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ABOUT COVER

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The primary aim of *World Journal of Gastrointestinal Endoscopy* (WJGE, *World J Gastrointest Endosc*) is to provide scholars and readers from various fields of gastrointestinal endoscopy with a platform to publish high-quality basic and clinical research articles and communicate their research findings online.

WJGE mainly publishes articles reporting research results and findings obtained in the field of gastrointestinal endoscopy and covering a wide range of topics including capsule endoscopy, colonoscopy, double-balloon enteroscopy, duodenoscopy, endoscopic retrograde cholangiopancreatography, endosonography, esophagoscopy, gastrointestinal endoscopy, gastroscopy, laparoscopy, natural orifice endoscopic surgery, proctoscopy, and sigmoidoscopy.

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Laparoscopy-assisted resection of colorectal cancer with situs inversus totalis: A case report and literature review

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Abstract

BACKGROUND

Situs inversus totalis (SIT) is a rare anomaly in which structures are located opposite to their usual positions. It is not a premalignant condition and the association with colorectal cancer (CRC) is rare. We here report a patient with SIT who underwent laparoscopic radical resection of sigmoid colon cancer, and review the pertinent literature.

CASE SUMMARY

A 53-year-old woman presented with CRC and SIT and underwent a complete examination after admission. The patient then underwent laparoscopic radical resection of sigmoid colon cancer and hyperthermic intraperitoneal chemotherapy. The operation duration was 120 min, and no intraoperative complications occurred. The final pathological report showed stage T4aN0M0. Postoperative chemotherapy was administered and no evidence of recurrence was observed during 18 mo of follow-up.

CONCLUSION

Surgery in a patient with CRC and SIT can be safely performed on the basis of routine preoperative clinical examination.

Key Words: Colorectal cancer; Situs inversus totalis; Hyperthermic intraperitoneal chemotherapy; Case report

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Core Tip: Situs inversus totalis is a rare anomaly in which structures are located opposite to

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their usual positions. It is not a premalignant condition and the association with colorectal cancer is rare. We here report a case and review the literature. In sum, a 53-year-old woman presented with colorectal cancer and situs inversus totalis and underwent a complete examination after admission. The patient then underwent laparoscopic radical resection of sigmoid colon cancer and hyperthermic intraperitoneal chemotherapy. The final pathological report showed stage T4aN0M0. Postoperative chemotherapy was administered and no evidence of recurrence was observed during 18 mo of follow-up.

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INTRODUCTION

Situs inversus totalis (SIT) refers to the complete reversal of unpaired tissues and organs in the thoracic and abdominal cavity. It is an extremely rare congenital disease with an incidence of approximately 1/4000-8000^[1]. According to statistics, the incidence of intestinal cancer is about 376.3/100000, and patients with intestinal cancer and visceral transposition are even rare. When lesions of internal organs in the reverse position occur, patients are easily misdiagnosed if imaging data are not available. We here report a patient with complete visceral transposition combined with sigmoid colon cancer. To the best of our knowledge, this is the first case report of sigmoid colon cancer associated with SIT in China. We also review the relevant literature and discuss the diagnosis and treatment of this patient.

CASE PRESENTATION

Chief complaints

In December 2017, a 53-year-old woman was admitted to our hospital due to lower abdominal discomfort for 1 wk.

History of present illness

The patient's symptoms started a week ago with recurrent lower abdominal discomfort, which had been worsened the last 24 h.

History of past illness

The patient had a free previous medical history.

Physical examination

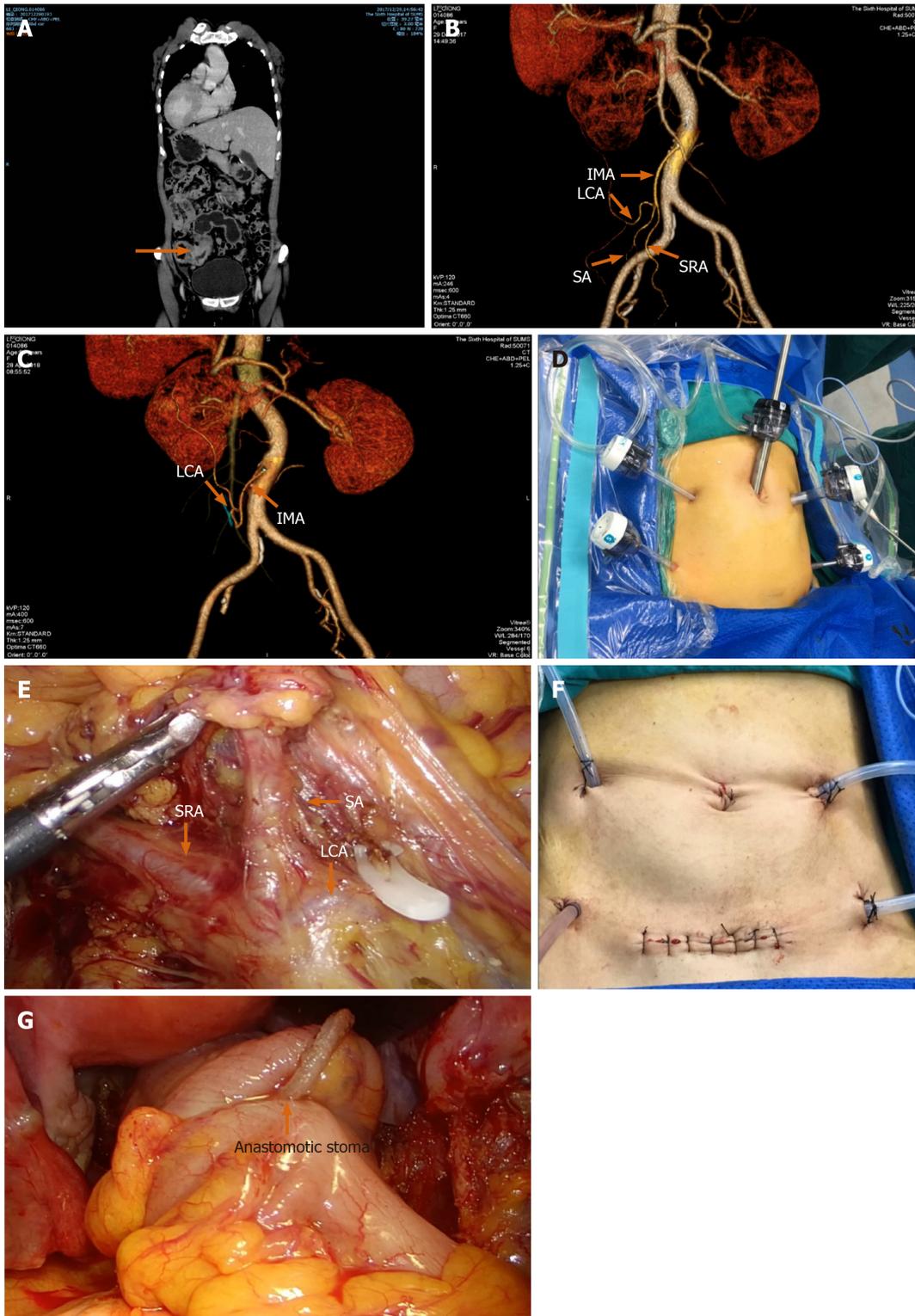
Initial vital signs were stable, and a systemic review and physical examination revealed nothing of note. However, the apex beat of her heart was located in the fifth intercostal space of the right clavicle midline.

Laboratory examinations

Serum carcinoembryonic antigen level was elevated (68.5 ng/mL; reference range, 0-5.0 ng/mL).

Imaging examinations

Colonoscopy revealed an obstructing sigmoid mass. Histological examination of the biopsied specimen indicated a moderately differentiated adenocarcinoma. Preoperative thoracic and abdominal enhanced computed tomography showed a complete right-left reversal of the thoracic and abdominal organs, sigmoid colon wall thickening, and the surrounding mesentery scattered with lymph nodes around the primary tumor (Figure 1A). A three-dimensional vascular reconstruction technique was used to observe the anatomy and variation of mesenteric vessels, and the anatomy of the vascular arch was clearly displayed (Figure 1B and C).



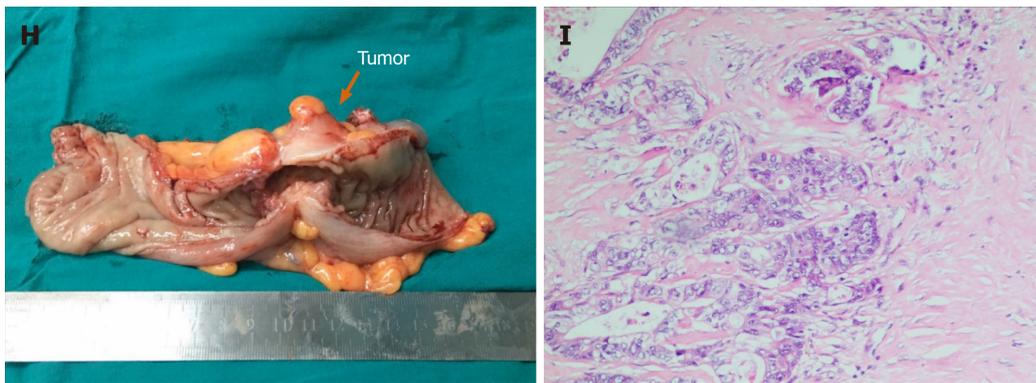


Figure 1 Images of computed tomography, operation, and histopathological examination. A: Computed tomography showing transposition of the abdominal; B: Three-dimensional reconstruction image of computed tomography angiography showing three branches of the inferior mesenteric artery, left colic artery, sigmoid artery, and superior rectal artery; C: Postoperative three-dimensional reconstruction of computed tomography angiography; D: Sites of trocar placement. A camera was inserted into the subumbilical area through a 12-mm trocar; the 12-mm trocar marked indicates the main operation hole; E: Exposure of each blood vessel during operation; F: The anastomotic stoma; G: Placement of a perfusion tube for hyperthermic intraperitoneal chemotherapy; H: Resected specimen showing a ulcerated mass in sigmoid colon; I: Histopathological examination. IMA: Inferior mesenteric artery; LCA: Left colic artery; SA: Sigmoid artery; SRA: Superior rectal artery.

FINAL DIAGNOSIS

The final diagnosis was CRC with SIT.

TREATMENT

On January 5, 2018, under general anesthesia, laparoscopic radical sigmoidectomy was performed and hyperthermic intraperitoneal chemotherapy was administered twice (Figure 1D and G). The surgical method of low ligation in combination with highly selective lymph node dissection was adopted to preserve the left colic artery in order to lower the postoperative incidence of anastomotic fistula. Postoperative pathological staging was T4aN0M0 based on the criteria proposed by the International Union Against Cancer (Figure 1H and I).

OUTCOME AND FOLLOW-UP

The patient recovered well after surgery, and regular chemotherapy (mFOLFOX6) was performed 8 times. During the regular 18 mo of follow-up, no tumor recurrence was observed and the patient's general condition was good.

DISCUSSION

We searched the compact disc read-only memory database of Chinese biomedical literature and the PubMed-indexed for MEDLINE search system to retrieve reports on visceral transposition combined with intestinal cancer published from January 2000 to May 2019. The Chinese search terms used were "visceral transposition" and "intestinal cancer", and the English search terms used were "colorectal cancer" and "situs inversus". Finally, 2 Chinese articles and 11 English articles were identified (Table 1)^[1-13].

Visceral transposition can be divided into complete visceral transposition and partial visceral transposition. Patients with complete visceral transposition are known as "mirror people" and are extremely rare^[14]. Some patients with visceral transposition often present with other complex malformations. The incidence of visceral transposition varies in different regions. In Japan, the incidence of visceral transposition is 0.125‰ to 0.250‰. Yang *et al*^[15] reported that the incidence rate was 0.005‰ to 0.010‰ in China. Several reports of the combination of a malignant tumor and SIT, such as cancer of the liver, stomach, lung, and colon, have been described. Only 2 cases of laparoscopy-assisted resection of CRC have been reported in China^[2,3].

Table 1 Summary of cases with complete transposition of viscera combined with intestinal cancer

Ref.	Publication time	Number of examples	Sex/Age (yr)	Tumor location	Pathological examination	Therapy	Prognosis
Fang <i>et al</i> ^[2]	2014	1	Female/39	Rectum	Moderately differentiated adenocarcinoma	Laparoscopic surgery	Good
Xu <i>et al</i> ^[3]	2018	1	Female/67	Colon ascendens	Medium-poor differentiated adenocarcinoma	Laparoscopic surgery	Good
Takeda <i>et al</i> ^[4]	2018	1	Female/72	Colon sigmoideum	Moderately differentiated adenocarcinoma	Laparoscopic surgery	Good
Sasaki <i>et al</i> ^[5]	2017	1	Female/75	Colon ascendens	Moderately differentiated adenocarcinoma	Laparoscopic surgery	Good
Yaegashi <i>et al</i> ^[6]	2015	1	Female/71	Colon sigmoideum	Well differentiated adenocarcinoma	Laparoscopic surgery	Good
Ito <i>et al</i> ^[7]	2015	2	Female/53; Male/60	Rectum Ascending colon cancer	Moderately differentiated adenocarcinoma	Laparoscopic surgery	Good
Hirano <i>et al</i> ^[8]	2015	1	Male/87	Carcinoma of the cecum	Moderately differentiated adenocarcinoma	Laparoscopic surgery	Good
Sumi <i>et al</i> ^[9]	2013	1	Male/83	Carcinoma of the descending colon	Moderately differentiated adenocarcinoma	Laparoscopic surgery	Good
Kim <i>et al</i> ^[10]	2011	1	Male/63; Female/71	Colon cancer of the hepatic flexure	Moderately differentiated adenocarcinoma	Laparoscopic surgery	Good
Han <i>et al</i> ^[11]	2011	1	Male/63	Ascending colon cancer	Moderately differentiated adenocarcinoma	Laparoscopic surgery	Good
Fujiwara <i>et al</i> ^[12]	2007	1	Female/53	Ascending colon cancer	Moderately differentiated adenocarcinoma	Laparoscopic surgery	Good
Goi <i>et al</i> ^[13]	2003	1	Female/72	Ascending colon cancer	Moderately differentiated adenocarcinoma	Laparoscopic surgery	Good
Viscott <i>et al</i> ^[14]	2011	1	Female/71	Rectal carcinoma gastric cancer	Moderately differentiated adenocarcinoma	Laparoscopic surgery	Good

The patient described here had sigmoid colon cancer and underwent laparoscopic radical surgery and postoperative intraperitoneal hyperthermic perfusion chemotherapy. The procedure was uneventful, and no tumor recurrence was found after 18 mo of follow-up.

To date, the mechanism of visceral translocation is still unclear, and some scholars believe that it is related to fetal ectopic and chromosomal abnormalities during embryonic development^[16]. Whether internal visceral translocation is related to tumor onset is still inconclusive. Studies have shown that there may be a correlation between internal visceral translocation and tumor onset; however, further research is needed^[17]. Due to the different pathological types and tumor sites, the clinical manifestations of patients vary, especially in patients with visceral transposition, which is prone to misdiagnosis. Therefore, comprehensive examinations should be completed, such as gastrointestinal endoscopy, computed tomography, and revascularization.

As internal visceral transposition is often accompanied by congenital anatomic abnormalities, surgery can be challenging. The main difficulty is distinguishing the blood vessels. In this case, the main branch vessels supplying the intestine were clearly distinguished by revascularization before surgery, which provided a guarantee for a smooth surgical procedure. In addition, it is necessary to consider the handedness of the surgeon to determine the position of the device, operator, and trocars. Oms and other researchers have found that laparoscopic techniques in visceral transposition patients are more difficult for right-handed surgeons, and are more advantageous for left-handed surgeons^[18]. The same effect can be achieved by changing the position of the operator during surgery^[6].

For the diagnosis and treatment of patients with visceral transposition combined with gastrointestinal cancer, the possibility of visceral inversion should always be considered. The presence of cardiopulmonary disease should be eliminated to ensure a smooth surgical procedure. Relevant imaging examinations should be improved, and if necessary, revascularization should be performed to determine whether there are obvious vascular variations. An understanding of the anatomical location and variation involved in the operation is essential, and research on the surgical approach

and possible problems during surgery should be conducted. Compared with traditional laparotomy, laparoscopic techniques have minimally invasive benefits for patients while also presenting challenges. With the continuous development of technology, there will be a further understanding of the diagnosis and treatment of patients with visceral transposition, especially those with tumor diseases. In addition, because patients with stage T4 are prone to postoperative peritoneal metastasis, hyperthermic intraperitoneal chemotherapy and adjuvant chemotherapy were used to prevent tumor peritoneum relapse^[19].

CONCLUSION

CRC and SIT can be diagnosed according to colonoscopy and imaging examination. Radical resection is the most effective method for treating CRC. A clear diagnosis before surgery can reduce the risk of surgery.

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