



Transhiatal versus Left Transthoracic Esophagectomy for Gastroesophageal Junction Cancer; The Impact of Surgical Approach on Postoperative Complications

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ABSTRACT

BACKGROUND

Esophagectomy is the mainstay of treatment for esophageal cancer. Although different surgical approaches have been described, choosing the most appropriate technique is still on debate. We compared the complications of transhiatal esophagectomy (THE) versus left transthoracic esophagectomy (LTE) among a group of Iranian patients with gastroesophageal junction cancer.

METHODS

This was a retrospective study between 2011 and 2013 on 40 patients with gastroesophageal cancer. 23 patients underwent THE and the others underwent LTE. 30-day postoperative mortality, complications, duration of hospital stay, and number of dissected lymph nodes were studied.

RESULTS

37.5% of the patients had squamous cell carcinoma. No mortality was seen. Totally, 10 patients suffered from complications. Cardiac and pulmonary complications occurred in eight and six patients, respectively. No patients suffered from vocal cord injuries and anastomotic leakage. The mean duration of postoperative hospital stay was 11.82 ± 3.8 days, and the mean number of dissected lymph nodes was 8.2 ± 3.9 . No significant difference was seen between the two groups ($p > 0.05$).

CONCLUSION

Choosing between the approaches for resection of gastroesophageal cancer may not impact the complications and mortality rates. We propose that LTE approach could be used safely in comparison with THE, and that selecting between THE and LTE may be based on the surgeon's preference and experience.

KEYWORDS:

Esophagectomy, Gastroesophageal junction cancer, Transhiatal esophagectomy, Left transthoracic esophagectomy, Complication, Iran

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INTRODUCTION

Esophageal cancer is of the 10 most prevalent malignancies worldwide and tumors of the distal parts are the most common types. In spite of the advances in the fields of chemotherapy and radiotherapy, surgery is still the mainstay of treatment.^{1,2}

The selection of surgical technique for resection of distal esophageal cancers may influence the peri- and postoperative complications and the ultimate oncological outcome.³⁻⁸ Different surgical approaches have been introduced

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and among them, transhiatal esophagectomy (THE), and left transthoracic esophagectomy (LTE) are of the described techniques for lower third esophageal cancers. The main differences between these two approaches lie beneath the extent of lymph node dissection, complications, and direct or indirect access to and vision on the tumor.

Considering the LTE technique, the tumor is directly accessible and visible, and enough periesophageal lymph node dissection is possible. However, cardiopulmonary complications are the major limitations.⁹ In contrast, the THE approach has less cardiopulmonary complications and anastomotic site defects are easier to manage.¹⁰

Although choosing the appropriate surgical approach for esophagectomy is mainly on the basis of tumor location, local invasion, and surgeon's opinion and experience, the presence of complications may influence the selection. Considering the two mentioned approaches, choosing between them is still a question.

MATERIALS AND METHODS

This was a retrospective study on patients with gastroesophageal junction cancer (Siewert I and II¹¹⁻¹³) who underwent esophagectomy between 2011 and 2013 at Cancer Institute, Tehran, Iran. All of these patients had received neoadjuvant chemoradiation until 8 weeks before the surgery. Of the note, none of the included patients had any underlying disease other than esophageal cancer. The operation of all patients was performed by a single surgeon either through THE or LTE approach. The patients in each group were studied for pre- and postoperative complications and mortality.

The data were collected through reviewing the patients' files during the mentioned period. Postoperative mortality was defined as a death due to surgery until 30 days after the operation. The included complications were pulmonary ones (defined as pneumonia, chylothorax, sustained chest tube secretion, and failure to wean-off from ventilator up to 5th postoperative day), cardiac ones (defined as cardiac arrest, arrhythmia, and myocardial infarction), anastomotic leakage (defined as the presence of intestinal secretions in surgical site wound, chest tube, drains, and signs of mediastinitis and/or sepsis based on imaging findings or second surgery up to 30th postoperative day), and vocal cord injuries (defined as postoperative hoarseness

confirmed by laryngoscopic examination). Duration of postoperative hospital stay and the mean number of dissected periesophageal lymph nodes were investigated, too. To perform the statistical analysis, SPSS software (IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.) was used. A *p* value less than 0.05 was considered as statistically significant.

Regarding the surgical techniques; in THE approach, a midline laparotomy was performed and the abdomen was thoroughly explored to certainly assess the possibility of tumoral resection. Then, the esophagogastric junction was precisely located and the esophagus was completely mobilized in the abdomen and also in the thorax through the hiatus, then followed by gastrolysis and abdominal lymph node dissection. Finally, an incision in the neck was made and esophageal dissection in upper thoracic cavity was performed. Ultimately, reconstruction by an appropriate conduit was done.

On the other hand, in LTE approach, the patient was positioned at right lateral decubitus position and thoracotomy was performed at the left sixth intercostal space. Access to the abdomen was achieved through a diaphragmatic incision and esophageal mobilization and gastrolysis was done through the same incision. Following mediastinal lymph node dissection, esophagogastrotomy was done just below the aortic arch.

The Ethics Committee of Tehran University of Medical Sciences approved the protocol of the study regarding the ethical issues.

RESULTS

40 patients were included in this study, of them 23 underwent THE (57.5%). The mean age of the patients was 63.6 ± 8.3 years and 60% were male. Considering the pathology, 37.5% had squamous cell carcinoma and others had adenocarcinoma. The details of demographic and clinical characteristics of the patients and also the TNM staging of the patients before surgery are shown in table 1.

All of the patients were alive after one month of surgery. Totally, 10 patients suffered from peri- and postoperative complications. Cardiac and pulmonary complications occurred in eight and six patients, respectively. No patients suffered from vocal cord injuries and anastomotic

Table 1: Demographic, and clinical characteristics of the patients

| Variables | | THE | LTE | Total | P value |
|------------------|-------------------------|-----------|-----------|------------|---------|
| Sex, N (%) | Female | 14 (60.8) | 10 (58.8) | 24 (60) | 0.896 |
| | Male | 9 (39.1) | 7 (41.1) | 16 (40) | |
| Age, y, mean±SD | | 64 ± 9.3 | 63 ± 6.9 | 63.6 ± 8.3 | 0.701 |
| Pathology, N (%) | Adenocarcinoma | 13 (56.6) | 12 (70.5) | 25 (62.5) | 0.088 |
| | Squamous cell carcinoma | 10 (43.4) | 5 (29.5) | 17 (37.5) | |
| T staging, N (%) | T2 | 7 (30.4) | 3 (17.6) | 10 (25) | 0.159 |
| | T3 | 15 (65.2) | 11 (64.7) | 26 (65) | |
| | T4 | 1 (4.3) | 3 (17.6) | 4 (10) | |
| N staging, N (%) | N0 | 14 (60.9) | 6 (35.3) | 20 (50) | 0.118 |
| | N1 | 5 (21.7) | 6 (35.3) | 11 (27.5) | |
| | N2 | 4 (17.4) | 4 (23.5) | 8 (20) | |
| | N3 | 0 (0) | 1 (5.9) | 1 (2.5) | |

LTE: left transthoracic esophagectomy; THE: transhiatal esophagectomy

Table 2: Peri- and postoperative findings of the patients

| Variables | THE | LTE | Total | P value |
|--|-------------|----------|------------|---------|
| Complications, N (%) | 7 (30.4) | 7 (41.1) | 14 (35) | 0.423 |
| Pulmonary | 4 (17.4) | 4 (23.5) | 8 (20) | 0.463 |
| Cardiac | 3 (13) | 3 (17.6) | 6 (15) | 0.511 |
| Vocal cord injury | 0 (0) | 0 (0) | 0 (0) | NA |
| Anastomotic leakage | 0 (0) | 0 (0) | 0 (0) | NA |
| 30-day mortality, N (%) | 0 (0) | 0 (0) | 0 (0) | NA |
| Hospital stay, d, mean ± SD | 11.82 ± 3.8 | 11 ± 3.2 | 12.8 ± 4.4 | 0.140 |
| Number of dissected lymph nodes, mean ± SD | 8.2 ± 3.9 | 7.9 ± 4 | 8.6 ± 3.8 | 0.588 |

LTE: left transthoracic esophagectomy; THE: transhiatal esophagectomy

leakage. Considering the peri- and postoperative complications, no significant difference was seen between the two groups ($p > 0.05$). The details of occurred complications are shown in table 2.

The mean duration of postoperative hospital stay was 11.82 ± 3.8 , 11 ± 3.2 , and 12.8 ± 4.4 days in all patients, and patients in the THE, and LTE groups, respectively ($p > 0.05$). The mean number of dissected lymph nodes was 8.2 ± 3.9 , 7.9 ± 4 , and 8.6 ± 3.8 in all patients, and patients in the THE, and LTE groups, respectively ($p > 0.05$).

DISCUSSION

The prevalence of gastroesophageal cancer is still increasing worldwide, and considering the higher prevalence of this disease in Iran,¹⁴ which is the most western point of the Silk Road – as known as the Asian Esophageal

Cancer Belt– employing the best treatment strategy is mandatory to improve the outcomes. Esophagectomy is still the mainstay of treatment for gastroesophageal cancers.¹⁻² Of the described surgical approaches, THE and LTE are of the favorable approaches.¹⁵⁻¹⁷ Although the LTE approach is not as popular as other approaches, it is even somehow superior in some aspects to a traditionally favorable technique of right transthoracic esophagectomy.¹⁸ However, the most appropriate technique is still open to debate even among the experts in this field.¹⁹ Herein, we have studied the peri- and postoperative complications and mortality rates among Iranian patients who underwent either THE or LTE.

A meta-analysis of studies on 1155 patients with gastroesophageal cancer showed that THE resulted in decreased pulmonary complications more than transtho-

racic esophagectomy, which is in accordance with the results of a recent study on 4053 patients.^{15,20} However, another study on 942 patients showed no difference between the two approaches regarding pulmonary complications.²¹ In our study, we found no significant difference between THE and LTE groups considering peri- and postoperative pulmonary complications.

Most of the previous studies concluded that the frequency of cardiovascular complications after transhiatal and transthoracic esophagectomy are similar.^{15,20-21} Among our patients, six patients suffered from peri- and postoperative cardiac complications. However, the difference between the two groups was not significant.

Anastomotic leakage is the most catastrophic complication after esophagectomy. Some of the previous studies have shown that anastomotic leakage occurs less frequently after transthoracic esophagectomy.²²⁻²⁴ However, recent studies have concluded that there is no significant difference between the two groups regarding anastomotic leakage.^{15,20-21} Fortunately, we encountered no occurrence of such incidents. Also none of our patients suffered from vocal cord injuries after either THE or LTE.

Considering the overall frequency of peri- and postoperative complications, we found no significant difference between the two groups.

The mean duration of hospital stay was similar in the two groups in our study. However, this duration was significantly longer among the patients who underwent transthoracic esophagectomy rather than transhiatal esophagectomy based on the previous studies.²⁰⁻²¹ The absolute mean hospital stay of our patients was similar to the findings of previous studies, though.^{21,25-27}

An important prognostic factor for gastroesophageal cancer is lymph node clearance. Removal of these lymph nodes is mandatory to reach the goals of the surgery.²⁰ However, the sufficient extent of lymph node dissection is still on debate.²⁸ A recent study has shown that patients who underwent transthoracic esophagectomy had significantly more lymph nodes removed than those who underwent transhiatal esophagectomy.¹⁶ However, some other studies showed no difference between the two groups.^{20,26,29-30} Concordantly, we found no significant difference between the two groups regarding the mean number of dissected lymph nodes.

Fortunately, we encountered no cases of postoperative

deaths. Most of previous studies found no significant difference between the two groups regarding postoperative deaths and patients' survival.^{15-16,21} However, a meta-analysis in 2014 showed that transhiatal esophagectomy led to lower 30-day postoperative mortality rates.²⁰

Considering the findings of this study, LTE as a more invasive technique than THE could be used as a safe method of esophagectomy. On the other hand, our results are assuring regarding enough lymph node dissection through THE. Therefore, we concluded that each of these two techniques can be implicated based on the patient's situation and characteristics, and also the surgeon's preference and experience.

Our study was limited in some ways. First, this was a retrospective study with its potential weaknesses. Second, the sample size of the study was small. However, it should be emphasized that we excluded a notable number of patients with significant previous medical illnesses to minimize the potential selection bias on the peri- and postoperative complications. Third, the follow-up period could be longer. However, it should be considered that calculating the long-term patient survival was not of the aims of our study. Regardless of these limitations, it should be considered that this is of few studies that compared the benefits and limitations of LTE with THE. We recommend future comprehensive prospective studies with larger sample size and longer follow-up periods.

As a conclusion, we found no significant difference between THE and LTE regarding peri- and postoperative complications, mean number of dissected lymph nodes, mean duration of hospital stay, and post-operative mortality rates. Therefore, we suggest that choosing between the approaches for resection of gastroesophageal cancer may not impact peri- and postoperative complications and mortality rates. We propose that the LTE approach could be used safely in comparison with THE, and that selecting between THE and LTE may be based on the surgeon's preference and experience.

ETHICAL APPROVAL

There is nothing to be declared.

CONFLICT OF INTEREST

The authors declare no conflict of interest related to this work.

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