgeries. As a minimally invasive surgical technique, 3D laparoscopic surgery facilitates more precise and easier operation compared with 2D laparoscopy.

The present patient is the first rectal cancer with SIT to undergo 3D-laparoscopic TME. Our case is also likely the first case in China. Because the depth perception provided by the 3D imaging system, aided visualization of critical vascular relationships and multiple tissue layers, such as ureter, seminal vesicle, female posterior vaginal wall, the operation was completed in 150 minutes with 50 mL of bleeding.

3D-laparoscopic total mesorectal excision (TME) in rectal cancer patient can provide better sense of depth to facilitate precise operation and, in turn, shorten the operation time. Thus, 3D-laparoscopic systems should improve minimally invasive surgery, and enable more complex resections to be performed in the future.

A large series of 3D-laparoscopic radical resection for rectal cancer have recently been reported. The reports demonstrated that 3D-laparoscopic surgery for rectal cancer is a safe and feasible alternative procedure in laparoscopic surgery. As exemplified by our patient, 3D-laparoscopic surgery can be successfully used to treat rectal cancer in SIT patients.

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