



Depth Analysis of Open Transhiatal Esophagectomy Outcomes (Orringer Technique) in Patients with Esophageal Cancer from 1990 to 2015: A 25-Year Experience Single-center Study

Jalaluddin Khoshnevis^{1,2}, Mohammad Esmaeil Akbari³, Mohammadreza Kalantar Motamed⁴, Afshin Moradi^{5,2}, Mohammad Ebrahimi^{1,2}, Meysam Jirabadi^{1,2}, Terifeh Dashti⁶, Afsaneh Sadat Makeh³, Maryam Karami^{7,*} and Farid Moradian^{8,**}

¹Department of General Surgery, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

²Shohada-ye-Tajrish Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran

³Cancer Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

⁴Shahid Beheshti University of Medical Sciences, Tehran, Iran

⁵Department of Pathology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

⁶Clinical Research Development Unit, Shohada-ye-Tajrish Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran

⁷School of Nursing and Midwifery, Shahid Beheshti University of Medical Sciences, Tehran, Iran

⁸Department of General Surgery, Alborz University of Medical Science, Alborz, Iran

*Corresponding author: School of Nursing and Midwifery, Shahid Beheshti University of Medical Sciences, Tehran, Iran. Email: maryam.karami64@gmail.com

**Corresponding author: Department of General Surgery, Alborz University of Medical Science, Alborz, Iran. Email: moradian.farid@yahoo.com

Received 2020 September 19; Revised 2022 September 14; Accepted 2022 October 01.

Abstract

Background: Esophageal cancer is an invasive tumor with rapid growth and a poor prognosis. The annual incidence of esophageal cancer in the United States is 6 per 100 000 men and 1.6 per 100 000 women. This is different in the case of Iran, and the number of patients in the country is higher than in other countries. In this evaluation, the researchers present the experience with open Transhiatal Esophagectomy (Orringer) technique outcomes.

Objectives: This study aimed at evaluating the Orringer technique and its complications in patients with esophageal cancer for 25 years at the Cancer Research Center of Shahid Beheshti University of Medical Sciences.

Methods: This is a descriptive study conducted from the beginning of 1988 to 2016. In this study, 114 patients with a mean age of 55 years and a gender classification of 60% male and 40% female were evaluated.

Results: After resection, more than 98% of patients were in the T3 N1 - N3 stage. There were 4 mortalities: 2 were due to descending aorta tearing, 1 was due to tracheobronchial tearing, and 1 was pneumonia. From 40 cases of pleural effusion, only 5 cases (12.5%) needed a thoracotomy tube. Only 2 patients needed intervention from 30 patients with dysphagia; 1 case was relieved by balloon dilatation and the other needed a free jejunal flap. Five-year survivals were 30% and 20% versus 48% and 23% in the neoadjuvant and non-neoadjuvant groups, respectively.

conclusions: The present study and other experiences showed that non-radical surgery such as the Orringer technique is acceptable and compassable compared to radical surgery in 3 fields.

Keywords: Esophageal Cancer, Orringer Technique, Complications

1. Background

There is a great deal of debate about whether en bloc esophagectomy provides esophageal cancer through a practical and prolonged resolution of obstruction of the esophagus. Despite higher mortality, further exacerbation, and diagnosis, a recent 7-year follow-up of a Dutch study on GEJ and lower esophageal cancers does not appear to be of any further benefit. Also, in a subgroup analysis of cases with positive lymph nodes, it appears that thoracic resec-

tion in the block may extend life expectancy (1). In another extensive database analysis (SEER), trans-thoracic and transhiatal esophagectomy were compared. In this study, transhiatal esophagectomy lost more long-term survival benefits compared to step-by-step. It seems that the mortality rate and complications after the transhiatal esophagus are lower (1, 2). Suffice it to say that the debate over the best way for esophageal cancer remains an open question. According to these studies, although this practice may violate many principles of cancer resection, including radical LN

Orringer technique dissection, it plays a role such as other methods in randomized trials and an extensive database (1). Lower mediastinal lymph node (LNS) basins can be resected in an Orringer like the upper abdominal LNS, which is an attractive option for GEJ cancers. Upper mediastinal LNS above the inferior pulmonary vein, which cannot be removed with this method, rarely leads to recurrent cancer recurrence (2).

Though this technique is primarily used for lower esophageal cancer and fragile patients, we would like to present our experience in lower, upper, and middle 3rd cancer of the esophagus globally. In the United States, 16,940 esophageal cancer cases are diagnosed each year, and 15,690 deaths are expected from the disease (3). Esophageal cancer is the 7th most commonly occurring cancer in men and the 13th most commonly occurring cancer in women. There were over 500,000 new cases in 2018 (4). Incidence rates vary internationally by nearly 16-fold, with the highest rates found in Southern and Eastern Africa and Eastern Asia and the lowest rates in Western and Middle Africa and Central China, 90% of cases are squamous cell carcinoma (5-9). It is the 7th most common cancer in Iran (8) and the 3rd cause of mortality due to cancer. It is estimated that out of 35,000 deaths caused by cancer in Iran, 5,800 are due to esophageal cancer, and statistically, Iran is the 2nd country with the highest number of cancer deaths in the eastern part of the Middle East (8).

2. Objectives

The present study presents experience with open transhiatal esophagogastrectomy (Orringer) technique outcomes.

3. Methods

Medical record of patients with esophageal carcinoma, who were operated with open transhiatal technique for 25 years from 1990 to 2015 at Shohadaye Tajrish Medical Center affiliated with Shahid Beheshti University of Medical Science, was subject to study. The records had complete documentation and were followed up. Also, incomplete records were excluded.

4. Results

Overall, 114 patients were eligible. The mean age was 55 years (40 - 70); 60% were male and 40% were female. Most were from the northern provinces of Iran. All had grade 3 dysphagia and more. In the upper 3rd, there was

1 case. In the middle 3rd, 61 cases, and 52 cases had a lesion in the lower 3rd; 60% were squamous cell carcinoma, and 40% were adenocarcinoma. After resection, more than 98% of patients were in the T3 N1 - N3 stage. There were 4 mortalities: 2 were due to descending aorta tearing, 1 was due to tracheobronchial tearing, and 1 was pneumonia (Table 1). There were many complications, fortunately, transient and almost manageable by non-operative treatment (Table 2). From 40 cases of pleural effusion, only 5 cases (12.5%) needed a thoracotomy tube. Only 2 patients needed intervention from 30 patients with dysphagia; 1 case was relieved by balloon dilatation and the other needed a free jejunal flap. The anastomotic leak occurred in 5 patients and was managed expectantly. Accordingly, a recurrent laryngeal injury occurred in 1 patient. The voice got better 6 months later. Azygous vein tearing occurred in 1 patient, whose lesion was at the middle 3rd of the esophagus and adherent to it. It was managed by thoracotomy and ligation of the vein. Chylothorax was managed after a course of supportive therapy by thoracotomy and ligation of the thoracic duct. Consequently, 2-year and 5-year survival in the neoadjuvant series (50 patients) were 40% and 30%, respectively. Besides, in the adjuvant or surgery-only groups, it declined to 30% and 20% (Table 2). Two cases survived more than 15 years and their tumor size was about 2 cm. Their pathology was well-differentiated squamous carcinoma, and 6 lymph nodes were removed in these cases, which were not involved by tumor cells.

5. Discussion

More extensive surgery (radical or en bloc esophagectomy) has not been proven to have more survival benefits than non-radical counterparts but has been associated with more mortality and morbidity (1, 10-12). In this technique, all hilar and posterior mediastinal lymph nodes should be removed alongside the esophagus and sometimes (as in Siewert type I lesions) with resection of the proximal part of the stomach and celiac axis lymph nodes. En bloc esophagectomy can be done in the context of 2 fields (Ivor Lewis technique) or 3 fields (McKeown) esophagectomy. Transhiatal esophagectomy (Orringer technique) is done through 2 incisions, 1 at the neck and the other at the abdomen, only lower mediastinal lymph nodes can be removed (1, 11, 12). This technique was associated with low mortality and morbidity in more extensive studies but with no survival difference (1, 2, 10, 12). Mortality and morbidity in our series were lower than in its original series (3.5% vs. 4%) (11) perhaps due to technical and experimental issues. By applying healthy techniques and gaining more experience, mortality and complications could decline more.

Table 1. Mortality in 114 Cases with Transhiatal Esophagectomy in Shohada-Tajrish Medical Center

Mortality	Aort Tearing	Bronchial Tearing	Pneumonia	Total
Number	2	1	1	4

Table 2. Complications in 114 Cases with Transhiatal Esophagectomy in Shohada-Tajrish Medical Center from 1990 to 2015

No.	Complication	No. (%)
1	Pleural effusion	40 (35)
2	Dysphagia	30 (26)
3	Anastomotic leak	5 (4.3)
4	Anastomotic stricture	2 (1.8)
5	Recurrent nerve injury	1 (0.9)
6	Pneumonia	1 (0.9)
7	Descending aorta tearing	2 (1.8)
8	Left main bronchus tearing	1 (0.9)
9	Azygus vein tearing	1 (0.9)
10	Chylothorax	1 (0.9)

From a survival perspective, we also had comparable results to its original report (11). Five-year survivals were 30% and 20% versus 48% and 23% in the neoadjuvant and non-neoadjuvant groups, respectively (11). To our knowledge, by considering more squamous cell carcinoma cases (60% vs. 37%) and more stage III cases (98% vs. 37%) in the studied series, this result is also comparable (11). The overall 5-year survival rates were comparable to some significant randomized trials: 35% vs. 47% (CROSS), 30% vs. 39% (Tepper) in the neoadjuvant group and 20% vs. 34% (CROSS), and 20% vs. 16% (Tepper) in surgery only group, respectively (10). Shortage of imaging facilities for better staging, and more squamous cell carcinoma cases may influence some suboptimal results. Today, complete resection has proved to be the most significant effect on 5-year survival (12). Five-year survival after RO resection is 15% to 40% independent from the stage of the disease and 0% to 5% after incomplete resection (12). This technique showed better results by considering 30% and 20% 5-year survival in the neoadjuvant and surgery-only groups.

5.1. Conclusions

More randomized trials are needed to incorporate various invasive and non-invasive techniques, chemotherapy, chemoradiotherapy, target therapy, and new remedies to affect survival significantly. Until achieving this success, transhiatal esophagectomy is a suitable option for old, smoker, and malnourished patients with several comorbidities. The present study and experiences (1, 2,

10, 11) indicated that non-radical surgery such as the Orringer technique is acceptable and compassable with radical esophagectomy.

Footnotes

Authors' Contribution: Study concept and design: M. F.; acquisition of data: A. M. E.; analysis and interpretation of data: K. M., M. F., J. M.; drafting of the manuscript: M. K., E. M., M. A. S.; critical revision of the manuscript for important intellectual content: A. M. E., M. F.; statistical analysis: M. F., K. M., D. T.; administrative, technical, and material support: A. M. E., Kh. J., K. M. M. R., M. A., M. F.; study supervision: Kh. J., A. M. E., K. M. M. R., M. A., M. F.

Conflict of Interests: There is no conflict of interests for authors.

Ethical Approval: This study is approved under the ethical approval code of IR.SBMU.CRC.REC.14.01.015.

Funding/Support: This research has no funding support.

References

1. Jobe BA, Hunter JG, Watson DI. Esophagus and diaphragmatic hernia. In: Brunicaardi F, Andersen DK, Billiar TR, Dunn DL, Kao LS, Hunter JG, et al., editors. *Schwartz's principles of surgery*. New York, USA: McGraw Hill Education; 2019. p. 1009-98.
2. Mousavi SR, Akbari ME. Comparison of Early and Late Complications in Three Esophagectomy Techniques. *Int J Cancer Manag*. 2017;**10**(6). <https://doi.org/10.5812/ijcm.7644>.
3. Siegel RL, Miller KD, Jemal A. Cancer Statistics, 2017. *CA Cancer J Clin*. 2017;**67**(1):7-30. [PubMed ID: 28055103]. <https://doi.org/10.3322/caac.2387>.
4. World Cancer Research Fund International. *Oesophageal cancer statistics*. London, UK: World Cancer Research Fund International; 2020. Available from: <https://www.wcrf.org/cancer-trends/oesophageal-cancer-statistics/>.
5. Jemal A, Bray F, Center MM, Ferlay J, Ward E, Forman D. Global cancer statistics. *CA Cancer J Clin*. 2011;**61**(2):69-90. [PubMed ID: 21296855]. <https://doi.org/10.3322/caac.20107>.
6. Gholipour C, Shalchi RA, Abbasi M. A histopathological study of esophageal cancer on the western side of the Caspian littoral from 1994 to 2003. *Dis Esophagus*. 2008;**21**(4):322-7. [PubMed ID: 18477254]. <https://doi.org/10.1111/j.1442-2050.2007.00776.x>.
7. Tran GD, Sun XD, Abnet CC, Fan JH, Dawsey SM, Dong ZW, et al. Prospective study of risk factors for esophageal and gastric cancers in the Linxian general population trial cohort in China. *Int J Cancer*. 2005;**113**(3):456-63. [PubMed ID: 15455378]. <https://doi.org/10.1002/ijc.20616>.
8. Aledavood A, Anvari K, Sabouri G. Esophageal Cancer in Northeast of Iran. *Iran J Cancer Prev*. 2011;**4**(3):125-9. [PubMed ID: 26328051]. [PubMed Central ID: PMC4551295].

9. Khodadost M, Yavari P, Khodadost B, Babaei M, Sarvi F, Khatibi SR, et al. Estimating the Esophagus Cancer Incidence Rate in Ardabil, Iran: A Capture-Recapture Method. *Iran J Cancer Prev*. 2016;**9**(1). e3972. [PubMed ID: 27413513]. [PubMed Central ID: PMC4934015]. <https://doi.org/10.17795/ijcp-3972>.
10. Spicer JD, Dhupar R, Kim JV, Sepsi B, Hofstette W. Esophagus. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. *Sabiston's Textbook of Surgery*. 20th ed. Amsterdam, The Netherlands: Elsevier; 2017.
11. Orringer MB, Marshall B, Iannettoni MD. Transhiatal esophagectomy: clinical experience and refinements. *Ann Surg*. 1999;**230**(3):392-400. discussion 400-3. [PubMed ID: 10493486]. [PubMed Central ID: PMC1420884]. <https://doi.org/10.1097/00000658-199909000-00012>.
12. Jobe BA, Hunter JC, Watson DI. Esophagectomy and diaphragmatic hernia. In: Brunnicardi FC, Andersen DK, Billiar TR, Dunn DL, Hunter JG, Kao LS, et al., editors. *Schwartz's principles of surgery*. New York, USA: McGraw Hill Education; 2019.