

# Laparoscopy-Assisted Distal Gastrectomy in a Patient With Situs Inversus Totalis

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## ABSTRACT

**Introduction:** We report on a patient with situs inversus totalis who underwent laparoscopic-assisted distal gastrectomy (LADG) involving standard lymph node dissection (LND) for early gastric cancer.

**Case Description:** A 42-y-old man presented at the Department of Internal Medicine in our hospital with the diagnosis of early gastric cancer detected elsewhere by upper endoscopy. Endoscopic submucosal dissection for this early gastric cancer was performed at our hospital. Histopathological examination of the resected specimen yielded the diagnosis of type 0-IIc, T1b1(SM), ly (+), v (-), UL (-), HM0, VM0, R0, according to the Japanese Classification of Gastric Carcinoma. Additional surgery was deemed necessary, and he was referred to our department. Preoperative computed tomography showed no liver or lung metastasis. The preoperative diagnosis was cStage IA (pT1b1, cN0, cH0, cP0, and cM0). Standard LADG with LND (D1+No.7, 8a, 9) was performed successfully. Histological examination disclosed stage IB (pT1b1, pN1, sH0, sP0, and sM0). The patient was discharged on postoperative day 14 after an uneventful postoperative course. Eighteen months after the operation, he is doing well without recurrent gastric cancer.

**Conclusion:** Laparoscopic surgery for gastric cancer with SIT should be considered a feasible, safe, and curative procedure.

**Key Words:** Situs inversus totalis, Laparoscopy-assisted distal gastrectomy, Gastric cancer.

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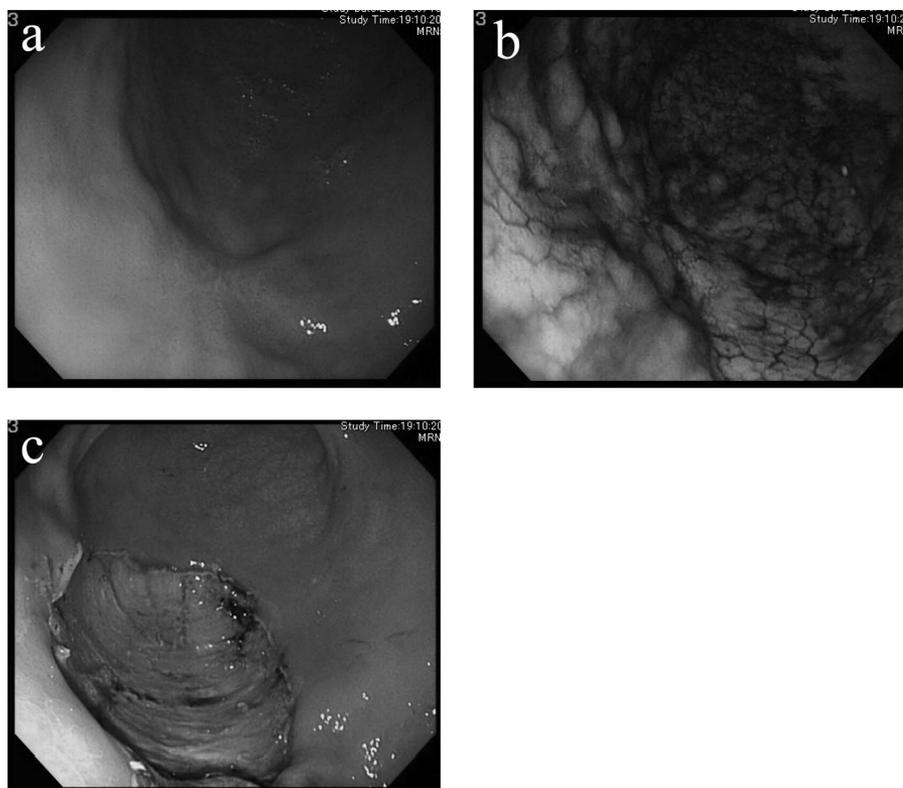
## INTRODUCTION

Situs inversus totalis (SIT) is a rare congenital anomaly with an incidence of only approximately 1 in 5,000 to 20,000 and denotes complete right-left inversion of thoracic and abdominal viscera.<sup>1</sup> Although laparoscopic experience in such patients often has been reported on, most reported cases are of laparoscopic cholecystectomy.<sup>1</sup> Reports of advanced laparoscopic surgeries are increasing in accord with progress in laparoscopic procedures. However, reports of laparoscopic surgery for malignancy in patients with SIT are very few, and only 4 such laparoscopic surgeries with lymphadenectomy have been reported in the English literature.<sup>2-6</sup> Of these, only 2 were of laparoscopic-assisted distal gastrectomy (LADG).<sup>5,6</sup> Here, we present the third case.

## CASE REPORT

A 42-y-old man with SIT visited the Department of Internal Medicine in our hospital with the previous diagnosis of early gastric cancer found by upper endoscopy (EGD). EGD performed at our hospital showed an irregularly shaped, slightly depressed lesion on the posterior wall of the antrum (**Figure 1A, B**), and the patient underwent endoscopic submucosal dissection (ESD) (**Figure 1C**). Histopathological examination of the resected specimen revealed a 0-IIc lesion that was a submucosal moderately differentiated adenocarcinoma, ly (+), v (-), UL (-), HM0, VM0, R0, according to the Japanese Classification of Gastric Carcinoma.<sup>6</sup> Because “ly(+)” is a risk factor for lymph node metastasis, additional surgery was recommended according to the Japanese Gastric Cancer Treatment Guidelines.<sup>7,8</sup> Thereafter, he visited our department, where he underwent a preoperative physical examination and laboratory tests, the results of which were normal.

Chest radiography showed dextrocardia from the frontal view (**Figure 2**). Upper gastrointestinal imaging (UGI) revealed a scar from past ESD at the greater curvature (**Figure 3**). Abdominal computed tomography (CT) showed that all organs inside the abdomen were inversely positioned (**Figure 4A**). Although the left hepatic artery was branched from the supramesenteric artery, courses of other blood vessels were normal (**Figure 4B**). Chest and

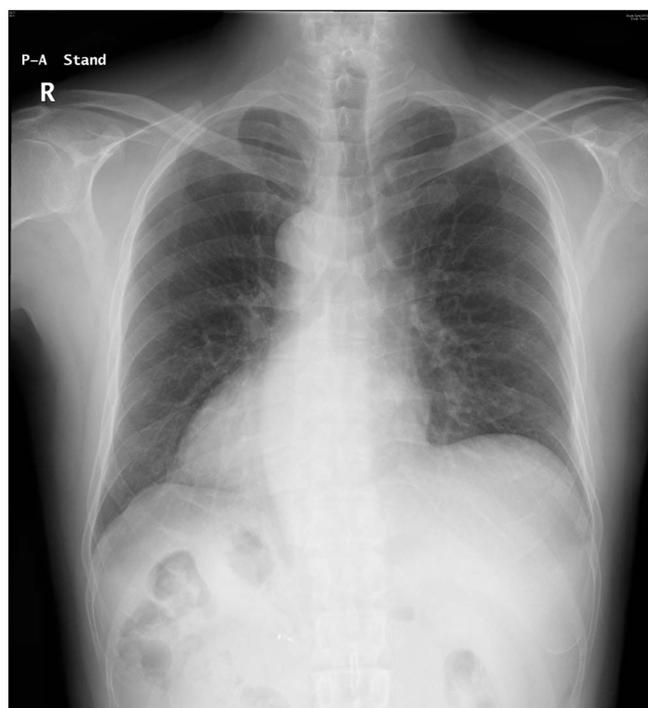


**Figure 1.** (A and B) Upper endoscopy shows an irregularly shaped, slightly depressed lesion on the posterior wall of the antrum. (C) Postendoscopic submucosal dissection.

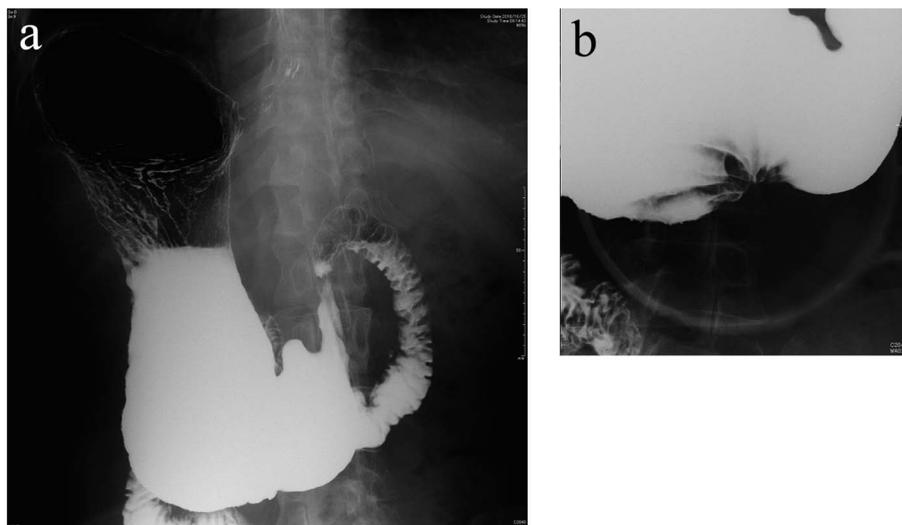
abdominal CT did not reveal any metastases, including those to the liver or lung. Based on findings of the histopathological examination, UGI, and CT, a 0-IIc lesion on the posterior wall of the antrum, post-ESD, invasion depth sm, pT1b1, cN0, cH0, cP0, cM0, stage IA was diagnosed according to the Japanese Classification of Gastric Carcinoma. LADG with standard lymph node dissection (LND) (D1+No. 7, 8a, 9) was performed in accord with the Japanese Gastric Cancer Treatment Guidelines.<sup>7,8</sup>

After general anesthesia was induced, the patient was placed in a supine position. First, a 12-mm trocar was placed, using Hasson's technique, in the umbilical site, and carbon dioxide was injected into the peritoneal cavity at 10 mm Hg. A laparoscope was inserted into the abdomen through the 12-mm trocar. An additional 5 ports were placed in the epigastric, left and right hypochondriac, and lateral abdominal regions (**Figure 5**). The surgeon was positioned on the left side of the patient for dissection of lymph node nos. 4sb, 5, 7, 8a, and 9 and was positioned on the right side for the dissection of lymph node no. 6. The positions of both the surgeon and assistant were opposite to their usual positions.

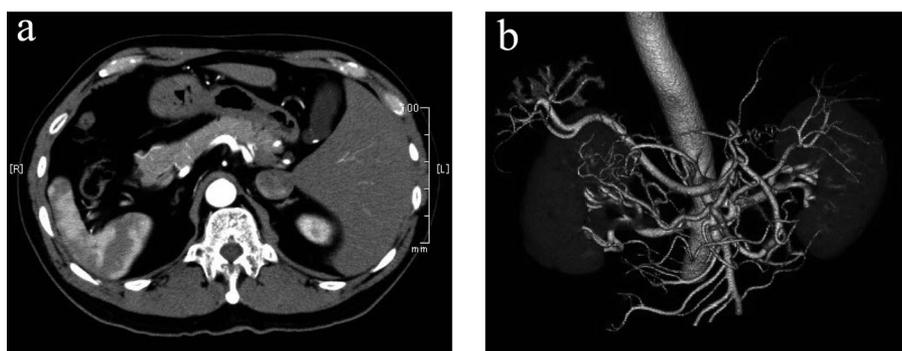
First, the great omentum was dissected. The spleen was confirmed, and the right gastroepiploic vessels were



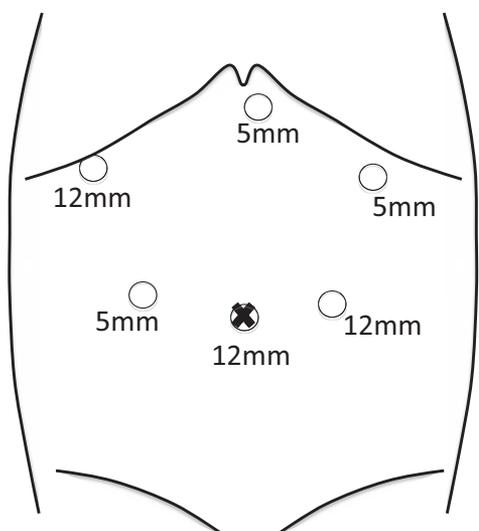
**Figure 2.** Dextrocardia is evident on chest radiography from the frontal view.



**Figure 3.** UGI imaging shows a scar of post-ESD at the greater curvature.

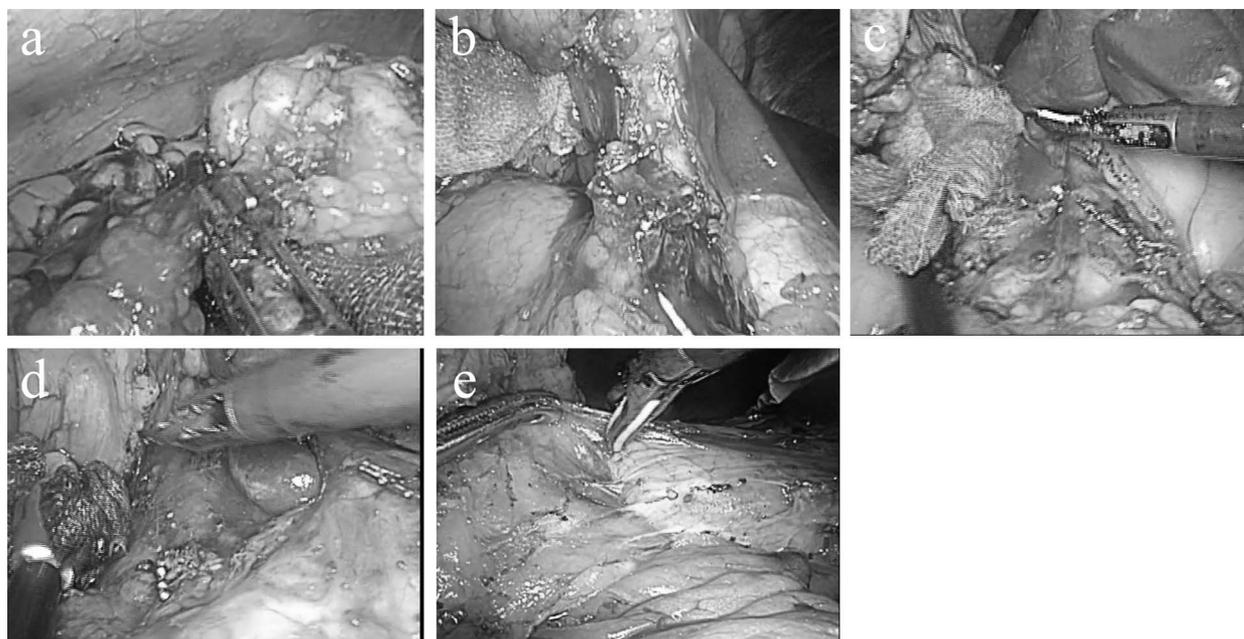


**Figure 4.** Abdominal CT. (A) CT shows that all organs inside of the abdomen were inversely positioned. (B) Left hepatic artery branched from the supramesenteric artery.



**Figure 5.** Sites of trocar placement: A camera was inserted into the subumbilical area through a 12-mm trocar.

clipped and incised. Consecutively, the area of lymph node no. 6 (infrapyloric lymph node) was dissected, and the duodenum was transected with a linear stapling device using a disposable gastrointestinal (GI) cartridge (Echelon 60; Ethicon Endo-Surgery, Inc., Cincinnati, OH) intraperitoneally. Areas of no. 5 (suprapyloric lymph node), no. 8a (lymph node along the common hepatic artery), no. 9 (lymph node around the celiac artery), no. 7 (lymph node along the left gastric artery), no. 1 (right pericardial lymph node), and no. 3 (lymph node along the lesser curvature) lymph nodes were dissected safely and completely in accord with Gastric Cancer Treatment Guidelines (**Figure 6**). Then, the extraperitoneal procedure was performed. After inflation was stopped, the incision of the epigastric region, where the trocar was inserted, was extended vertically to 5cm. Billroth I reconstruction was performed using a circular stapler (ECS29; Ethicon Endo-Surgery, Somerville, NJ). Operating time was 313 min, and blood loss was 90 mL.



**Figure 6.** Dissection of lymph nodes (**A** and **B**) Areas of no. 5 (suprapyloric lymph node). (**C**) Area of no. 6 (infrapyloric lymph node). (**D**) No. 8a (lymph node along the common hepatic artery), no. 9 (lymph node around the celiac artery), and no. 7 (lymph node along the left gastric artery). (**E**) No. 1 (right pericardial lymph node) and no. 3 (lymph node along the lesser curvature).

Histopathological examination showed an ulcer scar (post-ESD) in the posterior wall of the antrum and stage IB (pT1b1, pN1, sH0, and sM0).

After an uneventful postoperative course, the patient was started on a clear liquid diet on postoperative day 4 and was discharged on postoperative day 10. Currently, after a postoperative observation period of 18 mo, the patient is doing well without recurrent gastric cancer.

## DISCUSSION

Situs inversus (SI) is a rare congenital anomaly in which the organs are transposed from their normal site to the opposite side of the body. SIT denotes complete inversion of thoracic and abdominal viscera.<sup>9–11</sup> Apart from a genetic predisposition, no causes have been established. SI itself has no pathophysiologic significance,<sup>10,11</sup> although cardiovascular malformations (8%) and bronchiectasis (10%) are often present.<sup>12</sup> With SIT, abnormal vascularization of the arteries and veins are common; therefore, preoperative confirmation of any abnormal vascularization is very important, because abnormal vascularization involves the risk of misidentifying anatomy and unanticipated injury of important vessels in the LND. Particularly with laparoscopic surgery, it is essential to determine the presence of vascular anomalies by preoperative CT or

angiography, because with laparoscopic surgery, we cannot confirm directly the location of vessels by palpation.

In the report of Iwamura et al.<sup>10</sup> several cases having the combination of SIT and a malignant tumor, such as cancer of the lung, stomach, liver, colon, and rectum, were described. Only 2 cases of laparoscopic-assisted distal gastrectomy for gastric cancer complicated by SIT have been reported in the English literature.<sup>5,6</sup>

Surgical procedures, especially laparoscopic procedures, are considered more difficult in patients with SIT than in other patients because of the mirror-image anatomy. Thus, because laparoscopic surgery on patients with SIT presents technical challenges for the surgeon, it remains relatively rare. However, in our case, we encountered few technical difficulties in the laparoscopic procedure, because we had acquired images of the anatomy and paid attention to the fundamentals of laparoscopic procedures, such as the careful handling of devices and keeping the operating field dry. Accurate preoperative anatomic assessment and careful preoperative planning of laparoscopic procedures (e.g., positions of surgeon, assistants, and trocar sites as well as instrumentation) are needed to ensure a safe, smooth procedure.

In the case of laparoscopic surgery, a principal advantage is that the operating field is magnified, which is especially

helpful, for example, for visualizing vessels and nerves. Even in advanced surgery with radical lymphadenectomy in a patient with SIT, an accurate recognition of the patient's anatomy and careful adherence to the fundamentals of laparoscopic procedures can enable a safe operation without the distraction of a mirror-image anatomy. Laparoscopic surgery for gastric cancer with SIT thus should be considered a feasible, safe, and curative procedure that surgeons should not hesitate to perform.

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