Case Report

Single-incision Plus One-port Laparoscopic Sigmoidectomy in Situs Inversus Totalis: A Case Report and Literature Review

Yun Lee
Kuen-Lin Wu
Hong-Hwa Chen
Ko-Chao Lee
Division of Colorectal Surgery, Department of Surgery, Kaohsiung Chang Gung Memorial Hospital, Kaohsiung, Taiwan

Key Words
Situs inversus totalis;
Colorectal cancer;
Laparoscopic colectomy;
Sigmoidectomy

Situs inversus totalis (SIT) is a rare congenital autosomal recessive hereditary disease characterized by complete inversion of the thoracic and abdominal viscera. As a result, surgical procedures are considered more difficult in patients with SIT owing to the mirrored image of the anatomy, especially in laparoscopic surgery.
Herein, we report a case of SIT in a patient diagnosed with sigmoid colon cancer, that was treated with single-incision plus one-port laparoscopic sigmoidectomy. The patient was discharged on post-operative day 5 without any complication. Single-incision plus one-port laparoscopic anterior resection for SIT patient with colorectal cancer is safe and feasible when performed by a skilled surgeon with fully understanding of the anatomy.
[*J Soc Colon Rectal Surgeon* (*Taiwan*) *2020;31:60-65*]

Situs inversus totalis (SIT) is a rare congenital condition characterized by complete inversion of the thoracic and abdominal viscera, with an incidence rate of only 1 in 5000-20,000 persons, and co-occurrence of SIT and colon cancer is even rarer.[1-3] Accordingly, surgical procedures are considered more difficult in patient with SIT because of the different anatomic positions of the viscera, especially in laparoscopic operation.

Nowadays, laparoscopic colorectal surgery (LCS) is the common procedure for colorectal cancer, but only few patients with SIT treated with laparoscopic colectomy are reported in the literature. We herein report a case of a SIT patient with sigmoid colon cancer who underwent laparoscopic high anterior resection.

Case Report

A 57-year-old man had a medical history of acute appendicitis treated with appendectomy via a McBurney incision 30 years ago prior. Mirror-image transposition of the thoracic and abdominal viscera was observed during the appendectomy. His body mass index was 29 kg/m^2.

He experienced a from small caliber stool, change of bowel habit and hematochezia over the earlier few months. No associated symptoms including poor appetite neither body weight loss were noted. Colonoscopy revealed a 5 cm polypoid tumor at the sigmoid colon (Fig. 1) approximately 15 cm from the anal verge, which was diagnosed using biopsy as adenocarcinoma. Chest plain radiography and abdominal

Received: August 13, 2019. Accepted: October 28, 2019.
Correspondence to: Dr. Ko-Chao Lee, Division of Colorectal Surgery, Department of Surgery, Kaohsiung Chang Gung Memorial Hospital and Chang Gung University College of Medicine, Kaohsiung 83301, Taiwan. Tel: 886-7-731-7123; Fax: 886-7-731-8762; E-mail: kmch4329@gmail.com

computed tomography (CT) revealed dextrocardia and complete right and left inversion of the abdominal viscera (Fig. 2), and a no distant metastasis was found, clinical staging as T3N0-1. We determined that curative operation with laparoscopic sigmoidectomy was feasible. Preoperative bowel preparation was performed.

Surgical procedure

With lithotomy, position, the patient was placed in the Trendelenburg position with a left-sided tilt (Fig. 3). Both the surgeon and the camera-operator stood on the patient's left side. The single-incision laparoscopic surgery (SILS) with an additional port was set. A hand-made glove port was inserted via an umbilical incision, and a 12-mm trocar was inserted in the left lower quadrant. Some bowel adhesion (Fig. 4) due to the previous operation was found and enterolysis was performed during the surgery. An ultrasonic scalpel was used for the dissection. The inferior mesentery vessels were sealed with an endoclip from root of the vessle (Fig. 5) and complete the D3 lymph node dissection. The distal intestine stump was divided using

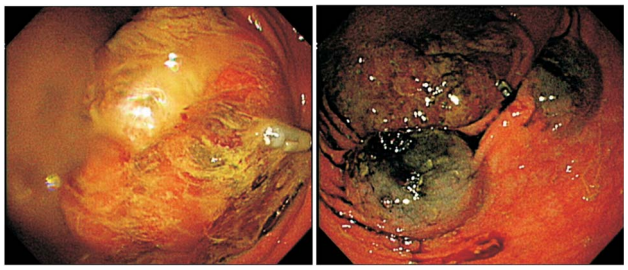

Fig. 1. Colonoscopic image showing a huge polypoid tumor in the sigmoid colon.

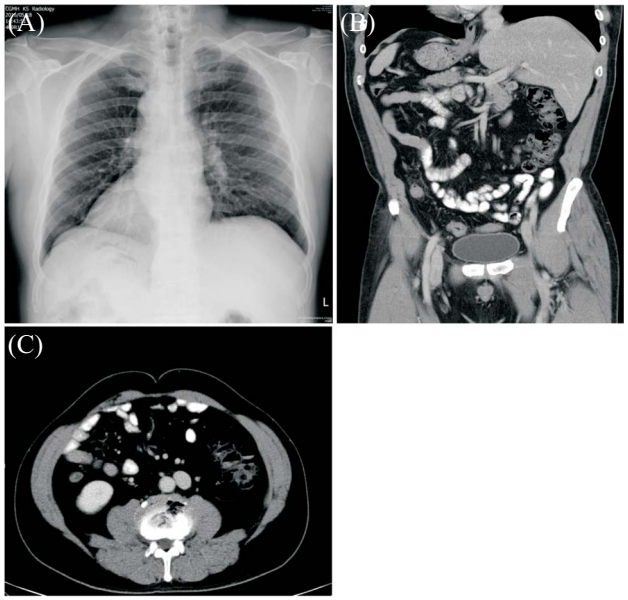

Fig. 2. (A) Chest radiograph showing dextrocardia. (B) Abdominal computed tomography image of complete right-left inversion of the abdominal viscera. (C) The IMA root dividing from the abdominal aorta.

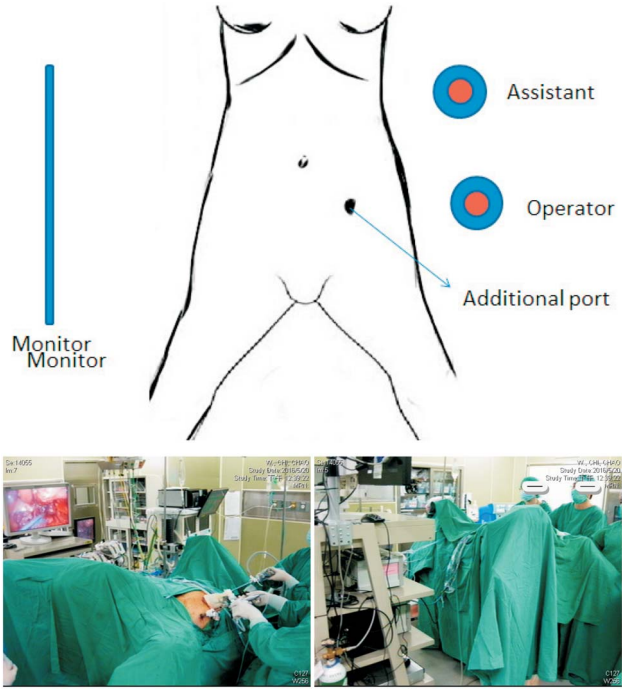

Fig. 3. Lithotomy in the Trendelenburg position with a left-sided tilt.

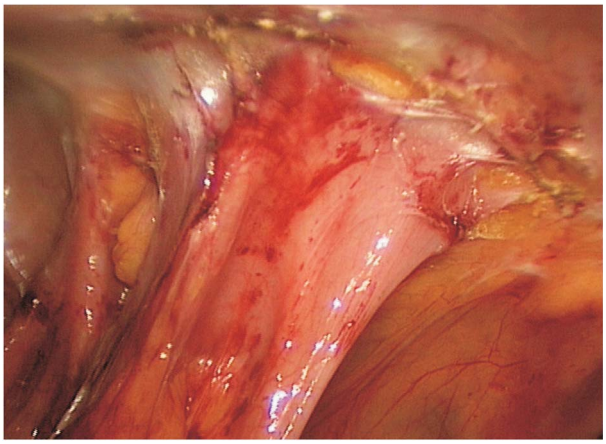

Fig. 4. Small bowel adhesion found during operation.

ECHELON FLEX-60. After mobilization of the descending and sigmoid colon, the specimen was extracted from the umbilical wound. Resection was performed extra-corporeally. Colo-rectal anastomosis was performed with an intra-luminal stapler (Fig. 6).

The bowel resection length was 15.2 cm, and 32 lymph nodes were harvested. The operation time was 347 minutes and the blood loss volume was 50 ml. The pathology report revealed an mucinous adenocarcinoma, pathology stage IIIB (pT3 N1a). The patient made a quick recovery and was discharged on post operative day 5. Postoperative follow-up did not reveal any complication

Discussion

SIT is a rare congenital condition with an incidence rate of 1 in 5000-20,000 persons, which may involve transposition of the thoracic viscera, abdominal viscera or both. SIT denotes a complete inversion of the thoracic and abdominal viscera.[1-3] Apart from genetic predisposition, no etiologies have been established, and SIT itself has no patho-physiological significance. Cardiovascular malformation (8%) and bronchiectasis (10%) are often present. With SIT, abnormal vascularization of the arteries and veins is common; therefore, preoperative confirmation of any abnormal vascularization is highly important.[3-5] Particularly with laparoscopic surgery, the presence of vascular anomalies must be detected on preoperative CT. Careful preoperative planning of the laparoscopic procedures (positions of operator and assistants, trocars sites and instrumentation) is needed, as mentioned in several previous reports of laparoscopic surgery in patients with SIT.[5-11]

Surgical procedures, especially laparoscopic procedures, are considered more difficult in patients with SIT than in other patients because of the mirror-image anatomy. Laparoscopic surgery in patients with SIT is a technical challenge for the surgeon because it is performed relatively rarely. A literature search for cause of malignancy with SIT revealed 10 cases of LCS (Table 1).[9] Several cases of SIT treated with LCS have been published.

In previous studies, LCS was considered more difficult in patients with SIT than in other patients because of the different position of the viscera. The authors suggested that a detailed preoperative study with abdominal CT or angiography and an exhaustive

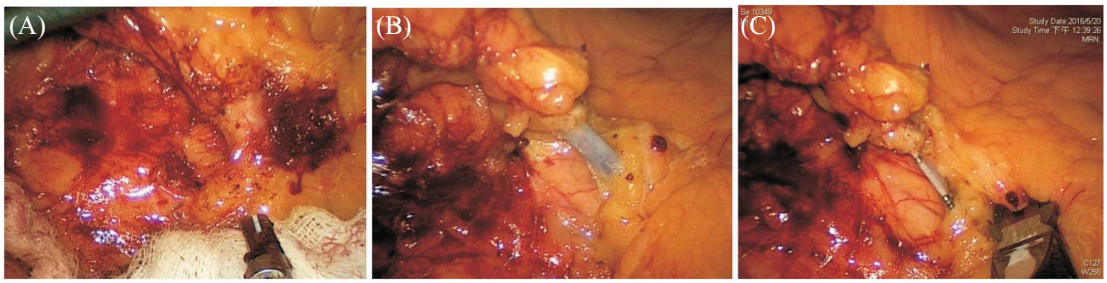

Fig. 5. (A) Inferior mesenteric artery. (B) Inferior mesenteric vein. (C) Ths inferior mesenteric vessel sealed with an endo-clip.

Fig. 6. Colo-rectal anastomosis performed with an intra-luminal stapler.

Table 1. Reports of laparoscopic colorectal surgery for colorectal cancer in patients with situs inversus totalis

Operation method (Laparoscopic)	First author	Year/ Country	Disease/age (years)/sex	Operation time (minutes)	Blood loss (ml)	No. of ports	Time of discharge after operation (days)	Complication
Hemicolectomy	Kazuhito Sasaki	2017/Japan	Colon cancer/ 75/female	109	10	5	9	None
Hemicolectomy	Maria Labalde Martinez	2017/Spain	Colon cancer/ 67/male	120	< 100	5	6	None
Hemicolectomy	Yushi Fujiwara	2007/Japan	Colon cancer/ 53/female	191	60	5	10	None
Hemicolectomy	Hye Jin Kim	2013/Japan	Colon cancer/ 83/male	402	230	6	16	None
Hemicolectomy	Seung-Seop Yeom	2011/Korea	Colon cancer/ 63/male	119	Minimal	4	7	None
Hemicolectomy	Mizunori Yaegashi	2018/Korea	Colon cancer/ 84/female	170	20	5	8	None
Sigmoidectomy	Jung Wook Huh	2015/Japan	Colon cancer/ 71/female	189	13	5	7	None
Total mesorectal excision	Jung Wook Huh	2010/Korea	Rectal cancer/ 41/female	250	120	5	8	None
Hemicolectomy	Yasumitsu Hirano	2014/Japan	Colon cancer/ 87/male	125	Negligible	SILS	16	None
Hemicolectomy	Yasuo Sumi	2017/Japan	Colon cancer/ 74/female	153	Negligible	SILS	8	None
Sigmoidectomy	Ko-Chao Lee	2019/Taiwan	Colon cancer/ 57/male	347	50	SILS+1	5	None

planning of the laparoscopic surgery are necessary.[5-11] The operative times and blood loss in most cases are comparative to those in patients without SIT.

SILS is more difficult and required longer operation time than the conventional laparoscopic operation due to the limited working space for the operator and assistant (camera operator). Adding an extra-port (SILS+1) is a better option than SILS, as insertion of one more port reduces the "sword fighting" between the camera operator and the surgeon.[4,10] However, surgical procedure with a totally "opposite" manipulation, a "right-handed" operator needs to deal fine movement with his or her left hand, and in particular the IMA. On the other hand, in this presented case, apart from the anatomic inversus, we encountered the challenges of obesity and severe adhesion (grade III or -IV), owing to the previous McBurney excision for appendectomy. Careful preoperative planning and recognition of the mirror-image anatomy are much more important in such cases than in patients undergoing a conventional colorectal surgery. Obviously, surgeon experience with the operation is an important factor for choosing the operation.

Conclusion

We present a case of SIT in a patient with a sigmoid colon cancer who underwent a single-incision plus one-port laparoscopic sigmoidectomy. This procedure is safe and feasible when performed by a skilled surgeon. Care must be taken to fully understand the transposition of the anatomy and preoperative planning of the laparoscopic surgery is necessary so that patients with SIT can fully benefit from the minimally invasive technique.

References

1. Mayo CW, Rice RG. Situs inversus totalis; a statistical review of data on 76 cases with special reference to disease of the biliary tract. *Arch Surg* 1949;58:724-30.

2. Varano NR, Meralin RJ. Situs inversus: review of the literature, report of four cases and analysis of the clinical implications. *J Int Coll Surg* 1960;33:131-48.
3. Fulcher AS, Turner MA. Abdominal manifestations of situs anomalies in adults. *Radiographics* 2002;22:1439-56.
4. Hirano Y, Hattori M, Douden K, Hashizume Y. Single-incision laparoscopic surgery for colon cancer in patient with situs inversus totalis: report of a case. *Indian J Surg* 2015; 77:26-8.
5. Kim HJ, Choi GS, Park JS, Lim KH, Jang YS, Park SY, et al. Laparoscopic right hemicolectomy with D3 lymph node dissection for a patient with situs inversus totalis: report of a case. *Surg Today* 2011;41:1538-42.
6. Oms LM, Badia JM. Laparoscopic cholecystectomy in situs inversus totalis: the importance of being left-handed. *Surg Endosc* 2013;17:1859-61.
7. Iwamura T, Shibata N, Haraguchi Y, Hisashi Y, Nishikawa T, Yamada H, et al. Synchronous double cancer of the stomach and rectum with situs inversus totalis and polysplenia syndrome. *J Clin Gastroenterol* 2001;33:148-53.
8. Huh JW, Kim HR, Cho SH, Kim CY, Kim HJ, Joo JK, et al. Laparoscopic total mesorectal excision in a rectal cancer patient with situs inversus totalis. *J Korean Med Sci* 2010;25: 790-3.
9. Sasaki K, Nozawa H, Kawai K, Hata K, Kiyomatsu T, Tanaka T, et al. Laparoscopic hemicolectomy for a patient with situs inversus totalis: a case report. *Int J Surgery Case Reports* 2017;41:93-6.
10. Lee WJ, Chan CP, Wang BY. Recent advances in laparoscopic surgery. *Asian J Endosc Surg* 2013;6:1-8.
11. Kim YW, Ryu H, Kim DS, Kim IY, et al. Double primary malignancies associated with colon cancer in patients with situs inversus totalis: two case reports. *J of Surgical Oncology* 2011;9:109.

病例報告

完全器官轉位病患接受單切口外加一孔之腹腔鏡乙狀結腸切除術之案例分享：病例報告及文獻回顧

李昀　吳昆霖　陳鴻華　李克釗

高雄長庚紀念醫院　外科部　大腸直腸外科

完全性器官逆位是一種少見的自體隱性遺傳疾病，胸腔及腹腔內的器官完全左右相反，呈現鏡像的表現。因此在臨床上疾病診斷及外科手術上伴隨相當程度的困難，尤其是在微創的腹腔鏡手術方面由是如此。

我們在此分享一位五十七歲男性，因排便習慣改變及血便等徵象求診，進一步大腸鏡檢查則發現乙狀結腸處一巨大腫瘤，切片檢查顯示為腺癌。在經過後續單切口外加一孔之腹腔鏡乙狀結腸切除，術後逐漸恢復正常活動及進食。臨床上無特殊併發症，於術後五天順利出院。

以這樣的病例而言，手術上困難的不只是單孔腹腔鏡手術空間上的限制，病人本身肥胖體型也對手術的時間存在影響。不過，在此我們認為，完全性器官逆轉位患者在接受手術上，經由完整術前評估及仔細影像上的規劃，由有經驗的外科醫師執行腹腔鏡手術是相對安全且適合的治療方式。

關鍵詞　器官轉位、大腸直腸癌、內視鏡結腸切除術、乙狀結腸切除術。