

**IMPACT OF RESPIRATORY COMPLICATIONS AND ANASTOMOTIC
LEAKAGE ON HEALTH-RELATED QUALITY OF LIFE FOLLOWING
THORACOSCOPIC ESOPHAGECTOMY**

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Abstract

Objectives: To evaluate health-related quality of life (QoL) in patients undergoing thoracoscopic esophagectomy (TE) and the impact of respiratory complications and anastomotic leakage on health-related QoL at 3 months postoperatively. **Methods:** A prospective, descriptive study was conducted on 70 patients with esophageal cancer who underwent TE at Military Hospital 103 and 108 Military Central Hospital between June 2022 and June 2024. QoL was assessed using the European Organisation for Research and Treatment of Cancer QoL Questionnaire - Esophageal Module (EORTC QLQ-OES18) preoperatively and at 1, 3, and 6 months after surgery. **Results:** The incidences of respiratory complications and anastomotic leakage were 18.6% and 7.1%, respectively. At 3 months postoperatively, patients with respiratory complications had significantly higher scores for cough and esophageal pain compared with those without complications (68.2 vs. 52.1 and 64.1 vs. 51.8, respectively; $p < 0.05$). Anastomotic leakage was associated with significantly higher dysphagia scores (67.0 vs. 54.3; $p = 0.04$) and greater eating restrictions (73.1 vs. 53.0; $p = 0.001$). Overall QoL showed gradual improvement from 3 to 6 months after surgery. **Conclusion:** Respiratory complications and anastomotic leakage are major determinants of early deterioration in QoL after esophagectomy, particularly affecting cough, esophageal pain, and eating function.

Keywords: Esophageal cancer; Thoracoscopic esophagectomy; Health-related quality of life.

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INTRODUCTION

Thoracoscopic esophagectomy with gastric conduit reconstruction is the mainstay of treatment for patients with localized esophageal cancer. As a major and complex surgical intervention, TE significantly affects patients' overall health, digestive function, psychological status, and postoperative recovery [1, 2].

In clinical practice, many patients experience persistent postoperative problems, including weight loss, gastroesophageal reflux, prolonged dysphagia, cervical or thoracic pain, cough, hoarseness, reduced appetite, and impaired social interaction. Although these symptoms are seldom life-threatening, they may persist over time and substantially reduce patient satisfaction after treatment. Therefore, assessment of QoL has emerged as a critical outcome measure for cancer treatment efficacy and serves as an essential component in developing comprehensive and individualized postoperative care plans [3, 4].

QoL assessment using the EORTC QLQ-OES18 questionnaire was specifically designed for patients with esophageal cancer. This instrument comprises 18 items that provide an in-depth evaluation of five major symptom domains, including dysphagia, eating-related problems, pain, reflux, and six single-item symptom scales. The EORTC QLQ-OES18 has been

widely validated and demonstrated to be a reliable and effective tool in clinical research and practice [5].

In Vietnam, studies investigating QoL after TE remain limited, particularly those employing disease-specific instruments such as the EORTC QLQ-OES18. Consequently, this study aimed to: *Evaluate health-related QoL following TE and assess the specific impact of respiratory complications and anastomotic leakage on patient outcomes at 3 months postoperatively.*

MATERIALS AND METHODS

1. Subjects.

A total of 70 patients with esophageal cancer who underwent TE with gastric conduit reconstruction at Military Hospital 103 and 108 Military Central Hospital between June 2022 and June 2024 were included.

** Inclusion criteria:* Patients diagnosed with stages I, II, or III thoracic esophageal cancer according to the American Joint Committee on Cancer (AJCC) classification, those who underwent TE with esophageal replacement using a gastric conduit reconstruction.

** Exclusion criteria:* Patients with severe psychiatric or neurological disorders hindering questionnaire completion, and those who were lost to follow-up at the scheduled assessment intervals.

2. Methods.

* *Study design:* A prospective, descriptive study.

* *Study procedures and outcome measures:*

Patients underwent TE with two-field lymphadenectomy, which was indicated for cancers of the middle and lower thirds of the esophagus. A gastric conduit was used to replace the resected esophageal segment and was positioned in the posterior mediastinum. Cervical esophagogastric anastomosis was performed in all cases.

Health-related QoL was assessed using the EORTC QLQ-OES18 questionnaire, which consists of 18 items grouped into five main symptom domains: (1) Dysphagia - 3 items; (2) eating restrictions - 3 items; (3) esophageal pain - 3 items; (4) reflux symptoms - 2 items; (5) trouble with social eating - 2 items. In addition, several single-item symptoms were evaluated, including cough, speech difficulty, dry mouth, altered taste sensation, and severe cough. Scoring method: Responses were recorded using a four-point Likert scale: 1 = not at all; 2 = a little (mild symptoms, occurring occasionally and not affecting daily activities); 3 = quite a bit (moderate symptoms, occurring frequently and partially affecting eating or daily activities); 4 = very much, reflecting the severity and frequency of symptoms and their impact on daily activities).

Transformation to a 0 - 100 scale:

Step 1: Raw score (RS) calculation:

$$RS = \frac{\text{sum of item scores}}{\text{number of items}}$$

Step 2: Linear transformation using the formula:

$$\text{Score} = \frac{RS - 1}{3} \times 100$$

Example: For the dysphagia scale with three items, if the scores were 2, 2, and 3, the total score would be 7. The RS would be $7/3 = 2.33$. The transformed score would be: $\text{Score} = [(2.33 - 1) / 3] \times 100 = 44.4$. Interpretation of scores: For symptom scales, higher scores indicate greater symptom severity.

* *Data collection:* Assessment time points: Questionnaires were administered preoperatively (baseline), and at 1 month, 3 months, and 6 months postoperatively. Patients were instructed to complete the questionnaires independently. If a patient was unable to do so, a trained investigator provided assistance in accordance with standardized instructions to ensure objectivity.

* *Statistical analysis:* Data were processed and analyzed using SPSS software.

3. Ethics

The study was approved by the Ethics Committee of Military Hospital 103 (Approval No. 193/CNChT-HĐĐĐ, dated December 9, 2022). The research data were authorized for use and publication by Military Hospital 103 and 108 Military Central Hospital. The authors declare no conflicts of interest related to this study.

RESULTS

The study comprised 70 male patients with mean age of 59.0 ± 7.9 years. A history of heavy smoking and alcohol consumption was reported in 42 patients (60.0%) and 39 patients (55.7%), respectively. Neoadjuvant chemoradiotherapy was administered in 77.1% of patients prior to surgery. Regarding tumor location, tumors were located in the middle third of the esophagus in 60% of cases and in the lower third in 40%.

Table 1. Intraoperative and postoperative characteristics (n = 70).

Intra-and postoperative characteristics	Values ($\bar{X} \pm SD$, median (Q1 - Q3), or n (%))
Operative time (minutes)	254.3 $\pm$ 34.9
Estimated blood loss (mL)	80 (50 - 100)
Postoperative ICU stay	18 (25.7)
Duration of endotracheal intubation (hours)	0.7 (0.5 - 1.0)
Duration of pleural drainage (days)	4.7 $\pm$ 1.5
Time to first flatus (days)	3.2 $\pm$ 0.9
Time to initiation of oral liquid intake (days)	7.0 $\pm$ 1.2
Postoperative hospital stay (days)	11.0 (9.0 - 14.0)
Total number of harvested lymph nodes	26.0 (21.8 - 34.0)
Respiratory complications	13 (18.6)
Anastomotic leakage	5 (7.1)
Chylous leakage	2 (2.9)
Mortality	2 (2.9)
Tumor (pTx):	
T0 / T1	18/19 (25.7 / 27.2)
T2 / T3	15/18 (21.4 / 25.7)
Nodes (pNx):	
N0	45 (64.3)
N1	14 (20.0)
N2	11 (15.7)
Stage (pTNM):	
0	13 (18.6)
IA/IB	2/14 (2.9/20.0)
IIA/IIB	11/10 (15.7/14.3)
IIIA/IIIB	5/15 (7.1/21.4)

Anastomotic leakage occurred in 5 patients (7.1%). Postoperative respiratory complications were the most common (18.6%). 2 patients (2.9%) died postoperatively, 1 due to pneumonia and 1 chylous leakage.

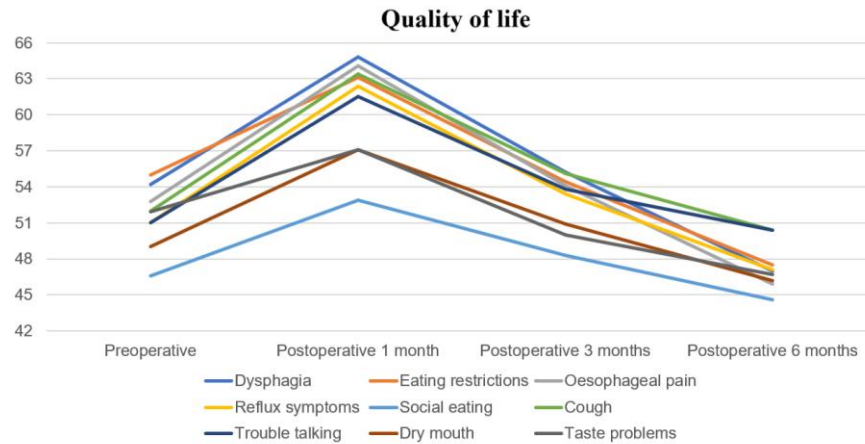


Figure 1. Mean scores of functional domains and symptom scales according to the EORTC QLQ-OES18 at different assessment time points.

QoL assessment using the EORTC QLQ-OES18 showed higher symptom scores during the first month after surgery, followed by a marked improvement between 3 and 6 months postoperatively.

Table 2. Association between symptom domains of the EORTC QLQ-OES18 and postoperative respiratory complications.

Symptom scales (EORTC QLQ-OES18) at 3 months postoperatively	Respiratory complications		p
	No (n = 57)	Yes (n = 13)	
Dysphagia	54.5 ± 13.4	58.2 ± 13.0	0.37
Eating	53.8 ± 12.5	57.2 ± 11.9	0.38
Esophageal pain	51.8 ± 11.2	64.1 ± 16.6	0.02
Reflux	53.5 ± 10.4	52.6 ± 9.4	0.77
Social eating	48.2 ± 9.9	48.7 ± 10.8	0.86
Coughing	52.1 ± 16.4	68.2 ± 16.8	0.006
Talking	52.1 ± 17.6	61.1 ± 23.0	0.21
Dry mouth	50.9 ± 16.5	50.7 ± 17.1	0.97
Taste	49.2 ± 16.6	53.3 ± 16.7	0.53

At 3 months after surgery, patients with postoperative respiratory complications had higher symptom scores than those unaffected by these complications; however, statistically significant differences were limited to cough and esophageal pain across groups.

Table 3. Association between selected EORTC QLQ-OES18 symptom scores at 3 months and anastomotic leakage.

Symptom scales (EORTC QLQ-OES18) at 3 months postoperatively	Anastomotic leakage		p
	No (n = 65)	Yes (n = 5)	
Dysphagia	54.3 ± 12.8	67.0 ± 15.6	0.04
Eating	53.0 ± 11.4	73.1 ± 9.6	0.001
Esophageal pain	54.4 ± 13.5	48.8 ± 6.6	0.36
Reflux	53.6 ± 10.1	50.0 ± 11.8	0.45
Social eating	47.9 ± 9.6	53.4 ± 14.0	0.24
Coughing	55.8 ± 17.4	46.2 ± 18.0	0.24
Talking	54.4 ± 19.0	46.2 ± 18.1	0.36
Dry mouth	51.3 ± 16.5	46.2 ± 18.1	0.51
Taste	49.8 ± 16.6	52.8 ± 18.0	0.69

At 3-month follow-up, patients with anastomotic leakage had higher symptom scores compared to their counterparts. Specifically, dysphagia and eating restrictions demonstrated statistically significant differences between the two groups.

DISCUSSION

Our study demonstrates that TE is a technically demanding procedure, while the overall complication rate remains within acceptable limits (with a mean operative time of 254.3 minutes, and complication rates comparable to those reported in recent literature). In this study, 18.6% of patients developed postoperative respiratory complications, and 7.1% experienced anastomotic leakage. The presence of both complications is clinically significant with substantial impact on postoperative recovery and health-related QoL.

Assessment of QoL using the EORTC QLQ-OES18 questionnaire allows quantitative evaluation of symptom burden across specific domains, thereby clarifying the effects of postoperative complications on swallowing function, eating ability, cough, and patients' subjective perceptions. This disease-specific instrument provides valuable insight into functional outcomes that are not fully captured by conventional surgical endpoints. This highlights the importance of incorporating patient-reported outcomes into the comprehensive evaluation of treatment efficacy after esophagectomy.

QoL assessment at 3 months after surgery showed that patients with respiratory complications had significantly higher scores for cough (68.2 vs. 52.1) and esophageal pain (64.1 vs. 51.8) compared with those without such complications ($p < 0.05$). These findings are consistent with the pathophysiological characteristics of postoperative respiratory complications, such as pneumonia, atelectasis, or impaired pulmonary function, which are commonly associated with persistent cough and chest pain after surgery. In the study by E Jezerskyte et al., postoperative respiratory complications were associated with a temporary increase in cough scores, with recovery of this symptom typically completed within 12 months after surgery. However, no clear evidence was found for a significant difference in chest pain between patients with and without respiratory complications [6]. The incidence of respiratory complications in our study (18.6%) is comparable to the reported rates of 16 - 25% in several large-scale studies, particularly among patients with a history of smoking or pre-existing chronic pulmonary disease prior to surgery [1, 2].

In this study, the incidence of anastomotic leakage was 7.1%, which is considerably lower than the 10 - 20% rates reported in international studies [1, 2]. Despite this relatively low incidence, its impact on QoL was pronounced. At 3 months postoperatively,

patients with anastomotic leakage had significantly higher levels of dysphagia (67.0 vs. 54.3) and eating restrictions (73.1 vs. 53.0) compared with those without this complication ($p = 0.04$ and $p = 0.001$, respectively). These findings indicate that anastomotic leakage not only affects surgical outcomes but also has a substantial negative impact on eating function, a key determinant of QoL after esophagectomy.

Kauppila et al. reported that although minimally invasive surgery is associated with favorable early QoL outcomes, these benefits are diminished in the presence of postoperative complications, particularly anastomotic leakage. In patients who developed complications, OES18 symptom scores remained elevated at both 3 and 6 months, reflecting delayed and incomplete functional recovery [7]. Similarly, Nath et al. observed that in patients without postoperative complications, OES18 symptom scores - especially those related to pain and dysphagia - showed marked improvement from 3 to 6 months. In contrast, the presence of postoperative complications, including anastomotic leakage, was associated with persistently higher symptom scores, indicating that these complications delays medium-term recovery of QoL [8]. Van der Schaaf M. demonstrated that the impact of anastomotic leakage extends beyond the immediate postoperative period, resulting in

sustained functional consequences for at least 6 months. The underlying mechanisms may involve inflammation and infection around the anastomotic site, leading to fibrosis, edema, or early anastomotic stricture, which, in turn, increases pain during swallowing and restricts oral intake [9].

In our study, the majority of patients demonstrated a tendency toward improvement in QoL scores between 3 and 6 months after surgery across several symptom domains, including esophageal pain, reflux, cough, dry mouth, and taste disturbances. This pattern is consistent with international studies on recovery after esophagectomy, many of which have reported a marked decline in QoL during the first postoperative month followed by gradual improvement over time. Nevertheless, the effects of anastomotic leakage and respiratory complications persisted and remained independent factors that delayed the recovery of eating function and respiratory status [6, 8].

Notably, the postoperative mortality rate in our study was 2.9%, which is lower than the average rate of 4 - 8% reported in many previous series. This finding reflects the benefits of minimally invasive surgical techniques, advances in anesthetic management, and improvements in postoperative care. Our results further support the notion that QoL after esophagectomy is more strongly influenced by early postoperative complications than by tumor-related characteristics [1, 2].

CONCLUSION

Thoracoscopic esophagectomy was associated with improvement in patients' QoL from the third postoperative month onward, as assessed by the EORTC QLQ-OES18 questionnaire. Respiratory complications were significantly associated with increased cough and esophageal pain scores, whereas anastomotic leakage was strongly related to greater dysphagia and eating restrictions, thereby exerting a negative impact on early postoperative QoL.

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