

THERAPEUTIC ENDOSCOPY FOLLOWING RADICAL TREATMENT OF UPPER GASTROINTESTINAL TRACT CANCER AT RĪGA EAST UNIVERSITY HOSPITAL

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Communicated by Dainis Krieviņš

The aim of this study was to evaluate the use of therapeutic endoscopy in Rīga East University Hospital “Gaiļezers” and Oncology Centre of Latvia in oesophageal and gastric cancer patients who underwent radical oesophagectomy and gastrectomy. A group of 22 patients was selected, who underwent oesophagectomy and gastrectomy and had developed complications such as anastomotic leak, anastomotic bleeding and stricture, and required endoscopic intervention. For statistical analysis, IBM SPSS and MS Excel programmes were used. The authors tested for correlation between patient age, diagnosis, stage of cancer, type of surgery, and particular complications, used endoscopic manipulations, repeated procedures, endoscopic success rate and mortality. Age, diagnosis and stage of cancer did not show statistically significant correlation with the previously mentioned factors. The type of surgery had one statistically significant correlation with bleeding complication (Fisher’s Exact test $p = 0.040$). In the Ivor Lewis oesophagectomy group there were no patients with anastomosis bleeding. The type of surgery had no statistically significant difference in stent placement rate, defect closure, endoscopic dilation, repeated procedures, mortality, and successful endoscopic outcome. Complications in the selected group and efficiency of endoscopic methods were compared to other studies in scientific literature, which showed similar results. It was concluded that in the future, implementation of new endoscopic techniques, such as pENPT, VAC stents, OTSC haemoclips and haemostatic powders, can be used to improve treatment results.

Keywords: oesophagectomy, gastrectomy, anastomotic leak, endoscopic stenting, stricture.

1. INTRODUCTION

Oesophageal and gastric cancer are relatively widespread. Oesophageal cancer ranks as the 19th most common malignant tumour in the European Union, with around 45,900 new diagnosed cases in 2012 (Lordick *et al.*, 2016). Gastric cancer is one of the deadliest in the world, ranking 3rd in mortality globally and claiming over 700,000 lives annually (Rawla *et al.*, 2019).

Risk factors for both diseases are widely spread in the population. For oesophageal cancer, these include smoking, alcohol consumption, obesity, and GE reflux disease (Napier *et al.*, 2014). For gastric cancer, risk factors include male gender, *Helicobacter pylori* infection, tobacco use, atrophic gastritis, etc. (Forman and Burley, 2006).

Diagnosis of oesophageal and gastric cancer at early stages allows for endoscopic or radical surgical therapy. Surgical

resections of these tumours have a relatively high number of complications, such as anastomotic insufficiency and anastomotic bleeding, which are potentially life-threatening and require prompt and effective action. According to literature data, oesophageal resection can be complicated by anastomotic insufficiency in 0–40% of cases. Mortality associated with this complication can be between 18–35% (Hummel and Bausch, 2017; Fabian, 2021). In gastrectomy patients, anastomotic insufficiency can occur in approximately 18% of cases, with a lethality rate ranging from 19–64% (Hummel and Bausch, 2017).

Post-operative bleeding requiring endoscopic therapy is relatively rare. The frequency of bleeding after oesophagectomy or gastrectomy for oesophageal cancer patients is around 2% (Schieman *et al.*, 2012) and poses a life-threatening situation.

Ahmed *et al.* (2017) reported a 24.5% frequency of anastomotic strictures in patients after oesophageal resection. Post-operative strictures affect the patient's quality of life and can lead to dysphagia, odynophagia, aspiration, and malnutrition (Wichmann *et al.*, 2022).

The aim of this study was to evaluate the use of therapeutic endoscopy in Rīga East University Hospital “Gaiļezers” and Oncology Centre of Latvia in oesophageal and gastric cancer patients, who underwent radical oesophagectomy and gastrectomy. To achieve this aim, patient data were collected from hospital electronic data systems. Patients that after oesophagectomy and gastrectomy developed complications and required endoscopic intervention were selected. Such complications were anastomotic leak, anastomotic bleeding and stricture.

MATERIALS AND METHODS

Study group selection. Data of patients who were hospitalised in Rīga East University Hospital “Gaiļezers” and Oncology Centre of Latvia hospitals and who underwent therapeutic endoscopic manipulation due to complications after radical surgical treatment for oesophageal and gastric cancer were retrospectively evaluated from 1 January 2018 to 31 December 2020. Data were analysed using hospital electronic data systems. During this period, a total of 61 oesophagectomies, 293 partial gastrectomies, and 233 total gastrectomies were performed in both hospitals combined. Endoscopic therapy was applied for postoperative complications such as anastomotic leakage, anastomotic strictures, and bleeding from the anastomosis. Patients with other upper gastrointestinal tract tumours such as duodenal, liver, gallbladder, biliary tract, pancreatic tumours were excluded, as well as patients with rare oesophageal/gastric tumours (e.g., neuroendocrine tumours), whose TNM staging differed from more common tumour types and those who received palliative endoscopic treatment (e.g., palliative oesophageal stenting). A group of 22 patients was selected, who were analysed based on diagnosis, age, type of complication, type of surgery, and tumour stage. Correlation be-

tween the type of complication, successful endoscopic outcome, and mortality was examined. Successful endoscopic outcome was defined as successful complication treatment with the appropriate endoscopic method. For anastomotic insufficiency, closure of the anastomotic leakage with subsequent stent evacuation was considered successful; for anastomotic bleeding, successful haemostasis with local injections of Sol. Adrenaline or haemoclips; and for anastomotic strictures, dilatation where after first or repeated dilatation procedure no further dilatation was required upon follow-up endoscopy.

Surgical methods. For oesophageal resection, two surgical methods were applied. Ivor Lewis oesophagectomy involved right thoracotomy and laparotomy with creation of a gastric conduit. Transhiatal approach included gastrectomy with resection of the distal part of the oesophagus. Partial gastric resections were performed using Braun's and distal Roux-en-Y techniques. Total gastrectomies were performed using the total Roux-en-Y method.

Endoscopic methods. For closure of anastomotic leakage, Boston Scientific's Leufen Leakage oesophageal covered stents were used. Depending on the location of the anastomosis, stent lengths ranged from 80–120 mm. Stents were placed under fluoroscopic guidance. In cases of anastomotic bleeding, haemostatic injections with Sol. Adrenaline were administered at a dilution of 1 : 10,000 (1 ml Sol. Adrenaline + 10 ml Sol. NaCl 0.9%) or haemoclips used. Endoscopic dilatation was performed under fluoroscopic guidance. Thermoplastic dilators ranging from 9–15 mm in diameter were used.

Statistical methods. Statistical analysis was conducted using IBM SPSS and MS Excel softwares. Descriptive statistical analysis was applied. Patient age data were expressed as median values with Q1 : Q3 quartiles and interquartile range (IQR). The Mann-Whitney U test was used for comparing interval data of patients. Chi-squared tests and Fisher's exact tests were used for comparing data sets. A p -value < 0.05 was considered statistically significant.

RESULTS

During the period from 1 January 2018 to 31 December 2020, a total of 61 oesophagectomies, 293 partial gastrectomies, and 233 total gastrectomies were performed in both hospitals combined. In the oesophagectomy group, therapeutic endoscopy was required for the treatment of complications in 15 patients (24.59%) — in the partial gastrectomy group for two patients (0.68%), and in the total gastrectomy group for 5 patients (2.15%).

Of the total number of oesophagectomies (61 patients), one (1.64%) patient experienced anastomotic bleeding, five (8.20%) patients had anastomotic insufficiency, and nine (14.75%) patients had anastomotic strictures. Of the total number of partial gastrectomies (293 patients), one (0.34%) patient experienced anastomotic bleeding, and one (0.34%)

patient had anastomotic stricture. Of the total number of total gastrectomies (233 patients), one (0.43%) patient experienced anastomotic bleeding, two (0.86%) patients had anastomotic insufficiency, and two (0.86%) patients had anastomotic strictures (Fig. 1).

Of 22 patients, there were five females (22.7%) and 17 males (77.3%). The median age for females was 58 years (Q1; Q3 = 54.0 to 60.5; IQR = 6.5). The youngest female patient was 52 years old, and the oldest was 61 years old. The median age for males was 64 years (Q1; Q3 = 53 to 71.5; IQR = 18.5). The youngest male patient was 26 years old, and the oldest was 85 years old. In the oesophageal cancer group, there were 15 patients, including four females and 11 males. In the gastric cancer group, there were seven patients, including one female and six males (Figs. 2 and 3).

Age was not significantly correlated with diagnosis, complications, successful endoscopic outcome or mortality.

The diagnosis was not significantly correlated with the development of specific complications (Pearson Chi-square $p = 0.373$), with closure of the defect (Fisher's Exact test $p > 0.99$), the need for stenting (Fisher's Exact test $p = 0.648$), the need for dilation (Fisher's Exact test $p > 0.99$), the need for repeat procedures (Fisher's Exact test $p > 0.350$), the frequency of bleeding (Fisher's Exact test $p > 0.227$), mortality (Fisher's Exact test $p = 0.99$), or successful endoscopic outcome (Fisher's Exact test $p > 0.343$).

The stage of cancer was not significantly correlated with successful therapeutic endoscopic outcome (Fisher's Exact test $p = 0.088$), frequency of anastomotic bleeding (Fisher's Exact test $p = 0.868$), stenting frequency (Fisher's Exact test $p = 0.923$), closure of defects after stenting (Fisher's Exact test $p = 0.323$), frequency of dilatation (Fisher's Exact test $p = 0.456$), need for repeat procedures (Fisher's Exact test $p = 0.246$), or mortality (Fisher's Exact test $p = 0.385$).

Comparison of complications based on the type of surgery showed a statistically significant difference (Fisher's Exact test $p = 0.040$). Considering that each of the two groups of partial gastrectomies and transhiatal oesophagectomy group had only one patient, a statistically significant difference was observed only in the Ivor Lewis oesophagectomy group, where out of 14 patients, none had anastomotic bleeding (Figs. 4 and 5)

The type of operation was not significantly correlated with the frequency of stenting (Fisher's Exact test $p = 0.634$), closure of defects after stenting (Fisher's Exact test $p > 0.99$), frequency of dilatation (Fisher's Exact test $p = 0.504$), need for repeat procedures (Fisher's Exact test $p = 0.643$), mortality (Fisher's Exact test $p = 0.942$), or successful endoscopic outcome (Fisher's Exact test $p = 0.157$).

Analysis of endoscopic outcomes. Stent placement in the study group. Stents were placed in nine patients. A successful outcome was observed in six procedures (66.67%), and unsuccessful in three procedures (33.33%). Out of nine

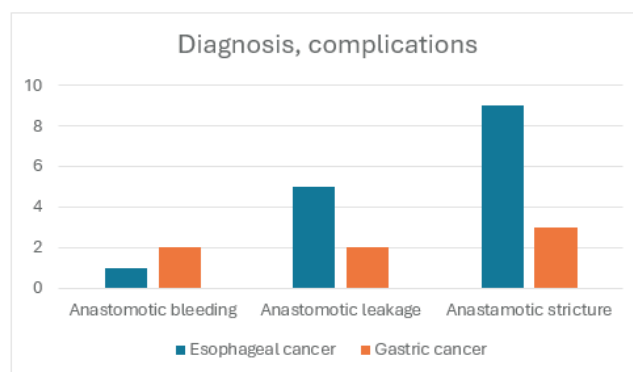


Fig. 1. Number of complications in oesophageal and gastric cancer groups.

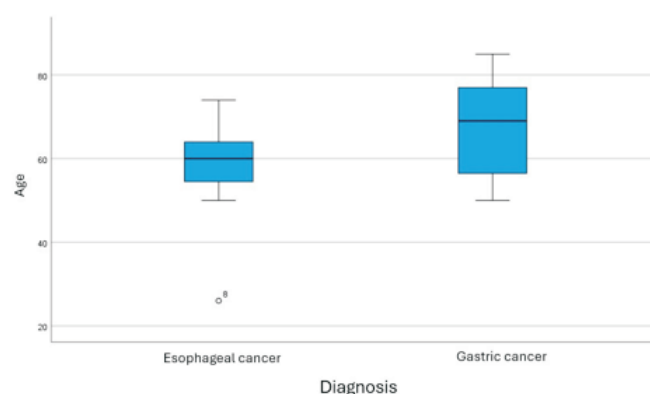


Fig. 2. Age distribution in oesophageal and gastric cancer groups.

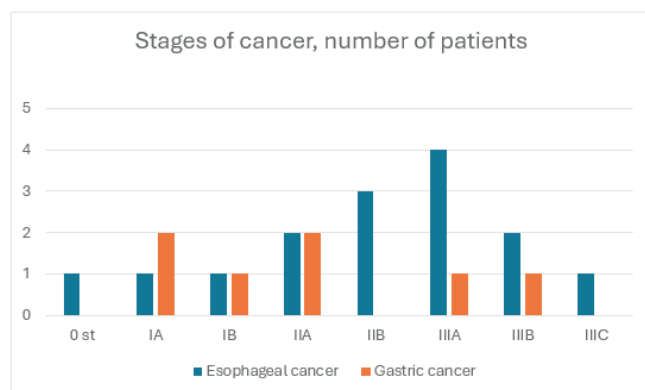


Fig. 3. Stage of cancer in oesophageal and gastric cancer groups.

stents, seven were placed due to anastomotic insufficiency, of which six (85.7%) had a successful endoscopic outcome. In the oesophageal cancer group, successful outcome was observed in four patients. Closure time of the oesophageal leak was 60, 39, 31, and 48 days, with an average of 44.5 days. In the gastric cancer group, successful outcome was observed in two patients, with closure times of 30 and 104 days, with an average of 67 days. The patient with a closure time of 104 days received a repeated stent placement (stent-in-stent placement). An unsuccessful procedure outcome was observed in three patients — a male, 55 years old, with diagnosis gastroesophageal junction adenocarcinoma pT3N2M0 G2, stage III B; and a female, 60 years old with diagnosis squamous cell carcinoma of the distal 1/3 of

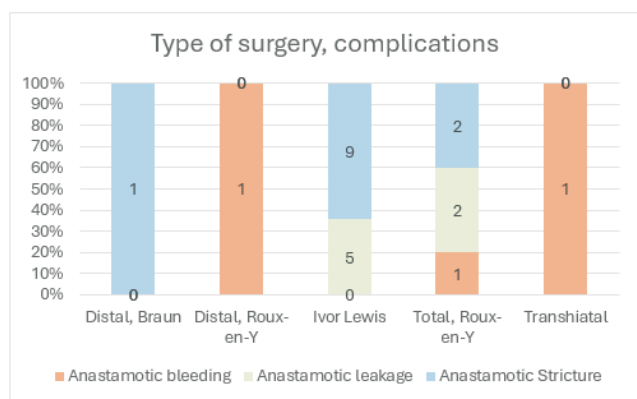


Fig. 4. Type of surgery, number of complications.

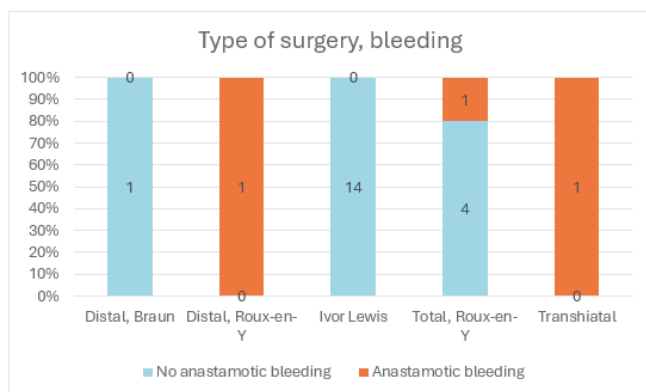


Fig. 5. Type of surgery, bleeding complication.

the oesophagus, T3N0M0 IIA; and a male, 64 years old with diagnosis adenocarcinoma of the lower 1/3 of the oesophagus, T2N0M0 G-3, stage I B. These cases are described further in mortality analysis (Fig. 6).

Anastomotic stricture dilation in study group. Dilation was performed in 12 patients — a single procedure in five patients, repeated procedures in seven patients and six of those (85.71%) with successful outcome. An unsuccessful outcome in the repeated stenting group occurred in one patient (14.29%) — a 55-year-old male, described below in mortality analysis.

The group of patients who had a single procedure included:

1) Male, 50 years old with gastric tubular adenocarcinoma, status post-total gastrectomy Roux-en-Y and oesophagojejunal anastomotic stricture. During the dilation procedure, the patient experienced desaturation and the procedure was not completed. An exploratory laparotomy was performed, observing disease progression with peritoneal dissemination. Jejunostomy was created.

2) Male, 50 years old with squamous cell carcinoma of the mid-third of the oesophagus, T3N2M0 G2, stage III B, status post-Ivor Lewis oesophagectomy and recurrent stricture. Jejunostomy was created.

3) Female, 61 years old with gastric corpus signet ring cell carcinoma, T1aN1M0 G3, stage I B, status post-total gas-

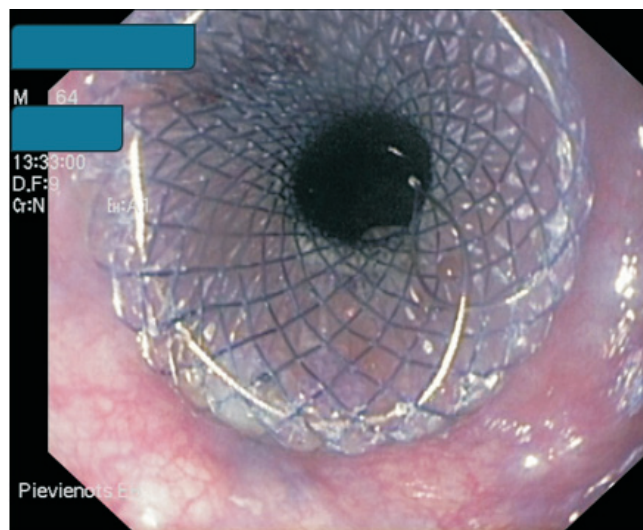


Fig. 6. Endoscopic stent placement (from Riga East University Hospital archive).

trectomy Roux-en-Y and anastomotic stricture. Due to perforation in small intestine distal to anastomosis, neoesophagojejunostomy and entero-entero anastomosis m Roux were made.

4) Male, 82 years old with adenocarcinoma of the antrum of the stomach, T3N0M0, stage II A, status post-subtotal distal gastrectomy after Braun and anastomotic stricture. Dilation was technically not feasible. Laparotomy, resection of the gastroentero-anastomosis and reconstruction of the gastroentero-anastomosis m Roux were made.

5) Male, 63 years old with squamous cell carcinoma of the mid-third of the oesophagus, T2N1M0, stage III A status post-oesophagectomy after Ivor Lewis and anastomotic stricture. Successful dilation was made.

Anastomotic bleeding in study group. Endoscopic local haemostasis was performed in three patients. Successful endoscopic manipulation was achieved in one patient with local haemostasis using Sol. Adrenaline. Unsuccessful endoscopic outcomes were:

1) Male, 74 years old with gastroesophageal junction adenocarcinoma, T3N1M0 G2, stage III A, status post-total gastrectomy Roux, Dieulafoy defect below the anastomosis, and bleeding. 2 haemoclips were applied, but massive bleeding ensued. Relaparotomy was performed. After recurrent bleeding endovascular emboliation of the splenic artery was performed.

2) Male, 52 years old with a gastric malignant tumour, T3N0M0, stage II, total gastrectomy Roux-en-Y and anastomotic bleeding. This case is described further in mortality analysis.

Mortality in the study group. Mortality in the anastomotic insufficiency group was one per seven (14.29%) patients, in the anastomotic stricture group, two of 12 (16.67%) patients

and in the anastomotic bleeding group, one of three (33.33%). Overall, there were four fatal outcomes:

1) Male, 55 years old with diagnosis: gastroesophageal junction adenocarcinoma pT3N2M0 G2 stage III B, status post-oesophageal resection after Ivor Lewis procedure. Due to benign refractory anastomotic stricture, repeated endoscopic stricture dilatations were performed without significant effect. Endoscopic stents were placed. As dysphagia progressed, stent replacement was performed. Subsequently, stent ingrowth was observed. Surgical therapy involved oesophageal transplantation from the small intestine loop. Transplant necrosis and progressing intoxication caused a fatal outcome.

2) Female, 60 years old with diagnosis: squamous cell carcinoma of the distal 1/3 of the oesophagus, T3N0M0 stage II A, status post-oesophageal resection after Ivor Lewis procedure and anastomotic insufficiency. Stent insertion was technically not possible. Surgical therapy was oesophageal reconstruction with colonic interposition. Transplant necrosis, progressing intoxication caused a fatal outcome.

3) Male, 52 years old with diagnosis: gastric malignancy, T3N0M0 stage II, total gastrectomy Roux-en-Y, and anastomotic bleeding. Local endoscopic haemostasis with Sol. Adrenaline and relaparotomy were performed.. Destructive necrotising pancreatitis and MODS led to a fatal outcome.

4) Male, 64 years old with diagnosis: adenocarcinoma of the lower 1/3 of the oesophagus, T2N0M0 G-3 stage I B, status post-oesophageal resection after Ivor Lewis procedure and anastomotic stricture. Endoscopic stents were placed. Sepsis led to a fatal outcome.

DISCUSSION

The Ivor Lewis oesophagectomy group had a statistically significant difference in relation to the development of complications (Fisher's Exact test $p = 0.040$), where out of 14 patients none had anastomotic bleeding. This could be explained by the fact that Ivor-Lewis is a more commonly used oesophagectomy technique, and accumulated surgical experience tended to decrease the rate of complications. Additionally, anastomotic bleeding is a relatively rare complication. We must take into consideration that both the partial gastrectomy group and transhiatal oesophagectomy group each had only one patient.

Lack of a significant correlation between the stage of disease and complication type or successful outcome could be attributed to the fact that the incidence of complications and the successful outcome of endoscopic procedures were more dependent on technical execution of surgical and endoscopic procedures.

Of the total number of oesophagectomies (61 patients), one (1.64%) patient experienced anastomotic bleeding, five (8.20%) patients had anastomotic insufficiency, and nine (14.75%) patients had anastomotic strictures. Mortality as-

sociated with oesophagectomy complications was 4.92% (3 out of 61 patients), consistent with literature data for specialised centres (around 5%) (Aramesh *et al.*, 2019).

Frequency of strictures was similar or lower than that described in the literature. Ahmed *et al.* (2017) reported a 24.5% frequency of anastomotic strictures in patients after oesophageal resection (Wichmann *et al.*, 2022), while Helminen *et al.* (2019) reported 16.7% in 2019. Strictures requiring three or more dilation procedures were amounted to 6.6% (Helminen *et al.*, 2019).

Incidence of anastomotic defects after oesophagectomy was five of 61 (8.20%) patients, which corresponds to complication rates mentioned in other studies — 10% (Ozawa *et al.*, 2020) and 11.4% (Low *et al.*, 2019). Bizakis *et al.*, reported anastomotic defects in 6% of cases in a group of 50 patients after Ivor-Lewis oesophagectomy (Bizakis *et al.*, 2006).

In a study by Gubler *et al.* (2019), preventive endoscopic vacuum therapy (pEVT) was applied to 20 patients after oesophagectomy — 30-day mortality was 0%, and anastomotic healing was successful in 19 of 20 (95%) anastomoses. Except for one case of device proximal dislocation, no complications were observed with the method's application.

In several studies, the use of EVT for anastomotic insufficiency showed effectiveness ranging from 66.70% to even 100% (de Moura *et al.*, 2019). It can be concluded that despite good results in anastomotic defect closure in our study (85.7%), in the long term, both EVT and preventive endoscopic vacuum therapy (pEVT) could be more frequently used for anastomotic insufficiency.

In the literature, the frequency of bleeding after oesophagectomy in oesophageal cancer patients is described at around 2% (Schieman *et al.*, 2012). In this study, the incidence of anastomotic bleeding after oesophagectomy was similar (1.64%).

Currently, there are no extensive studies in the literature on the use of OTSC (Over-The-Scope Clips) following oesophagectomies with subsequent anastomotic haemorrhage. Impairment of anastomotic blood circulation due to the clip may be possible. However, Tontini *et al.* (2013) described the application of OTSC for anastomotic bleeding after Billroth I resection (Wichmann *et al.*, 2022).

The mineral-based absorbent Hemospray (TC-325) is a biologically inert powder, which forms a mechanical barrier when comes in contact with fluid. Application of haemostatic powder in cases of anastomotic bleeding has been described in only a few clinical reports. Granata *et al.* reported the successful use of Hemospray in a patient with bleeding from a gastroenteric anastomosis (Granata *et al.*, 2015; Wichmann *et al.*, 2022).

Data comparing complications in patients undergoing trans-thoracic oesophagectomy (TTE) and transhiatal oesophagectomy (THE) in literature differ. Schlottmann *et al.*

noted that there were no statistically significant difference in the frequency of anastomotic insufficiency (THE 7.6% vs. TTE 9.4%, $p = 0.35$) and mortality (THE 2.3% vs. TTE 2.5%, $p = 0.63$) (Schlottmann *et al.*, 2017). Yalav *et al.* also found no significant difference in the incidence of complications and mortality (Yalav *et al.*, 2020). Takahashi *et al.* reported more frequent postoperative complications in THE (44.7%) compared to 29% in the TTE group ($p < 0.01$), with rates of anastomotic insufficiency in TTE and THE groups being 4.3% and 9.8%, respectively ($p = 0.1$). The incidence of anastomotic stricture was 7% in the TTE group and 26.5% in the THE group ($p < 0.001$). Different data in various studies comparing TTE and THE groups indicate that the differences in complications are mainly influenced by the size of the patient population and the experience of the operating surgeons (Takahashi *et al.*, 2021; Zhengyan *et al.*, 2018).

From the total number of partial gastrectomies (293 patients), one (0.34%) patient experienced anastomotic bleeding, and one (0.34%) had anastomotic stricture. From the total number of total gastrectomies (233), one (0.43%) patient had anastomotic bleeding, two (0.86%) had anastomotic insufficiency, and two (0.86%) had anastomotic stricture.

Qi *et al.* in a meta-analysis in 2016 also compared total gastrectomy (TG) and distal gastrectomy (DG) in cases of distal gastric cancer. They analysed ten retrospective cohort studies and one randomised controlled trial, involving 5447 patients. The analysis showed no statistically significant differences in postoperative mortality (OR 1.48; 95% CI, $p = 0.12$). The TG group had a higher incidence of postoperative intra-abdominal abscesses (OR 3.41; 95% CI, $p < 0.05$). There were no statistically significant differences in anastomotic insufficiency, intestinal obstruction, postoperative bleeding, anastomotic stricture, and wound infections ($p > 0.05$) (Qi *et al.*, 2016).

Kim *et al.* analysed risk factors for postoperative bleeding from the anastomosis after gastrectomy in a study with 2031 patients. Bleeding occurred in seven patients. The frequency of bleeding did not differ between subtotal and total gastrectomy ($p = 0.6780$). TNM stage also did not show statistically significant difference compared to the group without bleeding (Kim *et al.*, 2012).

In our study, mortality in the anastomotic insufficiency group was one of seven (14.29%) patients. The patient had a graft necrosis after oesophageal reconstruction with colon interposition. In the anastomotic stricture group, the mortality rate was two of twelve (16.67%) patients. The causes of death were graft necrosis and sepsis. Graft necrosis after oesophageal reconstruction is a severe complication after oesophagectomy, often resulting in defect development. It occurs in approximately 2% of cases but can reach 13% in the laparoscopic group. Mortality can reach up to 90% as complications develop (Yalav *et al.*, 2020).

ETHICS

Ethical approval was received from Ethics Committee for Clinical Research at Development Society of Pauls Stradiņš Clinical University Hospital.

STUDY LIMITATIONS

One of the study limitations was a small number of patients. To ensure more precise statistically significant correlations using the analysis methods applied in IBM SPSS, a recommended minimum of five patients per group is suggested. A larger sample size would improve precision of statistical analysis.

There were also limited technical capabilities of the endoscopy department. Methods such as VAC stents or absorbable agents (Hemospray, etc.) for treating complications were not available for the patient sample group.

In addition, the Oncology Centre of Latvia had previous clinical cases involving EVAC application, but this method was not used in the patient sample group. The broader application of this method in future clinical practice could improve treatment outcome and allow for the expansion of the study by including a group of patients treated with EVAC for anastomotic insufficiency.

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Received 26 June 2024

Accepted in the final form 24 July 2024

TERAPEITISKĀS ENDOSKOPIJAS PIELIETOŠANA PĒC RADIKĀLAS AUGŠĒJĀ KUŅĢA–ZARNU TRAKTA VĒŽA ĀRSTĒŠANAS RĪGAS AUSTRUMU KLĪNISKĀ UNIVERSITĀTES SLIMNĪCĀ

Pētījuma mērķis bija novērtēt terapeitiskās endoskopijas pielietojumu Rīgas Austrumu klīniskās universitātes slimnīcas “Gaiļezers” un “Latvijas Onkoloģijas centrs” pacientiem ar barības vada un kuņģa vēzi pēc radikālas ķirurģiskas terapijas. Tika atlasīta 22 pacientu grupa, kuriem pēc radikālas ezofagektomijas un gastrektomijas attīstījās tādas komplikācijas kā anastomozes insuficiences, anastomozes asiņošana un anastomozes striktūra, kam bija nepieciešama endoskopiska ārstēšana. Statistiskai analīzei tika izmantotas *IBM SPSS* un *MS Excel* programmas. Tika meklēta korelācija starp pacienta vecumu, diagnozi, procesa stadiju, veiktās operācijas veidu un specifiskām komplikācijām, pielietoto endoskopisko manipulāciju biežumu, atkārtoto procedūru nepieciešamību, sekmīgu endoskopisku iznākumu un mirstību. Vecumam, diagnozei un vēža stadijai nebija statistiski nozīmīgas korelācijas ar iepriekš minētajiem faktoriem. Operācijas veidam atrasta statistiski nozīmīga korelācija ar asiņošanas komplikāciju attīstību (*Fisher's Exact test* $p = 0,040$). *Ivor Lewis* ezofagektomijas grupā nebija pacientu ar anastomozes asiņošanu. Operācijas veidam nebija statistiski nozīmīgas atšķirības stentēšanas biežumu, defekta slēgšanas pēc stentēšanas, bužēšanas biežumu, atkārtoto procedūru nepieciešamību, mirstību un sekmīgu endoskopisku iznākumu ziņā. Pētījuma grupā komplikācijas un endoskopisko metožu efektivitāte salīdzinājumā ar zinātniskajā literatūrā aprakstītajiem pētījumiem uzrādīja līdzīgus rezultātus. Var secināt, ka, ieviešot jaunas endoskopiskas ārstēšanas metodes, piemēram, pENPT, VAC stentus, OTSC hemostātiskos klipšus un hemostātiskos pulverus, nākotnē var uzlabot ārstēšanas rezultātus.