



## **COMPLEXITIES IN MANAGING GASTROESOPHAGEAL JUNCTION ADENOCARCINOMA: A CASE REPORT OF TOTAL GASTRECTOMY WITH DISTAL ESOPHAGECTOMY, D2 LYMPHADENECTOMY, AND ROUX-EN-Y ESOPHAGOJEJUNOSTOMY**

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### **ABSTRACT**

**Background:** Adenocarcinoma of the gastroesophageal junction (GEJ) poses significant diagnostic and therapeutic challenges due to its complex anatomy and variable treatment approaches between Eastern and Western guidelines. In Indonesia, where resources are limited, the Japanese Gastric Cancer Association (JGCA) guideline is often adapted for surgical management. **Case Presentation:** We present a 55-year-old man with progressive dysphagia, significant weight loss, and upper gastrointestinal bleeding for four months. Laboratory tests showed elevated tumor markers. Endoscopy revealed a nodular mass at the GEJ extending into the gastric corpus, confirmed by contrast-enhanced abdominal computed tomography (CT). The patient underwent total gastrectomy, distal esophagectomy, and D2 lymphadenectomy in accordance with JGCA guidelines. Reconstruction was performed using Roux-en-Y esophagojejunostomy. Histopathology confirmed a locally advanced, moderately differentiated adenocarcinoma (cT4, N3a). At one month follow-up, the patient reported symptomatic improvement. However, at two months he developed pleural effusion, ascites, and clinical deterioration, and ultimately died from multiple organ dysfunction syndrome (MODS). **Conclusion:** This case highlights both the technical feasibility and the limitations of radical surgery for advanced GEJ adenocarcinoma. Although total gastrectomy with distal esophagectomy and D2 lymphadenectomy was performed to optimize oncological clearance and symptom control, the outcome underscores the importance of achieving negative margins, integrating multimodal therapy, and addressing the challenges of managing complex upper gastrointestinal cancers in resource-limited settings.

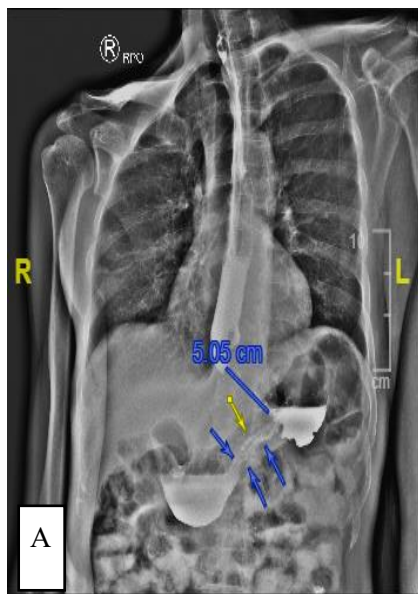
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### **BACKGROUND**

Upper gastrointestinal (GI) cancers arising from the esophagus or gastroesophageal junction (GEJ) have become a significant global health concern. While the incidence of conventional gastric carcinoma has declined, GEJ adenocarcinomas have shown a notable increase<sup>1,2</sup>. A study in China reported 56,521 cases of GEJ cancer between 2017 and 2023, with the proportion rising to 38.2% compared with earlier reports (22.3% in 1988–1992

and 35.7% in 2008–2012)<sup>3</sup>. Similarly, a study from Japan published in 2022 showed a 10% increase in incidence<sup>4</sup>. In Indonesia, however, epidemiological data remain limited, and unequal healthcare resources often delay diagnosis and treatment. We report a case of GEJ adenocarcinoma and discuss therapeutic strategies in light of Western and Asian guidelines.

## CASE PRESENTATION



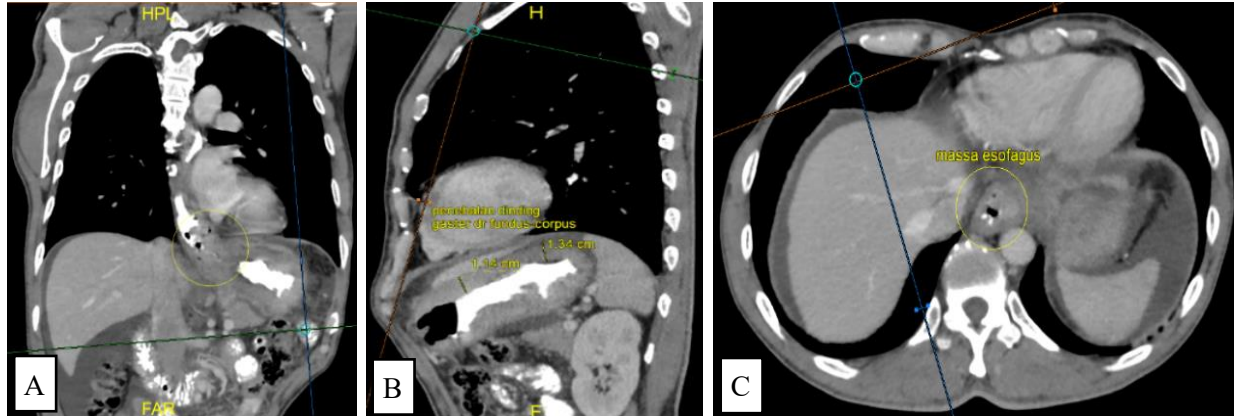
**Figure 1.** Esophagogram findings: A segmental narrowing measuring  $\pm 5.05$  cm in length at the distal esophagus extending to the gastroesophageal junction, located at the level T11-T12.

A 55-year-old man initially experienced intermittent dysphagia to solid food approximately four months before admission. After about four weeks, the dysphagia gradually worsened and progressed to involve semi-solid food intake. Within the following four to six weeks, he developed intermittent melena and noted a progressive, unintentional weight loss of approximately 10 kg over the four-month period. On physical examination at admission, there was no palpable cervical or supraclavicular lymphadenopathy, no jaundice, no abdominal distension, and no clinically detectable ascites or hepatomegaly.

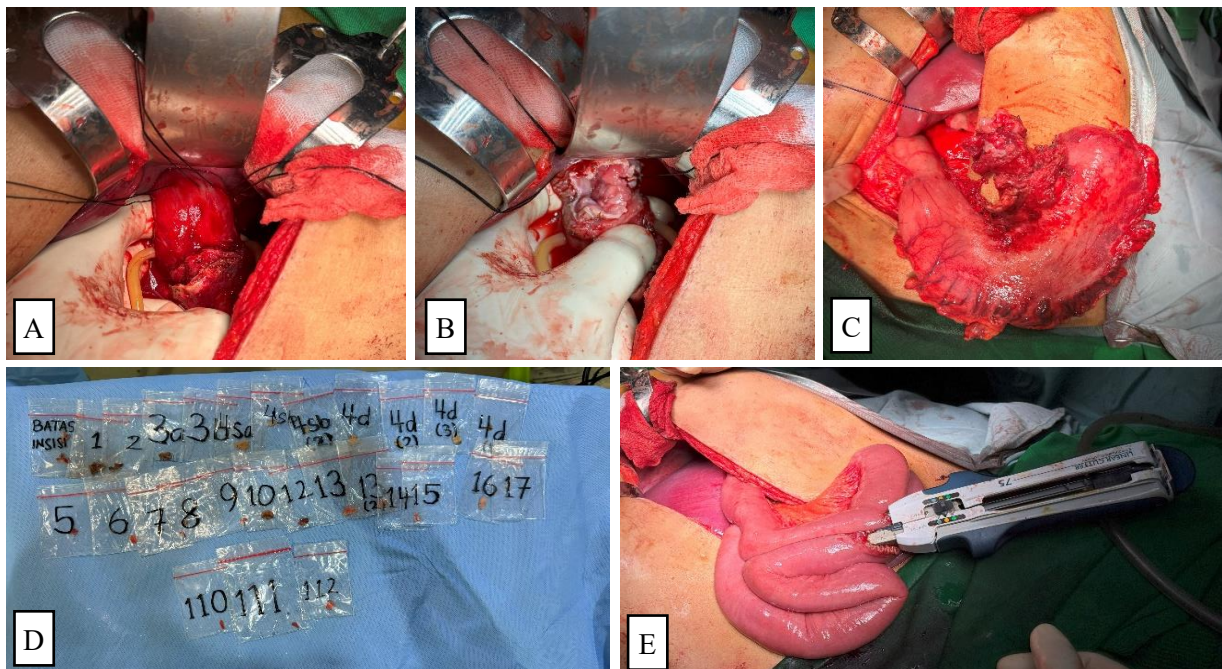
Two months after symptom onset, as dysphagia became persistent, the patient sought medical attention at previous hospital. Upper gastrointestinal endoscopy revealed a tumor extending from the GEJ to the gastric corpus, histopathological examination of the biopsy specimen confirmed adenocarcinoma. Laboratory tests showed anemia (Hb 5.80 g/dL) and elevated CA 19-9 levels (255.58 U/mL). Esophagogram demonstrated narrowing of the distal esophagus extending to the GEJ, suspicious for a mass (**Figure 1**). Contrast-enhanced computed tomography (CT) of the thorax revealed irregular enhancing thickening of the distal esophageal wall extending to the GEJ, resulting in luminal narrowing.

There was also gastric wall thickening suggestive of tumor extension. These findings are suggestive of a malignant gastroesophageal junction mass. There was no enlargement of any lymph node or distant metastasis (**Figure 2**). These findings were interpreted with caution, given the limited sensitivity of CT imaging in detecting microscopic lymph node involvement in advanced GEJ cancer.

Based on these clinical and pathological findings, we diagnosed the patient with GEJ adenocarcinoma, Siewert type II. The management of GEJ adenocarcinoma in this study was guided by the Japanese Gastric Cancer Association (JGCA) guidelines. The patient was deemed to total gastrectomy with distal esophagectomy, D2 lymphadenectomy, and reconstruction using a Roux-en-Y esophagojejunostomy. A right thoracotomy was performed to mobilize the distal esophagus, which was then resected transhiatally at a healthy margin (**Figure 3**). The surgery was performed successfully with no major complications. Histopathological examination following total gastrectomy revealed a moderately differentiated adenocarcinoma with lymphovascular invasion. Tumor cells were found at the proximal resection margin involving the esophagus and metastatic involvement was identified in nine lymph nodes located at stations 2, 3a, 3b, 45b, 4d, 6, 8, 9, 12, 13, 15, 16, 17, and 112.

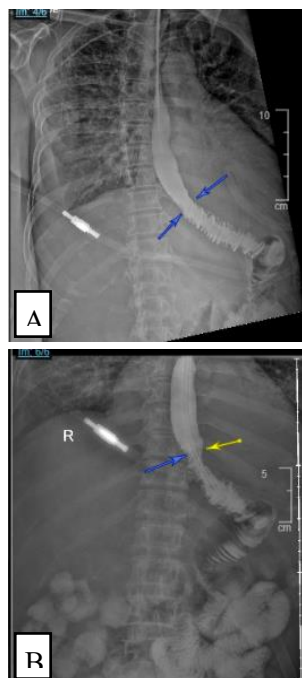


**Figure 2.** Thorax contrast-enhanced CT Scan: (A) Irregular enhancing thickening of the distal esophagus to the GEJ  $\pm 1.0$ – $1.2$  cm with the upper margin was  $\pm 3.8$  cm above the GEJ. (B) Gastric wall thickening  $\pm 1.14$ – $1.34$  cm at the fundus–corpus, consistent with tumor extension. (C) Esophageal mass causing luminal narrowing  $\pm 5.4$  cm suggesting a malignant esophageal mass.



**Figure 3:** Surgical Procedure. (A) The GEJ was identified and the mass was dissected free from surrounding tissues. (B) The tumor extended approximately 6 cm into the esophagus. Esophageal resection was performed with clear margins. (C) Resection of the gastric pre-pyloric area was performed. (D) Lymphadenectomy was carried out according to a D2 dissection based on nodal station mapping. (E) Reconstruction included an end-to-end esophagojejunostomy using a circular stapler, followed by a side-to-side Roux-en-Y jejunojunctionostomy with linear stapler.





**Figure 4:** Esophagogram postoperative. (A) The visualized esophageal caliber appeared normal. The anastomotic site with the small intestine (jejunum), located approximately at the left T11 paravertebral level. (B) Contrast passing through the small intestine and reaching the large intestine. No contrast extravasation was observed.

An esophagogram was performed on postoperative day seven to assess anastomotic integrity (**Figure 4**). The patient was discharged on postoperative day eleven in stable condition. At the two-month follow-up, the patient presented to the emergency department with nausea, persistent vomiting, and dyspnea. Physical examination revealed decreased vesicular breath sounds in the right lung, accompanied by abdominal distension and reduced bowel sounds. CT scan examination revealed bilateral pleural effusion, predominantly on the right lung, as well as abdominal ascites. During a two-week hospitalization, the patient's condition progressively deteriorated and he died due to multiple organ dysfunction syndrome (MODS).

## DISCUSSION

The anatomical definition of GEJ tumors remains debated due to the complex histological and functional nature of this transitional zone. By current consensus, GEJ carcinoma refers to adenocarcinomas with the epicenter located within 5 cm proximal or distal to the anatomical cardia, where the squamous

epithelium of the esophagus transitions to the gastric columnar epithelium. For clinical classification, the Siewert system remains the standard framework<sup>5,6</sup>. Our patient was classified as Siewert type II, situated between 1 cm above and 2 cm below the junction, regarded as “true EGJ cancer”<sup>6,7</sup>. A major challenge is the frequent absence of symptoms in the early stages, which leads to delayed presentation. This was consistent with our case, where the patient presented with progressive dysphagia and significant weight loss, and was diagnosed at an advanced stage<sup>2</sup>.

Surgical resection is the only potentially curative treatment for GEJ adenocarcinoma, but the choice of procedure depends on tumor characteristics and surgeon expertise. The decision between gastrectomy and esophagectomy is often difficult, as both aim for complete oncologic clearance. In Western countries, esophagectomy with proximal gastrectomy is more common, while in East Asia, total or proximal gastrectomy is preferred<sup>8</sup>. Our patient underwent total gastrectomy with distal esophagectomy with the intention of achieving adequate oncologic clearance, given the tumor extension into both the gastric corpus and distal esophagus. However, histopathological examination revealed microscopic tumor infiltration at the proximal resection margin (R1). This finding is of major oncologic significance and represents a critical determinant of prognosis in gastroesophageal junction adenocarcinoma. Numerous studies have consistently demonstrated that R0 resection is the strongest independent predictor of long-term survival, whereas R1 resection is associated with significantly higher risks of local recurrence and reduced overall survival, regardless of the extent of lymphadenectomy performed. The challenge of achieving a negative proximal margin is particularly pronounced in Siewert type II tumors with longitudinal esophageal spread, where preoperative imaging may underestimate submucosal or microscopic tumor extension<sup>9,10</sup>. The Royal College of Pathologists defines R1 resection as a margin clearance of less than 0.1 cm, while the College of American Pathologists defines it as direct microscopic involvement at the resection margin. Importantly, St-Amour et al. demonstrated that a margin clearance of less than 0.1 cm behaves biologically similar to overt R1 disease and is strongly associated with poor tumor biology, increased recurrence rates, and inferior long-term survival<sup>11</sup>. In this context, the positive proximal margin in our



patient likely reflects aggressive tumor behavior and represents a central factor contributing to the unfavorable outcome, despite radical surgical resection.

The role of multimodal treatment, including neoadjuvant chemoradiation, perioperative chemotherapy, or their combination, remains an area of ongoing debate, with no definitive consensus regarding superiority in long-term outcomes<sup>12</sup>. In Indonesia, the implementation of these modalities is further constrained by healthcare infrastructure, socioeconomic disparities, and the scope of coverage provided by the national health insurance system. At the 2023 Upper GI Oncology Summit, Yuko Kitagawa and colleagues highlighted that, based on evidence from both Eastern and Western studies, perioperative chemotherapy or neoadjuvant chemoradiotherapy for patients with resectable advanced EGJ adenocarcinoma is only weakly recommended<sup>12-14</sup>. Nevertheless, recent advances in perioperative systemic chemotherapy or neoadjuvant radiochemotherapy have demonstrated significant tumor regression in several cases, offering promise for more individualized and effective treatment pathways<sup>10,15</sup>.

Reconstruction of the alimentary tract after total gastrectomy remains a major surgical challenge. The Roux-en-Y esophagojejunostomy is the most widely used method because of its technical simplicity and familiarity among surgeons<sup>16</sup>. However, it carries risks of both early and late complications, such as anastomotic leakage, stricture, dumping syndrome, empyema, and intestinal obstruction. Alternative techniques have been explored. Li Yub et al. compared functional jejunal interposition (FJI) with the traditional Roux-en-Y and reported better postoperative nutritional recovery with FJI<sup>16,17</sup>. Despite this, FJI is rarely performed in routine practice due to its technical complexity and limited availability of formal surgical training, restricting its use to specialized centers or research-based contexts. The JGCA guidelines also mention double-tract reconstruction (DTR), which combines esophagojejunostomy, gastrojejunostomy, and jejunojejunostomy. Although DTR may help preserve digestive function, further studies are required to validate its role<sup>18</sup>. Based on these considerations, we selected the Roux-en-Y esophagojejunostomy for our patient.

Comprehensive lymphadenectomy during gastrectomy is essential not only for accurate pathological staging but also for reducing recurrence risk and is widely recognized as a key prognostic factor in gastric cancer. A D1 lymphadenectomy includes dissection of perigastric nodes (stations 1–7), whereas D2 lymphadenectomy extends this to nodes along the celiac axis and its branches, specifically stations 8a, 9, 11p, 11d, and 12a. The lymphatic spread pattern of Siewert type II EGJ cancer remains unclear, contributing to variability in surgical practice<sup>1</sup>. Both D1 and D2 dissections are endorsed by the Japanese Gastric Cancer Association (JGCA), which recommends D2 when lymph node involvement cannot be confidently excluded<sup>13</sup>. Similarly, the National Comprehensive Cancer Network (NCCN) advises retrieval of at least 15 nodes after preoperative therapy to ensure adequate staging<sup>14</sup>. While D2 lymphadenectomy is accepted in both Eastern and Western practice, it carries higher risks of morbidity and mortality, particularly in low-volume centers<sup>19</sup>. In our case, the patient underwent D2 lymphadenectomy including stations 1, 2, 3, 4sa, 4sb, 4d, 5, 6, 7, 8a, 9, 11p, 11d, and 12a. Given tumor extension into the distal esophagus, additional lower mediastinal lymph nodes (stations 110, 111, and 112) were resected. Further extended lymphadenectomy was performed at the surgeon's discretion due to advanced disease. Histopathological analysis revealed metastatic involvement in nine lymph nodes. Study from Nobel et al., reported that prognosis strongly correlates with nodal burden, with patients harboring eight or fewer positive nodes achieving significantly better outcomes compared with those with more than eight positive nodes<sup>9</sup>. This factor likely contributed to the poor prognosis in our patient.

In the present case, the choice of surgical approach was driven by tumor location, extent of longitudinal spread, and the goal of achieving optimal oncologic clearance. The tumor was classified as Siewert type II with extension into both the distal esophagus and the gastric corpus, making total gastrectomy more appropriate than other gastric surgery to ensure adequate distal margins. Distal esophagectomy was performed because of the significant esophageal involvement, as limited esophageal resection carries a high risk of positive proximal margins in advanced Siewert type II tumors. A D2 lymphadenectomy was selected, given that lymph node involvement could not



be reliably excluded preoperatively and to allow accurate pathological staging. Right thoracotomy was required to facilitate safe mobilization of the distal esophagus and to obtain sufficient proximal esophageal length for resection and reconstruction, aiming to maximize the likelihood of achieving negative margins. Despite this aggressive surgical strategy, microscopic proximal margin involvement was still identified, underscoring the technical and biological challenges associated with advanced GEJ adenocarcinoma.

The unfavorable outcome in our patient can therefore be explained by several oncologic and systemic factors. Extensive lymph node involvement with nine positive nodes placed the patient in a poor prognostic category. The discrepancy between negative preoperative imaging and extensive nodal metastases on final pathology likely reflects the limited sensitivity of CT in detecting microscopic lymph node involvement, which is well recognized in advanced GEJ cancer. The presence of microscopic tumor infiltration at the proximal margin (R1) further limited the curative potential of surgery, as negative margins (R0) remain the strongest predictor of long-term survival. The absence of multimodal therapy such as perioperative chemotherapy or chemoradiation, which has been supported by several evidence-based studies for advanced Siewert type II tumors, also reduced the likelihood of achieving durable disease control. Furthermore, the resource-limited healthcare setting and socioeconomic context in Indonesia, including restricted access to neoadjuvant therapy and intraoperative frozen section analysis, contributed to the suboptimal outcome. These combined factors likely explain the patient's rapid disease progression and poor prognosis despite radical surgical intervention. The postoperative deterioration marked by pleural effusion, ascites, and eventual MODS likely reflects a multifactorial process. Rapid disease progression or early recurrence is possible given the extensive nodal involvement and positive resection margin<sup>20</sup>. Infectious complications and occult anastomotic leakage, despite a negative postoperative esophagogram, cannot be completely excluded. Malignant pleural effusion and ascites may have further contributed to respiratory compromise and systemic inflammatory response, culminating in organ failure<sup>21</sup>.

## CONCLUSION

This case highlights both the technical feasibility and the limitations of radical surgery for advanced gastroesophageal junction adenocarcinoma. Although total gastrectomy with distal esophagectomy and D2 lymphadenectomy was performed to optimize oncological clearance and symptom control, the outcome underscores the importance of achieving negative margins, integrating multimodal therapy, and addressing the challenges of managing complex upper gastrointestinal cancers in resource-limited settings.

## ETHICAL APPROVAL

This case report was conducted in accordance with the principles outlined in the Declaration of Helsinki. Written informed consent was obtained from the patient's legal guardian for the publication of this case and accompanying clinical details.

## CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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## AUTHOR CONTRIBUTIONS

Case management and surgery, RPN; data collection, VNPN and KTZ; literature review, VNPN, C, and JAM; writing—original draft preparation, VNPN; writing—review and editing, C and JAM; visualization, C and JAM; supervision, RPN; project administration, C.

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