



Original article

Oesophagogastric anastomosis complications in the Ivor Lewis operation

Álvaro Díaz de Liaño Argüelles,^{a,*} Gustavo Sánchez García,^b
Concepción Yárnoz Irazábal,^a Alicia Artajona Rosino^a

^aUnidad Esófago-gástrica, Área de Cirugía, Complejo Hospitalario de Navarra, Pamplona, Navarra, Spain

^bClínica Quirúrgica 2, Hospital Maciel, Facultad de Medicina, Universidad de la República, Montevideo, Uruguay

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Introduction: Oesophagectomy is the principal treatment for cancer of the oesophagus. The oesophagogastric anastomotic leak is a serious complication of the Ivor Lewis operation, and is associated with increased mortality. The objective of this study is to analyse its incidence, its diagnosis and treatment results.

Material and methods: A descriptive analysis of a consecutive series of oesophagectomies, carried out during a 5 year period, using the Ivor Lewis technique. All patients had hand sewn anastomosis. Data were collected on general morbidity, anastomosis leak, hospital mortality, survival, and stenosis of the anastomosis.

Results: A total of 41 intrathoracic anastomoses were performed. Complications, of any type, were observed in 49% of cases, of which 3 (7.3%) were anastomotic leaks, one of them asymptomatic. One patient was urgently reoperated, and two others were treated with drains and conservative treatment. The mortality of the series was 7.3%, none associated with the anastomotic leak. The survival at 5 years was 27%, and 34% of the patients developed stenosis of the anastomosis.

Conclusions: Intrathoracic anastomosis after oesophagectomy, in our experience, can be performed with a low incidence of anastomotic leaks and without mortality due to this cause. Their treatment must be individualised and a considerable proportion do not require surgical intervention.

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Complicaciones de la anastomosis esofagogástrica en la operación de Ivor Lewis

R E S U M E N

Introducción: La esofagectomía es el principal tratamiento del cáncer de esófago. La dehiscencia de la anastomosis esofagogástrica es una complicación grave de la operación de Ivor Lewis que se asocia a una elevada mortalidad. El objetivo de este estudio es analizar su incidencia, su diagnóstico y los resultados del tratamiento.

Palabras clave:

Esofagectomía

Anastomosis esófago-gástrica intratorácica

Dehiscencia

*Corresponding author.

E-mail address: adiazdea@cfnavarra.es (Á. Díaz de Liaño Argüelles).

Material y métodos: Análisis descriptivo de una serie consecutiva de esofaguectomías según la técnica de Ivor Lewis realizadas durante 5 años. Todas las anastomosis se realizaron de forma manual. Se registró la morbilidad general, dehiscencia de anastomosis, mortalidad intrahospitalaria, supervivencia y estenosis de la anastomosis.

Resultados: Se realizaron 41 anastomosis intratorácicas. Se presentaron complicaciones, de cualquier índole, en el 49% de los casos y se diagnosticaron 3 dehiscencias de la anastomosis (7,3%), una de ellas asintomática. Se reintervino de urgencia a un paciente, y los otros dos fueron tratados con drenajes y tratamiento conservador. La mortalidad de la serie fue del 7,3%, ninguna relacionada con la dehiscencia. La supervivencia a los 5 años fue del 27%. Un 34% de los pacientes desarrollaron estenosis de la anastomosis.

Conclusiones: La anastomosis intratorácica tras esofaguectomía puede realizarse, en nuestra experiencia, con una baja incidencia de dehiscencias y sin mortalidad por esta causa. El tratamiento de las mismas debe individualizarse y una parte considerable no precisa reintervención quirúrgica.

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Introduction

Cancer of the oesophagus is a neoplasm with poor prognosis mainly because the diagnosis is made in the advanced stages of its evolution, when curative treatment is often too late to be effective. Patient comorbidity is also an important associated risk factor, as well as the inherent complexity of associated surgery.¹⁻³ As part of a multidisciplinary approach to treatment, whether it is curative or palliative, surgery is the first therapeutic option, as only chemotherapy and/or radiation therapy have not shown better results.⁴⁻⁷ Despite advances in anaesthesia, surgery and postoperative care, surgical treatment is associated with significant morbidity and mortality, although the latter has decreased in recent years.

After oesophageal resection, gastrointestinal continuity is restored via a gastroplasty. Oesophagogastric anastomosis leakage is a major complication and the leading cause of postoperative mortality.⁸⁻¹⁰ Intrathoracic anastomosis has been associated with a lower incidence of leakage but increased morbidity and mortality. Various techniques to reduce its frequency have been studied: manual or mechanical suture (without either being clearly shown to be superior), ischaemic preconditioning and using different suture material types. Nevertheless, the frequency of the anastomosis leakage described in the literature ranges between 0% and 11.6%. The main late complication of intrathoracic anastomosis is stenosis, which can vary between 20% and 40% in highly specialised surgical teams, with influencing factors being a history of leakage and whether manual or mechanical anastomosis is performed.¹⁰⁻¹⁴

The aim of this study was to analyse the frequency, characteristics and treatment results of intrathoracic oesophagogastric anastomosis leakage.

Material and methods

Patients

A descriptive analysis of a consecutive series of patients undergoing an Ivor Lewis oesophagectomy (laparotomy, right thoracotomy and gastroplasty) during a 5-year period (2004-2008) in the *Unidad de Cirugía Esófago-gástrica del Complejo Hospitalario, Navarra*, (gastro-oesophageal surgery unit, Navarra hospital), Pamplona. Oesophagectomies performed during this period using another surgical technique were excluded.

Surgical technique and perioperative care

Two-field lymphadenectomy was performed (with the fatty lymph tissue next to the carina, posterior mediastinum and perioesophageal area included in the chest phase). Gastroplasty was performed with a mechanical stapler, with vascularisation depending exclusively on the right gastroepiploic and pyloric arteries. Extramucous pyloromyotomy was performed and a feeding jejunostomy was added in all cases. Oesophagogastric anastomosis was performed manually in all cases in a plane with long-term absorbable suture, while located in the apex of the thorax. A nasogastric catheter was inserted through the anastomosis towards the region above the pylorus and left connected to gentle intermittent aspiration. The nasogastric tube was removed on the third or fourth day after the operation. Jejunostomy tube feeding was begun on the third day. On day eight after the operation, radiological monitoring of the oesophageal anastomosis was performed, using water-soluble contrast, and oral feeding started if normal status had returned. If intrathoracic anastomotic leakage was clinically suspected, an urgent x-ray test and computed tomography (CT) with contrast or endoscopy was carried out. All patients were operated on by the same surgeon.

Postoperative morbidity was defined as the presence of complications of any severity, and mortality as death from any cause within 30 days after surgery. Postoperative follow-up was performed with clinical controls and periodic checks. Examinations included CT and laboratory analysis with CEA and CA 19-9 markers.

Statistical analysis

Quantitative variables were expressed as mean and standard deviation (SD) if they were normally distributed (according to the Kolmogorov-Smirnov test), or median and interquartile range if not. Qualitative variables were expressed as frequencies and percentages. Survival analysis was performed using the Kaplan-Meier method with the log-rank test used to calculate statistical differences. *P* values less than 0.05 were considered statistically significant. The SPSS programme for Windows v17.0 (SPSS Inc, Chicago, IL, USA) was used for statistical analysis of all data.

Results

During this period of 5 years, 53 patients underwent oesophagectomy, and intrathoracic oesophagogastric anastomosis was performed in 41 of them, which are those included in this study. The patient characteristics are shown in Table. There were 33 males (80.5%) and 8 females with a mean age of 61.9 (SD, 10.3). Thirty-nine patients underwent oesophagectomy as treatment for oesophageal cancer. The other two resected cases were for benign, non-dilatable intrathoracic oesophageal stenosis. The mean number of lymph nodes resected was 18.5 per case (SD, 9.7). Three out of the 39 patients (7.7%) received neoadjuvant radiotherapy and chemotherapy, according to the Al-Sarraf scheme.¹⁵ The resection was R0 in 38 cases (97.4%), and R2 in the other.

Complications were found in 20 out of the 41 patients (48.8%), and some patients had more than one. The most common complications were respiratory: atelectasis, which resolved spontaneously in 2 cases (4.9%), pneumonia in 6 cases (14.6%) and empyema in one case (2.4%). There were four cases (9.8%) of arrhythmia (atrial fibrillation) that required only medical treatment and had no consequences. There were 3 cases diagnosed with gastro-oesophageal anastomotic leaks (7.3%). One patient required re-operation: a 62-years old man with locally advanced squamous cell carcinoma adjacent to the carina who had not received neoadjuvant treatment. He presented with severe chest pain and respiratory failure on the eighth postoperative day. A chest CT scan was performed, which showed leakage of water-soluble contrast into the mediastinum. The surgery was repeated, and partial leakage was found at the anterior edge of the anastomosis with well vascularised margins. It was repaired with discontinuous suture and the patient recovered and was discharged 28 days after the initial surgery. A year and a half after surgery he remained asymptomatic. The second case was a 52-year old male with a very advanced lower oesophageal adenocarcinoma, who had received prior cancer treatment with the Al-Sarraf

Table 1 – Oesophagectomy with intrathoracic anastomosis

	n	%
ASA		
I	2	4.9
II	13	31.7
III	25	61.0
IV	1	2.4
Histological type		
Adenocarcinoma	21	51.2
Squamous cell	18	43.9
Non-tumour	2	4.9
Tumour location (39 cases)		
Adjacent to carina	5	12.8
Within carina	14	35.9
Lower oesophagus	20	51.3
T category		
Is	1	2.6
1b	5	12.8
2	3	7.7
3	23	59.0
4	7	17.9
Lymph node metastasis		
N0	15	38.5
N+	24	61.5
Stages (TNM 6th edition)		
0	1	2.6
I	5	12.8
IIA	6	15.4
IIB	2	5.1
III	21	53.8
IV	4	10.3

ASA indicates American Society of Anesthesiologists.

scheme. Given the apparent good clinical response, he was reconsidered for surgical treatment when, on the eighth postoperative day, purulent material was observed from the thoracotomy scar, associated with fever and leukocytosis. An urgent x-ray and endoscopic examination revealed partial leakage at the oesophagogastric anastomosis. An appropriate thoracic drainage tube was used and the clinical outcome was favourable. The closure of the leak was confirmed and the patient was discharged 35 days after surgery. At 2 years follow-up, he was still asymptomatic. The third case was a 61-year old male with a history of multiple vascular diseases and chronic obstructive pulmonary disease who underwent surgery for an intramucosal adenocarcinoma on Barrett's oesophagus. The operation revealed a weak pulse in the gastroepiploic arcade. He was asymptomatic on the seventh postoperative day, when the x-ray study revealed a small leak at the anastomosis which evolved favourably with medical treatment. After 5 years, he was still asymptomatic. Other surgical complications were superficial infection of the surgical wound in 3 cases (7.3%) and contained evisceration in 1 case (2.4%).

Postoperative mortality was 3 cases (7.3%), but none due to anastomotic leakage. The first patient died suddenly on the

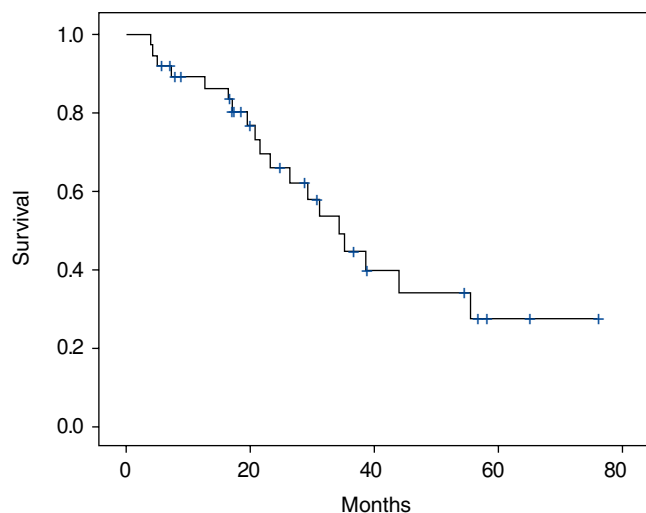


Figure 1 – Overall survival in the series.

third day after the intervention, with the autopsy showing a myocardial infarction. The second, with a history of chronic obstructive pulmonary disease and an ASA anaesthetic risk III, died of respiratory sepsis on the ninth day. The third patient, also with a history of significant respiratory problems, died after 20 days due to progressive respiratory failure.

Overall survival at 5 years of the 39 cases undergoing surgery for a tumour was 27.1% (Figure 1), with a median of 34.4 months. The median survival by histological type was 44.1 and 26.4 months for adenocarcinoma and squamous cell carcinoma, respectively, with no statistically significant differences ($P=.071$). According to the presence or absence of lymph-node metastases, this was 22 and 56 months, respectively, with significant statistical difference ($P=.008$), see Figure 2.

At some point during the follow-up, oesophagogastric anastomosis stenosis was found in 14 cases (34%), with an endoscopic dilation average of 3.9 (SD 2.9, range 1-8),

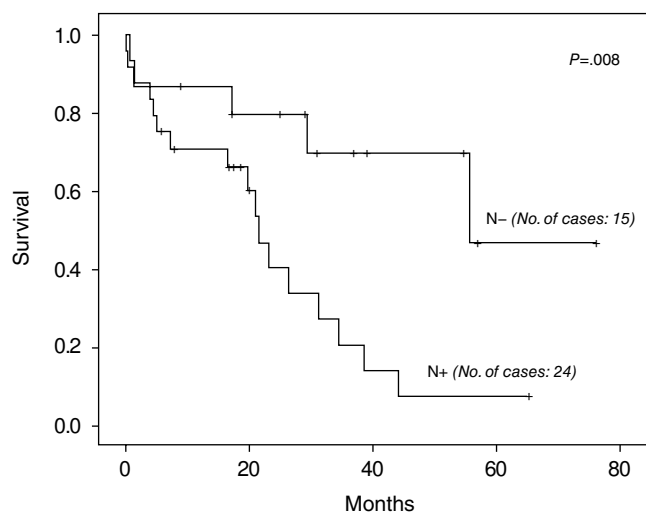


Figure 2 – Comparison of survival according to lymph node metastasis.

although 43% required 2 or less dilations. The three reported anastomosis leak cases required dilation in the subsequent follow-up (the first case, once, and the other two, eight times). Prosthesis was not used in any of the cases.

Discussion

Overall morbidity in our series was between 27% and 67%, which was within the range reported by other authors, considering that all postoperative complications were included, regardless of their importance.¹⁶⁻²² Overall postoperative mortality was around 7%-8%, although in recent years lower mortality has been reported for specialised groups. In our series, there was no mortality due to anastomosis leakage even though over 60% of cases had an ASA anaesthetic risk of III or IV.¹⁶⁻²¹

The incidence (7.3%) of anastomotic leakage in our series was acceptable, as it was within the range published by several specialist groups, especially considering that one of the three cases was asymptomatic and was detected only after a radiology test.^{11-14,23-25}

The factors involved in the increased leakage risk are diverse. Chemotherapy and radiotherapy are often part of the treatment for these patients, and this is considered a risk factor in overall complications, especially in anastomotic leakage, although this has not been confirmed by all authors.^{4,7,23,26-29} Only 1 out of the 3 patients undergoing neoadjuvant treatment in our series had a suture leak, although the low number of cases does not allow us to draw any conclusions. Ischaemia of the gastropasty is another factor that clearly affects leakage incidence, and its vascularisation has been therefore studied and various techniques have been developed to improve it.^{12,26,30-32} Only one patient in our series had a weak pulse in the gastroepiploic arcade (it was one of the leakage cases). However, this was minimal and did not require specific treatment. Other technical factors that clearly reduce the leak rate are adequate haemostasis, R0 resection type and careful tissue handling.²³ Neither manual nor mechanical techniques used showed any significant differences in the leakage rate.^{8,11,13} In addition, the versatility of manual suturing is suited to different anatomical situations: thread diameter, and anastomosis location. In general, mechanical suturing is considered technically easier to perform and to be learned by surgeons in training. However, no method has yet succeeded in demonstrating its superiority over the other, thus leaving the choice of technique to the surgeon's preference. Our patients received one-plane manual discontinuous suture in all cases, which were preferred for their versatility and safety. We believe that another factor that could explain the low number of leaks is the application of proper technique, as there was only one case with an R2 type resection involving the side margin and not the proximal or distal margins.

Accurate and early diagnosis of leakage is critical, as it enables adequate treatment while influencing patient outcomes.²⁴ The clinical presentation varies widely, depending on the extent, location and cause of the leakage

(whether oesophagogastric anastomosis, gastroplasty or necrosis). It may occur as purulent material in pleural drainage and/or intrathoracic collection and be accompanied by sepsis or, more insidiously, with fever, leukocytosis and no pathological content in the pleural drainage.⁹ The first two cases in this series presented with symptoms of leakage, although with greater and more rapid general deterioration in the first case, while the third case was totally asymptomatic, which was in accordance with the degree of leakage. The two symptomatic cases occurred on the eighth postoperative day, similar to those reported in other series.^{14,24} Given the difficulties of diagnosis in cases which are not obvious and the risk of starting the oral route in leakage cases, monitoring for clinical signs is essential, as well as the availability of diagnostic methods such as contrast radiology, CT and endoscopy. Gastro-oesophageal contrast radiological studies to detect anastomotic leaks are performed routinely by most of the authors, citing the increased risk of subclinical leak when oral feeding is started.^{14,25} However, others do not use it routinely because of its low sensitivity, and use it only in patients with clinical suspicion.^{24,33} We performed it in all cases and it showed evidence of leaks without any false negatives. Therefore, we believed in performing it at all times when supported by specialist surgeons and radiologists. When water-soluble contrast shows no leakage, barium can be used, which increases its sensitivity.³⁴ CT is another useful method, primarily to assess the presence of intrathoracic collection, although a leak can also be shown by a contrast administered orally, as we observed in the first case, with even the presence of air being shown at the mediastinal level. According to a recent study, diagnostic performance would be even higher than conventional gastro-oesophageal radiology.³⁵ Endoscopy is a fundamental method to rule out ischaemia of the gastroplasty and useful for detecting leaks, but must be performed by an experienced endoscopist to prevent excessive and possibly iatrogenic inflation.⁹ We used it in one of the three cases and it gave a correct diagnosis.

Once the diagnosis was made in accordance with the clinical condition of the patient, the appropriate treatment was given. In cases with sudden onset and rapid deterioration in the general condition, usually before the seventh postoperative day, the prescribed treatment was urgent surgical intervention depending on the findings: it may have been an anastomotic leakage or necrosis of the gastroplasty. In other cases, the treatment had to be individualised. In general, conservative treatment was preferred, with antibiotics, absolute diet, adequate nutritional support and proper drainage through chest tubes or CT-guided percutaneous drainage.^{14,23–25,33,36,37} Only one patient underwent surgery for a second time in our series, with conservative treatment being performed in the other two cases. Anterior repair of the suture was performed in the re-operation. This gave good results, and this procedure is recommended by other authors in cases with good vascularisation and tissue appearance.³⁶ Our series had no mortality from this cause, whereas in the literature a typical value is between 8.5% and 35% of patients

with leakage, although some have published virtually zero mortality.^{13,14,23–25,36}

The incidence of anastomotic stenosis we observed is within that reported by other specialist groups, between 19.2% and 40%. Nevertheless, these figures may be influenced by the surgical suturing technique or the use of mechanical staplers, with notably almost half of the cases requiring a maximum of 2 dilation sessions.^{8,11,13,38}

Moreover, the overall 5-year survival obtained by other groups varied between 19% and 33%. We believe that our results, 27.1%, are acceptable given that over 60% were stage III and IV, and that surgery was the only treatment carried out for most of them.^{18,39,40} We found no differences between adenocarcinomas and squamous cell carcinomas, although we believe that the size of the sample does not allow us to draw any conclusions to that effect.^{18,41} Considering a percentage of isolated nodes per case that we believed appropriate, we found significant differences in the presence or absence of metastatic nodes, as in other series.^{29,39,40}

In conclusion, the morbidity of oesophagectomy remains high, despite falling in recent times. We believe this operation should be performed by experienced surgeons with strict criteria for surgical indication, especially in relation to cardiorespiratory risk factors. For intrathoracic oesophageal anastomosis, we believe that our results showed that it is possible to perform this with a low leakage incidence and reduced mortality. This confirms the relationship between the experience of surgeons and surgery teams, and the number of leaks. The factors that we consider fundamental are surgical technique and perioperative care, a multidisciplinary team, close monitoring of clinically suspicious signs, availability of diagnostic resources, surgical reintervention only in some cases, as well as proper drainage for leaks and collections.

Conflict of interest

The authors declare they have no conflict of interest.

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