



Da Vinci Single-Port Robot-Assisted Cervical Esophagectomy as a Salvage Strategy in Esophagogastric Junctional Adenocarcinoma with Severe Right Fibrothorax: A Case Report

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Abstract

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Background: The incidence of esophagogastric junction (EGJ) adenocarcinoma, particularly Siewert type II tumors, has markedly increased in Western countries. While Ivor Lewis esophagectomy remains a standard approach for curative treatment, it may not be feasible in patients with hostile thoracic anatomy. This paper illustrates the successful management of Siewert II adenocarcinoma using a minimally invasive alternative when conventional thoracic access was not possible.

Case Presentation: A 65-year-old male with multiple comorbidities was diagnosed with a Siewert II EGJ adenocarcinoma (cT2N2M0). After four cycles of neoadjuvant FLOT chemotherapy, imaging showed partial response. Planned robotic-assisted minimally invasive esophagectomy (RAMIE) was initiated, but extensive right pleural adhesions and fibrothorax prevented thoracic access and single-lung ventilation. A transhiatal resection was considered oncologically inadequate due to limited lymphadenectomy and the inability to achieve an optimal control of the proximal margin, risking a non-curative resection (R+ resection). The operation was completed via da Vinci Single-Port Robot-Assisted Cervical Esophagectomy (SP RACE), allowing oncologic radicality without thoracic entry. Postoperative recovery was uneventful aside from minor complications — such as macrohematuria, urinary tract infection and atrial arrhythmia — managed pharmacologically. The patient was discharged in good clinical condition.

Conclusion: This case highlights the necessity of intraoperative flexibility and the value of advanced robotic platforms in achieving safe and radical outcomes under unexpected conditions in patients with esophageal cancer. SP RACE may be a viable and oncologically radical alternative in selected patients with contraindications to standard transthoracic approaches. Further studies are warranted to evaluate its role in complex esophageal cancer cases.

Keywords: Esophagogastric junction cancer; Esophageal cancer; Esophagectomy; Robotic surgery; Single port; RAMIE; RACE

Abbreviations

EGJ: Esophagogastric Junction; RAMIE: Robotic-Assisted Minimally Invasive Esophagectomy; SP RACE: da Vinci Single-Port Robot-Assisted Cervical Esophagectomy

Introduction

Particularly in Western countries, the incidence of esophagogastric junction (EGJ) adenocarcinoma has increased exponentially in recent decades [1]. Currently, EGJ adenocarcinomas are divided topographically into three groups according to the Siewert classification, based on the location of the tumor center in relation to the esophagogastric junction. Type I cancer has its

center 1-5 cm above the junction, type II has its center between 1 cm proximal and 1 cm distal to the EGJ, while type III has its center 1-5 cm distal to the junction [2]. This anatomical classification reflects the different etiologies and biological characteristics of Siewert type I and type III cancers. In fact, it has been extensively reported that Siewert type I tumors arise from Barrett's intestinal metaplasia, while Siewert type III cancers are associated with *H. pylori* infection and gastric atrophy [3]. However, for type II tumors, it is not possible to identify a single etiopathogenetic mechanism. Among EGJ adenocarcinomas, Siewert type II tumors are the most problematic in terms of the accurate identification of the biological subtype of the tumor and thus the selection of the most appropriate treatment [1,3].

Following neoadjuvant therapy, esophagectomy remains the primary curative treatment for esophageal and esophagogastric junction cancers [1,4]. Two-field esophagectomy has become the preferred procedure in many high-volume Western centers, due to the increasing prevalence of distal esophageal and EGJ tumors in Western countries [1,5–7]. However, in the case of Siewert II cancers the surgical approach consists of either an Ivor Lewis esophagectomy or gastrectomy and transhiatal distal esophagectomy with an exclusive abdominal approach [1]. Anyway, due to its practical complexity and high morbidity and mortality rates, esophagectomy is one of the most complex surgical procedures in general surgery [8].

In patients with a history of pulmonary disease (hemothorax, pleuritis, pneumonia, etc.), access to the right hemithorax, by open or minimally invasive approach, may be difficult or impossible due to the presence of a severe fibrothorax [9].

This case report presents the management of a patient with adenocarcinoma Siewert I candidate for Ivor Lewis esophagectomy. Access to the chest was not possible for a severe right fibrothorax so, we proceeded with *da Vinci* Single-Port Robot-Assisted Cervical Esophagectomy (SP RACE) [10]. This surgical procedure is based on previous cadaveric studies that demonstrated its complete technical feasibility [11–13]. In this paper we want to describe some technical details and analyze the validity of this approach of minimally invasive surgery even in difficult situations.

Case Presentation

A 65-year-old male patient, with a relevant medical history of atrial fibrillation (CHADS VASc score 4, HAS-BLED score 3), metabolic syndrome (BMI 40.76, hypertension, dyslipidemia), type 2 diabetes mellitus, benign prostatic hyperplasia with chronic urinary catheterization, and psychiatric comorbidities (paranoid schizophrenia and major depression), presented to the emergency department due to symptomatic anemia of unknown origin.

Upper endoscopy revealed an exophytic, substenosing and ulcerated lesion in the distal esophagus, located between 46 and 49 cm from the dental arcade, suspected for EGJ cancer at 49 cm (Figure 1a). Biopsies confirmed poorly differentiated adenocarcinoma PDL1 CPS 3, HER2 score 0 (Siewert II). The staging CT scans showed evidence of lymphadenopathy in both the mediastinum and abdomen without distant metastases for a clinical stage cT2N2M0 (according to the 8th edition of the American Joint Committee on Cancer (AJCC) [14].

After discussing the patient in our multidisciplinary oncologic board, he was scheduled for preoperative chemotherapy (FLOT). The four cycles were completed by the end of January 2025. At restaging (endoscopy and CT scan), partial response on both the primary lesion



Figure 1: Upper endoscopy before (a) and after (b) chemotherapy.

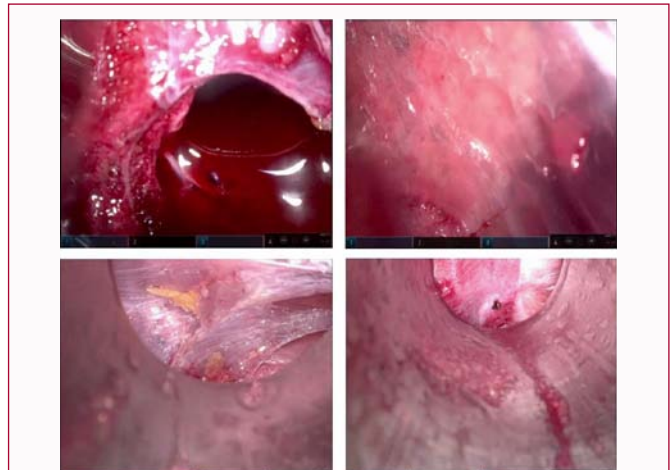


Figure 2: Fibrothorax found during multiple failed attempts to access the right chest.

and associated adenopathies was seen. Given that no further benefit of the chemotherapy was expected, surgical exploration was planned to assess the feasibility of RAMIE.

The operation began with the abdominal field, following the standard steps [15], resulting in the creation of the gastric conduit for the reconstruction of the esophagus. The procedure was completed without intraoperative complications.

In contrast, due to extensive pleural adhesions (fibrothorax) (Figure 2), access to the right thoracic cavity was very difficult and the RAMIE strategy was abandoned. The surgical procedure was completed the following day using a SP RACE approach. This approach has already been described in another work by *Hadzijušufovic E et al.* [10]. The key steps of the surgery are summarized in Video 1. The digestive continuity was restored by a hand-sewn, end-to-end esophagogastric anastomosis performed extracorporeally.

Postoperative recovery was affected by macrohematuria, urinary tract infection due to *P. aeruginosa*, and one episode of atrial tachyarrhythmia managed with beta-blockers.

The patient was monitored in the ICU, where he remained hemodynamically stable and clinically compensated. He was subsequently transferred to the ward for ongoing postoperative surveillance and clinical follow-up and discharged on 11th postoperative day.

Discussion

The surgical procedure was marked by a significant practical challenge during the thoracic phase: the inability to access the right thoracic cavity. However, the difficulties encountered were not limited

to practical aspects, related to technical complexity of the surgery; it was also necessary to ensure oncologic radicality by achieving an adequate proximal margin and performing an appropriate thoracic lymphadenectomy, all while taking the patient's comorbidities and overall clinical condition into consideration.

Given the intraoperative findings and the resources available, two potential surgical strategies were considered: resection of the distal esophagus via a transhiatal approach to avoid the thoracic phase, or an Ivor-Lewis esophagectomy.

The transhiatal approach was initially evaluated. Although this approach would have enabled continuation of the procedure without requiring single-lung ventilation, it did not guarantee an adequate proximal resection margin. In fact, intraoperative assessment showed a greater spread of the tumor towards the proximal esophagus than previously suggested by the last endoscopic evaluation (Figure 1b). Furthermore, the transhiatal approach would have limited the ability to perform an appropriate mediastinal lymphadenectomy, thereby compromising oncologic radicality.

Several attempts to access the right chest for robotic trocar placement were made without success. A subsequent mini-thoracotomy similarly failed to provide adequate exposure. It became evident that the thoracic cavity was surgically inaccessible due to the presence of severe fibrothorax.

To overcome the challenges encountered, the single viable solution was the SP RACE procedure. This surgical approach resolved all challenges, allowing for a procedure that was simultaneously safe for the patient and oncologically valid.

Conclusion

This case report highlights the critical importance of surgical adaptability when confronted with unexpected intraoperative challenges. The inability to access the right thoracic cavity due to severe fibrothorax, combined with the need to guarantee oncologic radicality, necessitated a re-evaluation of the surgical strategy and SP RACE was a viable alternative. This report also demonstrates that the ongoing development of advanced robotic platforms can provide innovative solutions to complex surgical problems, particularly in patients with hostile thoracic anatomy, unfit for transthoracic approach.

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MM wrote the manuscript. MM, VJL, and PPG conceptualized the study, analyzed and interpreted the procedure. VJL and PPG participated in writing of the manuscript. MM, EH, VJL and PRG collected data, edited and analyzed data. PRG participated in conceptualization and methodology. VJL and PPG supervised and reviewed the manuscript. All authors have read and agreed to the final version of the manuscript.

References

- Giacopuzzi S, Bencivenga M, Weindelmayer J, Verlato G, de Manzoni G. Western strategy for EGJ carcinoma. *Gastric Cancer*. 2017;20(Suppl 1):60-68.
- Siewert JR, Stein HJ. Classification of adenocarcinoma of the oesophagogastric junction. *Br J Surg*. 1998;85(11):1457-9.
- McColl KE, Going JJ. Aetiology and classification of adenocarcinoma of the gastro-oesophageal junction/cardia. *Gut*. 2010;59(3):282-4.
- Mariette C, Markar SR, Dabakuyo-Yonli TS, Meunier B, Pezet D, Collet D, et al. Hybrid Minimally Invasive Esophagectomy for Esophageal Cancer. *N Engl J Med*. 2019;380(2):152-162.
- Carneiro F, Moutinho C, Pera G, Caldas C, Fenger C, Offerhaus J, et al. Pathology findings and validation of gastric and esophageal cancer cases in a European cohort (EPIC/EUR-GAST). *Scand J Gastroenterol*. 2007;42(5):618-27.
- Hasegawa S, Yoshikawa T. Adenocarcinoma of the esophagogastric junction: incidence, characteristics, and treatment strategies. *Gastric Cancer*. 2010;13(2):63-73.
- Obermannová R, Alsina M, Cervantes A, Leong T, Lordick F, Nilsson M, et al. Oesophageal cancer: ESMO Clinical Practice Guideline for diagnosis, treatment and follow-up. *Ann Oncol*. 2022;33(10):992-1004.
- Kassis ES, Kosinski AS, Ross P Jr, Koppes KE, Donahue JM, Daniel VC. Predictors of anastomotic leak after esophagectomy: an analysis of the society of thoracic surgeons general thoracic database. *Ann Thorac Surg*. 2013;96(6):1919-26.
- Misthos P, Kakaris S, Sepsas E, Athanassiadi K, Skottis I. Surgical management of late postpneumonectomy bronchopleural fistula: the transsternal, transpericardial route. *Respiration*. 2006;73(4):525-8.
- Hadzijušufovic E, Lozanovski VJ, Griemert EV, Bellaio L, Lang H, Grimminger PP. Single-Port *da Vinci* Robot-Assisted Cervical Esophagectomy: How to Do It. *Thorac Cardiovasc Surg*. 2024;72(8):654-658.
- Van der Sluis P, Egberts JH, Stein H, Sallum R, van Hillegersberg R, Grimminger PP. Transcervical (SP) and Transhiatal DaVinci Robotic Esophagectomy: A Cadaveric Study. *Thorac Cardiovasc Surg*. 2021;69(3):198-203.
- Wedel T, Heinze T, Möller T, van Hillegersberg R, Bleys RLAW, Weijs TJ, et al. Surgical anatomy of the upper esophagus related to robot-assisted cervical esophagectomy. *Dis Esophagus*. 2021;34(12):doaa128.
- Grimminger P P, van der Sluis P C, Stein H, Lang H, van Hillegersberg R, Egberts JH. Feasibility of transcervical robotic-assisted esophagectomy (TC-RAMIE) in a cadaver study-a future outlook for an extrapleural approach. *Appl Sci (Basel)* 2019;9:3572.
- Rice TW, Patil DT, Blackstone EH. 8th edition AJCC/UICC staging of cancers of the esophagus and esophagogastric junction: application to clinical practice. *Ann Cardiothorac Surg*. 2017;6(2):119-130.
- Egberts JH, Schlemminger M, Hauser C, Beckmann JH, Becker T. Robot-assisted cervical esophagectomy (RACE procedure) using a single port combined with a transhiatal approach in a rendezvous technique: a case series. *Langenbecks Arch Surg*. 2019;404(3):353-358.