

Case Report

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# Gastric Conduit Cancer following Ivor-Lewis Esophagectomy for Esophageal Adenocarcinoma: A Case Report and Literature Review

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## Keywords

Esophageal cancer · Surgery · Gastric conduit cancer · Tumor recurrence · Surveillance

## Abstract

The incidence of gastric cancer associated with esophageal cancer is notably high. In recent years, there has been an increase in patients with gastric conduit cancers due to early detection and radical treatment of esophageal cancer, leading to prolonged survival of the patients. Metachronous gastric cancer following esophagectomy sometimes can pose a clinical challenge for surgeons, while gastric tube reconstruction is a well-established procedure accompanying esophagectomy, treating gastric cancer within the gastric tube can be difficult in contrast. Surgical treatment of gastric tube cancers is often complex and life-threatening. Early detection of gastric tube cancer is crucial for improving prognosis as it allows for less invasive surgical interventions. However, no specific guidelines for detecting gastric tube cancer have been established. In this report, we present a case of gastric tube cancer in a patient that had Ivor-Lewis surgery 20 years ago for preinvasive adenocarcinoma of the thoracic esophagus against the background of Barrett's esophagus. Recommendations for earlier and more accurate diagnosis and treatment of this pathology are discussed.

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## Introduction

Nowadays, esophageal cancer is on the rise globally, and, in some cases, it is well known to be associated with metachronous malignancies in various organs. The stomach is the second most common site for the development of such malignancies, following the head and the neck [1]. These situations pose challenges for the medical community regarding the prevention, diagnosis, and treatment methods of metachronous cancer. We recently encountered a case of gastric tube cancer in a patient who had undergone esophageal resection and gastric tube reconstruction 20 years prior. Our purpose is to report this rare case and analyze the literature retrospectively to investigate the characteristics of gastric carcinoma following esophagectomy, in order to determine appropriate tactics and compare it with the approach we had chosen for our patient. The authors have completed the CARE Checklist for this case report, which is attached as supplementary material (for all online suppl. material, see <https://doi.org/10.1159/000531637>).

## Case Presentation

An 86-year-old male was admitted to our hospital with recurrent complaints of weakness, discomfort in the epigastric region, and heartburn. In 2002, the patient underwent Ivor-Lewis surgery for preinvasive adenocarcinoma of the mucous membrane of the middle third of the thoracic esophagus against the background of Barrett's esophagus (pTisN0M0, stage 1) [2].

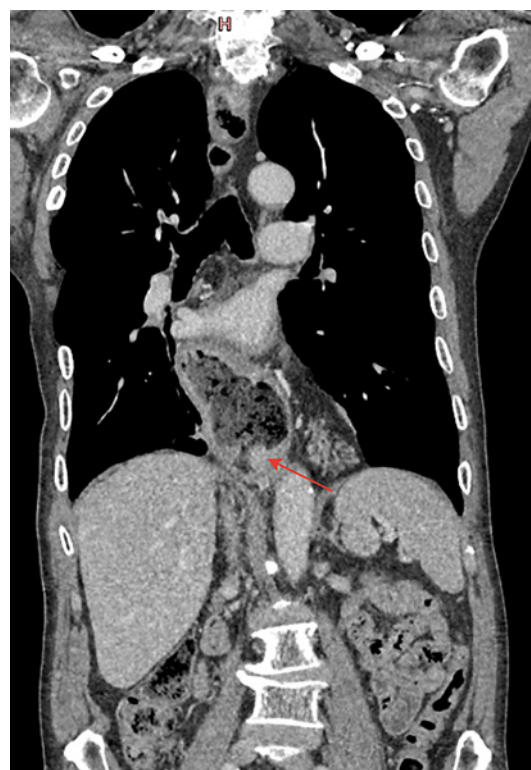
It is noteworthy that the patient had a significant family history of cancer among the risk factors which could trigger the development of cancer: the patient's father had suffered from esophageal cancer and his mother from gastric cancer. The patient's comorbidities included coronary heart disease with a history of heart attack in 2016 and coronary stenting in 2016; chronic heart failure class II according to the New York Heart Association Functional Classification; high blood pressure, stage 3 hypertension; multifocal atherosclerosis of the aorta, brachiocephalic and coronary arteries; impairment of cardiac conduction: a complete left bundle branch block. Upon admission to the hospital, the patient's ECOG performance score was 2.

In June 2021, during a scheduled examination, esophagogastroduodenoscopy revealed three ulcerative lesions from 1.0 to 1.5 cm long. Subsequent histological examination classified these lesions as ulcers of the body and antrum of the stomach, with an epithelial formation in the prepyloric region of the stomach identified as grade 2 adenocarcinoma, pT1N0M0, stage I [2]. An immunohistochemical study was conducted, revealing negative PD-L1 and HER2 status.

Multispiral computed tomography of the chest and abdominal cavity with intravenous contrast revealed a polypoid tumor (shown in Fig. 1), with no evidence of metastatic lesions of the chest, abdominal cavity, or retroperitoneal space. Based on the comprehensive examination results, we diagnosed the patient with gastric body and antrum cancer, histologically confirmed as grade 2 adenocarcinoma, pT1bNxM0, stage 1 [2].

Following a multidisciplinary oncological consultation decision, on December 10, 2021, the patient underwent radical surgery, consisting of a local resection of the stomach conduit with the revealed lesions. A distal gastrectomy was deemed inappropriate due to the patient's overall severe health status and the technical complexity of the reconstructive phase.

The patient received comprehensive medical treatment, including antibacterial, anti-secretory (proton pump inhibitors), thromboembolic complication prevention, infusion therapy, symptomatic treatment, and dressings. Control X-ray examinations with a water-soluble contrast agent on the 3rd and 5th postoperative days showed no contrast leakage and



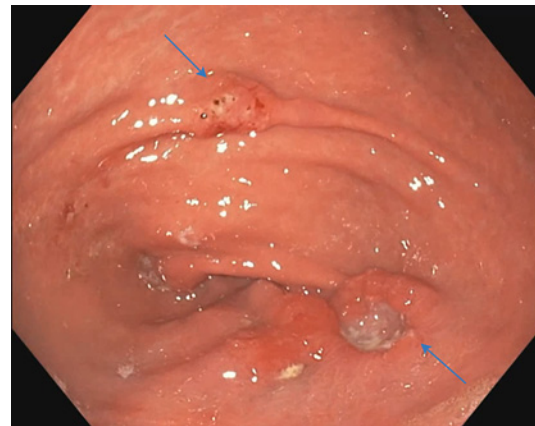
**Fig. 1.** Computed tomography of the abdominal cavity with contrast enhancement. The red arrow indicates a polypoid tumor of the gastric conduit.

timely evacuation. Laboratory parameters demonstrated a trend toward normalization. The patient was discharged in satisfactory condition under the supervision of an oncologist at their place of residence. One year after the surgical intervention, the patient underwent a control gastroscopy (shown in Fig. 2), which revealed and histologically confirmed the recurrence of adenocarcinoma foci. An oncological consultation was arranged, and due to the patient's severe concomitant cardiovascular pathology, it was decided to refrain from repeated surgical treatment. The patient was referred for chemotherapy.

## Discussion

In recent years, the overall prognosis of esophageal carcinoma has improved, leading to an increased incidence of patients with secondary and multiple malignancies [3, 4]. Patients with esophageal cancer are predisposed to other tumors of the aerodigestive tract, with an incidence of 8–12% [5]. The occurrence of the multiple primary cancers involving the stomach and esophagus, which are the most frequent, including metachronous and synchronous multiple cancers, is about 3–7% (with some authors reporting up to 12.6%) [3]. Synchronous esophageal and gastric cancers are more frequently found than metachronous gastric carcinoma [6]. On the other hand, cases of metachronous gastric carcinoma arising from a gastric tube used for reconstruction have been increasing in long-term survivors of esophageal cancer in recent years as the 3-year and 5-year survival rates for curative and palliative resection continue to rise [3]. According to various sources, the interval between the esophagectomy and the development of gastric tube cancer ranged from 1.1 to 9 years [3, 4, 7]. In our case, it was 20 years, which corresponds to metachronous cancer.

Other studies have also demonstrated that gastric cancer in the gastric tube following esophagectomy is occasionally found, with an incidence of 1.0–7.0% and a 10-year cumulative



**Fig. 2.** Gastroscopy 1 year after surgery. The blue arrows indicate the foci of adenocarcinoma recurrence.

incidence rate of gastric tube carcinoma (GTC) of 5.7% [8, 9]. We have identified several factors contributing to the increased morbidity of this pathology. In recent decades, diagnostic and therapeutic advances for esophageal carcinoma have improved, leading to better patient survival outcomes and an increased incidence of gastric tube cancer [6]. Consequently, the incidence of adenocarcinoma developing in the gastric tube used for esophageal substitution has increased, and there has been rising concern regarding the diagnosis and treatment of this disease [7].

It should be noted that the development of de novo adenocarcinoma in the gastric conduit is a rare occurrence [5]. Few cases have been reported of carcinoma arising from the reconstructed stomach tube 36 years after esophageal resection for a benign stricture. Histological analysis confirmed that the cancer had developed from the gastric mucosa near the anastomosis, and it was thought to be induced by mechanical stimulation, reflux of digestive juices, local ischemia, and/or other factors. There is limited information on similar cases in the literature, possibly because most cases of gastric tube cancer are diagnosed at an extremely advanced stage, and the prognosis is very poor [10]. In the case of our patient, we suppose that postoperative lesions may have played a role in the development of the pathology. However, since the tumor is far from the anastomosis, it should be considered a metachronous cancer occurring 20 years after the esophagectomy.

Overall, the etiology of the secondary carcinoma in the gastric tube remains unclear [3, 5]. While it is well known that radiotherapy and chemotherapy can cause gastric lymphoma, there is no reliable evidence that these carcinogenic agents increase the risk of GTC [5, 7]. Some reports have indicated that mediastinal irradiation as adjuvant therapy for esophageal cancer, as well as long-term bile reflux and pancreaticoduodenal secretions, may contribute to the carcinogenesis of gastric carcinoma. These factors together might play a significant role in the development of secondary gastric carcinoma during the long-term follow-up [3, 5–7, 9]. Cancerous multiplicity is another important cause that can be associated with esophageal cancer and play a role in the development of GTC. This phenomenon can be explained by the concept of “field cancerization,” in which exposure of the epithelium of the head and neck, esophagus, and lung to a common carcinogen leads to multiple carcinomas [9, 11]. Additionally, there is some evidence suggesting that *Helicobacter pylori* infection may be a risk factor of gastric cancer as it is strongly related to the development of intestinal metaplasia [3, 5, 9, 11]. Our patient had not undergone chemotherapy or radiation therapy and had not had a *Helicobacter pylori* infection. Therefore, his family history and “field cancerization” are likely the primary factors in the etiology of gastric tube cancer in this case.

The early stage of the tumor process allows to choose from a range of treatment options. For many years, surgical resection has remained the standard of care for patients with gastric

tube cancer. Some studies show that the prognosis for the resected group with gastric tube cancer is better than that for the non-resected group (chemotherapy with 5-fluorouracil alone and in combination therapy) [6]. However, total gastrectomy with regional lymph node dissection or distal gastrectomy for gastric tube cancer is highly invasive and problematic in patients who have undergone radical esophagectomy, especially in cases where gastric tube is reconstructed via the retro-mediastinal route [3, 5]. The treatment of gastric conduit adenocarcinoma in post-esophagectomy patients presents unique challenges for surgeons. Surgical resection of an intrathoracic gastric tumor is difficult and can lead to complications such as anastomotic leakage, flap failure, and treatment failure – recurrence of gastric or esophageal carcinoma [3, 5, 7]. Radical operations may lead to problems due to severe adhesion of the gastric tube to the surrounding tissues or invasion of adjacent organs by the tumor in some cases [3, 5, 11]. The route of prior esophageal reconstruction also influences the success of resection and may significantly impact a patient's survival. Therefore, it can be concluded that surgical resection of GTC carries high risks and may be replaced by more modern treatment methods [5, 7].

Although gastric cancer in the remnant stomach or gastric tube is typically detected at an advanced stage and surgical resection of the total remnant stomach has been the standard treatment for a long time, radical resection of advanced disease is technically demanding and carries high surgical morbidity rates [5, 8, 9, 12]. Currently, the detection of early gastric cancer (EGC) in the remnant stomach or gastric tube is increasing due to follow-up endoscopic surveillance programs. Endoscopic submucosal dissection (ESD) and endoscopic mucosal resection (EMR) for treating EGC are less invasive than surgery, leading to a better quality of life [5, 8]. The indications for EMR are the same as for gastric cancer: well-differentiated adenocarcinoma (grade 1); depth of invasion limited to the lamina propria; less than 1.0 cm in diameter; no ulceration [3]. These methods of treatment allow for complete resection and also provide curative resection for patients without lymph node metastasis [5, 8]. Compared to conventional EMR procedures, ESD offers several advantages including the potential to achieve a higher complete resection rate. Among the articles addressing ESD in a gastric conduit, the complete resection rate was reported to be 88–95% [9]. Authors reported that there was no recurrence in patients treated with ESD during a median follow-up of 24 months [5, 7]. Additionally, it is crucial to mention that these methods do not cause many complications – only one instance of stomach perforation [7, 12]. Less invasive treatment modalities, such as EMR, ESD, or local resection, may have more favorable morbidity and mortality outcomes, particularly for early-stage tumors [5]. Nevertheless, there is very limited evidence regarding the long-term outcomes of ESD for EGC in the remnant stomach or gastric tube, and the results are inconsistent. Therefore, it is essential to carefully select the appropriate treatment [8].

We would like to emphasize the need for long-term follow-up after esophagectomy. Most patients are asymptomatic when their gastric carcinomas are detected [3]. Consequently, many cases of GTC are discovered at the advanced stage (about 70–80%), resulting in a poor prognosis for GTC (death due to metastasis from GTC occurred in 50% of cases) [5, 7, 9]. At the same time, authors have reported that in cases of early-stage GTC, particularly those treated by EMR, most patients remain alive, without local or distant metastasis and with minimal complications. Thus, early diagnosis is crucial for improving the prognosis of GTC [7].

The risk and morbidity of gastric tube cancer are higher than the risk of esophageal cancer recurrence several years after esophageal resection. Therefore, careful endoscopic screening after esophagectomy to detect early-stage gastric tube cancer is essential, rather than relying on CT scanning to identify metastasis from esophageal cancer [6]. Consequently, strict periodic endoscopic examinations after esophagectomy are necessary for detecting asymptomatic gastric tube cancer [5, 7]. These procedures should be performed by

experienced endoscopists as some lesions may be less than 5 mm, and deformity of the gastric tube can make detection of these lesions difficult [7]. Annual endoscopic examinations are cost-effective and recommended for detecting early-stage gastric lesions. These examinations should be performed on an ongoing basis, even 5 years after esophagectomy as the longest reported interval from esophagectomy to gastric carcinoma detection was 14 years and 10 months [4–7, 9, 12]. All gastric cancers detected during annual endoscopic examinations in these studies were limited to the early stage, allowing for radical and less invasive treatment options (EMR, ESD, or partial resection) [3]. Thus, we can conclude that this method of diagnostic is effective and may have a positive effect on overall and disease-free survival.

## Conclusion

With the increasing survival rates of esophageal cancer, we anticipate an increase in cases of gastric tube cancer. Therefore, it is crucial to closely monitor patients for early detection of gastric conduit damage. According to the literature, annual endoscopic examination is recommended after esophageal resection. However, in our case, we believe that endoscopic investigations every 6 months will be more appropriate for the patient to determine possible disease progression and provide an opportunity for ESD at an early stage. In our opinion, further observation is required for such patients which may enhance their survival rates.

## Statement of Ethics

Written informed consent was obtained from the patient for the publication of this case report and any accompanying images. Ethical approval is not required for this case report in accordance with local or national guidelines.

## Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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## Author Contributions

Tatyana Khorobrykh, Ivan Ivashov, Alexey Spartak performed surgery; Pavel Pavlov performed gastroscopy and biopsy; Juliet Babayan, Alexey Spartak, and Ivan Ivashov: manuscript preparation, data collection, literature search; Andrey Andriyanov: manuscript revision; Juliet Babayan: manuscript translation. All authors read and approved the final manuscript.

### Data Availability Statement

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

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