

Minimally invasive Ivor Lewis esophagectomy in a patient with situs inversus totalis through a total of five ports

Situs inversus totalis hastasında toplam beş port ile minimal invaziv Ivor Lewis özofajektomisi

Sezer Aslan¹, Çağatay Çetinkaya¹, Ali Fuad Durusoy¹, Hasan Batirel¹

Department of Thoracic Surgery, Marmara University Faculty of Medicine, Istanbul, Turkey

ABSTRACT

Situs inversus totalis is inverse placement of intra-thoracic and abdominal organs identical with a mirror image. Herein, we present a rare case of situs inversus totalis and gastroesophageal junction carcinoma treated with minimally invasive Ivor Lewis esophagectomy. A 73-year-old male patient presented with dysphagia and a diagnosis of adenocarcinoma was made. He underwent three-port laparoscopic gastric conduit preparation without using a liver retractor. Esophageal mobilization in the chest was completed with biportal video-assisted thoracoscopic surgery technique and a completely side-to-side stapled anastomosis. The patient is still alive without recurrence four years after surgery. Minimally invasive Ivor Lewis esophagectomy can be performed in these cases; however, a careful planning and rethinking of the anatomy for correct intraoperative orientation are needed. Similar surgical and oncological outcomes are expected in this patient population.

Keywords: Esophagectomy, minimally invasive, situs inversus totalis.

Situs inversus totalis (SIT) is the inverse placement of the intra-thoracic and abdominal organs as a completely mirror image. It occurs due to a disorder in the looping stage of the embryonal development due to an unknown cause.^[1] Patients with SIT are mostly asymptomatic in daily life. It is recognized by physical examination and imaging for any reason. Herein, we present a rare case of locally advanced adenocarcinoma of the gastroesophageal junction (GEJ) who underwent minimally invasive Ivor Lewis esophagectomy (MI-ILE).

ÖZ

Situs inversus totalis, ayna görüntüsünde intratorasik ve abdominal organların ters yerleşimidir. Bu yazıda, minimal invaziv Ivor Lewis özofajektomisi ile tedavi edilen situs inversus totalis ve gastroözofageal kavşakta karsinomu olan nadir bir olgu sunuldu. Yetmiş üç yaşında erkek hasta disfaji ile başvurdu ve adenokarsinom tanısı kondu. Hastada karaciğer retraktörü kullanılmadan üç port laparoskopi ile gastrik conduit hazırlandı. Göğüste özofageal mobilizasyon, biportal video yardımcı torakoskopik cerrahi tekniği ve tamamen staplerle yan-yan anastomoz ile kapatıldı. Hasta ameliyattan dört yıl sonra nüks görülmeden hala hayattadır. Minimal invaziv Ivor Lewis özofajektomisi, bu hastalara yapılabilir; ancak titiz bir planlama ve ameliyat sırası doğru oryantasyon için anatominin gözden geçirilmesi gerekmektedir. Benzer cerrahi ve onkolojik sonuçlar, bu hasta popülasyonunda beklenebilir.

Anahtar sözcükler: Özofajektomi, minimal invaziv, situs inversus totalis.

CASE REPORT

A 73-year-old male patient with SIT was admitted to our clinic with progressive dysphagia within the last two months. He had history of 100 pack-year smoking, hypertension, bilateral hip replacement, and bilateral inguinal hernia surgery. Endoscopy and endoscopic ultrasound were performed. There was extensive fibrosis in mucosa on endoscopy and, therefore, biopsy was non-diagnostic. Barium swallow showed pseudoachalasia and tortuosity. Computed tomography (CT) showed a mass at the

Received: July 15, 2020 Accepted: September 15, 2020 Published online: January 28, 2022

Correspondence: Sezer Aslan, MD. Marmara Üniversitesi Tıp Fakültesi, Göğüs Cerrahisi Anabilim Dalı, 34899, Üst Kaynarca, Pendik, İstanbul, Türkiye.
Tel: +90 216 - 625 45 13 e-mail: sezeraslan012@gmail.com

Cite this article as:

Aslan S, Çetinkaya Ç, Durusoy AF, Batirel H. Minimally invasive Ivor Lewis esophagectomy in a patient with situs inversus totalis through a total of five ports. *Türk Göğüs Kalp Dama* 2022;30(1):132-135

©2022 All right reserved by the Turkish Society of Cardiovascular Surgery.

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes (<http://creativecommons.org/licenses/by-nc/4.0/>).

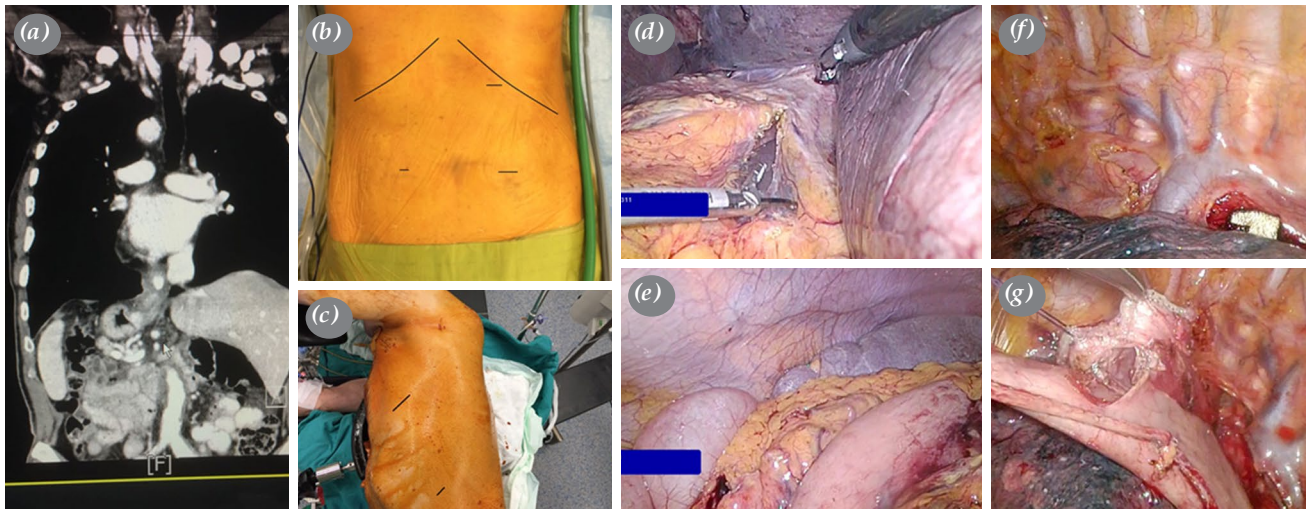


Figure 1. (a) Computed tomography section showing a mass at the gastroesophageal junction. (b) Laparoscopic port incisions; 5 mm right paramedian, 10 to 15 mm left paramedian and 10 to 12 mm left subcostal. (c) Thoracoscopic incisions; on the fifth intercostal space anterior axillary line and a second port on the eighth intercostal space posterior axillary line. (d) The gastrohepatic ligament is divided initially. (e) The greater curvature is freed while preserving the gastroepiploic artery. (f) Pleura over the esophagus is opened up to azygos vein over the pericardium, intermediate bronchus, and the carina. (g) Posterior wall anastomosis is completed for a double-barrel, completely stapled, side-to-side linear stapled intrathoracic anastomosis.

GEJ (Figure 1a) and positron emission tomography (PET)-CT showed an increase uptake (standard uptake value 8) only at the GEJ. Laparoscopic exploration was planned before the major surgery,

and serosa was opened and sample was taken directly from the tumor. Biopsy was diagnosed as adenocarcinoma of GEJ. Three weeks later, three-port laparoscopy was performed without using

Table 1. Review of literature data of patients with situs inversus totalis who underwent esophagectomy for esophageal cancer

Authors	Age of the patient (year)	Abdominal approach	Thoracic approach	Lymph nodes dissected (n)	Postoperative outcome	Survival
Singh et al. ^[2]	65	5 port laparoscopy	Access and 3 port VATS	20	Uneventful	Not described
Mimae et al. ^[3]	57	Laparotomy	Thoracotomy	Not described	Uneventful	22 months
Chinusamy et al. ^[4]	62	Laparoscopy	Prone VATS	Not described	Uneventful	18 months
Nakano et al. ^[5]	82 and 66	Hand-assisted laparoscopy	Prone 5 port VATS	Case 1: 49 Case 2: Not described	Uneventful	Not described
Ujje et al. ^[6]	63	Hand-assisted laparoscopy	6 port VATS	41	Uneventful	5 years
Yagi et al. ^[7]	73	Hand-assisted laparoscopy	Access and 5 port VATS-conversion to thoracotomy	19	Uneventful	12 months
Yoshida et al. ^[8]	57	Hand-assisted laparoscopy	Access and 5 port VATS	Not described	Died of liver and lung metastasis	3 months
Peel et al. ^[9]	67	5 port laparoscopy	VATS- port placement not described	43	Not described	Not described
<i>Current case</i>	73	3 port laparoscopy	Biportal VATS	24	Uneventful	4 years

VATS: Video-assisted thoracoscopic surgery.

a liver retractor (Figure 1b). Gastrohepatic ligament was divided (Figure 1c). Left gastric lymph nodes were dissected and vessels were divided with an endoscopic stapler. Hiatus was dissected 5 cm into the chest. The greater curvature was freed preserving the gastroepiploic artery (Figure 1d). A 4 to 5-cm gastric tube was formed and laparoscopy was completed.

The patient was placed in the right lateral decubitus position. Biportal approach was adopted, first on the fifth intercostal space anterior axillary line and second on the eighth intercostal space posterior axillary line (Figure 1b). The pleura was opened up to azygos vein over the pericardium, intermediate bronchus, and the carina anteriorly and posteriorly (Figure 2e). Azygos vein was divided with a vascular stapler. Esophagus was encircled with a Penrose drain. After the esophagus was completely mobilized, a completely stapled, double-barrel, side-to-side anastomosis was performed using endoscopic linear staplers (Figure 1f). Total surgical time and bleeding were 180 min and 70 mL, respectively. Postoperative course was uneventful and the patient was discharged on Day 7. The pathological examination revealed a T4aN0, well-differentiated adenocarcinoma with clear margins and 24 non-metastatic lymph nodes. He had a hiatal intra-thoracic herniation of colon and omentum three months postoperatively that was managed through a mini-laparotomy. The patient is still alive and well without recurrence four years after surgery. A written informed consent was obtained from the patient.

DISCUSSION

Situs inversus totalis is a rare anomaly in which all the intrathoracic and abdominal organs are transposed. In the literature, there are nine patients with SIT of which eight are case reports who underwent surgery for esophageal pathology and eight were performed minimally invasively and one in an open fashion (Table 1).^[2-9] Intrathoracic anastomosis was used for three cases, two with circular stapler and the other one was a semi-stapled, side-to-side anastomosis.^[2,7,9]

Minimally invasive esophagectomy is a complex procedure and, in case of a SIT, this is more challenging, as all the organs are located in different positions. Various types of esophagectomy were applied for patients with SIT cases in the literature, such as prone positioning and hand-assisted mobilization. In our case, we used

three-port laparoscopy and biportal video-assisted thoracoscopic surgery, which is probably one of the least invasive approaches.

The most challenging surgical situation is the different position of the anatomical landmarks during the operation. The surgeon's high concentration and experience in normal anatomy are major factors in making the surgery safer. Careful and safe recognition of mirror imaged anatomy and preoperative mind setting is important to plan the incisions and the approach. Preoperative advanced imaging is useful for preparation of the case.

In conclusion, our case demonstrates that minimally invasive Ivor Lewis esophagectomy can be safely performed in a patient with situs inversus totalis and offers an equivalent surgical outcome and survival. Preoperative planning and mind-setting, as well as stepwise intraoperative approach, are important to perform the surgery uneventfully.

Declaration of conflicting interests

Dr. Hasan Fevzi Batirel is a consultant with Johnson & Johnson and receives fees and honoraria, other authors have no financial interests.

Funding

The authors received no financial support for the research and/or authorship of this article.

REFERENCES

1. Spoon JM. Situs inversus totalis. *Neonatal Netw* 2001;20:59-63.
2. Singh G, Costa J, Bessler M, Sonett J. Minimally invasive Ivor Lewis oesophagogastrrectomy in a patient with situs inversus totalis. *Interact Cardiovasc Thorac Surg* 2016;22:235-7.
3. Mimae T, Nozaki I, Kurita A, Takashima S. Esophagectomy via left thoracotomy for esophageal cancer with situs inversus totalis: Report of a case. *Surg Today* 2008;38:1044-7.
4. Chinusamy P, Bansal S, Praveenraj P, Ramakrishnan P. Minimally invasive McKeown esophagectomy with modified three-field lymphadenectomy in case of situs inversus totalis with carcinoma mid esophagus. *J Minim Access Surg* 2016;12:68-70.
5. Nakano T, Kamei T, Onodera Y, Ujiiie N, Ohuchi N. Thoracoscopic surgery in the prone position for esophageal cancer in patients with situs inversus totalis: A report of two cases. *Int J Surg Case Rep* 2017;31:43-6.
6. Ujiiie N, Nakano T, Kamei T, Ichikawa H, Miyata G, Onodera K, et al. Thoracoscopic esophagectomy for esophageal cancer with situs inversus totalis: A case report and literature review. *Gen Thorac Cardiovasc Surg* 2016;64:359-62.
7. Yagi Y, Yoshimitsu Y, Maeda T, Sakuma H, Watanabe M, Nakai M, et al. Thoracoscopic esophagectomy and hand-assisted laparoscopic gastric mobilization for esophageal cancer with situs inversus totalis. *J Gastrointest Surg* 2012;16:1235-9.

8. Yoshida T, Usui S, Inoue H, Kudo SE. The management of esophageal cancer with situs inversus totalis by simultaneous hand-assisted laparoscopic gastric mobilization and thoracoscopic esophagectomy. *J Laparoendosc Adv Surg Tech A* 2004;14:384-9.
9. Peel J, Darling G. Left video-assisted thoracoscopic surgery esophagectomy in a patient with situs inversus totalis and Kartagener syndrome. *Ann Thorac Surg* 2014;98:706-8.