

Comparison of Early and Late Complications in Three Esophagectomy Techniques

Seyed Reza Mousavi,^{1,*} and Mohammad Esmaeil Akbari¹

¹Cancer Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

*Corresponding author: Seyed Reza Mousavi, MD, PhD, FACA, Professor of Vascular and Reconstructive and Surgical Oncology, Cancer Research Center, Shahid Beheshti University Medical Sciences, Tehran, Iran. E-mail: prof.srmousavi@gmail.com

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Abstract

Background: Due to the high prevalence and mortality rates of esophageal cancer in some parts of the world and considering that in most patients, symptoms occur when cancer is advanced, this study aimed to compare early and late complications in three esophagectomy techniques for treatment of esophageal cancer.

Methods: The present study was a descriptive research on 316 patients with esophageal cancer referring to Shohada Tajrish hospital, Tehran. The results were recorded in the research forms consisting of individual characteristics, symptoms and reasons for referring to the hospital. Findings were extracted after classification and evaluated using descriptive statistics.

Results: Among 316 patients studied, 190 patients (60%) were male and 126 (40%) were female. The highest prevalence was between 40 and 60 years old. The most significant reason for referring to the hospital was dysphagia and weight loss. Among 260 patients, 72 patients (27.7%) underwent surgery by transthoracic (Ivor Lewis type) approach, 76 patients (29.2%) underwent surgery by three-incision approach (Mc Keown procedure), and 112 patients (43%) underwent surgery by Trans-Hiatal (Oringer). A total of 36 deaths occurred. 22 deaths occurred using Ivor-Lewis (61%), 10 deaths occurred using Mc Keown (27.7%) and 4 deaths occurred after Oringer (11.1%). In terms of prevalence of complications, the most common early complication was pleural effusion (11%) and the most common late complication was anastomotic stricture (17.8%).

Conclusions: Complications occurred in all three surgeries. The most complications occurred using transthoracic (Ivor Lewis type) approach and the least complications occurred using Trans-Hiatal (Oringer).

Keywords: Esophageal Cancer, Leaks, Stenosis, Anastomosis

1. Background

In Iran, surgeons have the main responsibility for the treatment of patients with esophageal carcinoma. In the past two decades, significant progress has occurred in esophageal cancer treatment. The progress includes more accurate diagnostic and therapeutic techniques, improvements in the management after surgery, and adjuvant therapy. Consequently, the 5-year survival rate is now over 50% in all three methods of esophageal surgery (1). Treatment and epidemiology of patients with esophageal carcinoma have significantly changed over time. In the Western hemisphere, increasing the incidence of cancer is seen in cardiac region and gastroesophageal junction (2-5). For as much as the long-term survival of life in surgery is seen only in the use of locoregional tumor therapy, therapeutic strategies in recent years have suggested using preoperative chemoradiation at the same time (6, 7). Treatment method for Esophageal Cancer using Neoadjuvant preoperative chemo-radiotherapy is chemotherapy and radiotherapy after surgery and the treatment of metastatic disease (8).

The ultimate goal of treatment is to reach the curative treatment. Conventional methods of surgery are considered as the main basis of treatment using a multidisciplinary approach (9, 10).

Patient safety and surgical skills are always important for surgeons (11, 12). The complications after surgery such as dysphagia after a successful surgery can be a major problem for swallowing food (13).

In this study, we discuss conventional surgical techniques and the advantages and disadvantages of each approach. The aim of our study is to analyze and manage the standard methods in esophageal cancer over twenty years. In the present study, we introduce a method that has the least complications.

2. Methods

The present study was a descriptive research on 316 patients with esophageal cancer referring to Shohada Tajrish hospital, Tehran. The results were recorded in the research forms consisting of individual characteristics, symptoms

and reasons for referring to the hospital. Findings were extracted after classification and evaluated using descriptive statistics. This study was approved by the ethics committee at Shahid Beheshti University of Medical Sciences.

Among 316 patients studied, 190 patients (60%) were male and 126 (40 per cent) were female. The highest prevalence was between 40 and 60 years old. The most significant reason for referring to the hospital was dysphagia and weight loss (Table 1). The most common pathologic type was squamous cell carcinoma (72%) and adenocarcinoma (38%). Among 260 patients, 72 patients (27.7%) underwent surgery by transthoracic (Ivor Lewis type) approach, 76 patients (29.2%) underwent surgery by three-incision approach (Mc Keown procedure), and 112 patients (43%) underwent surgery by Trans-Hiatal (Oringer).

Table 1. Reasons of Referring to Shohada Tajrish Hospital (360 Patients)^a

Reason of Referring	Number	Men	Women
Dysphagia	316 (Grade: +1 to +4)	190	126
Weight loss	292 (92.2)	172	120
Pain behind the sternum	85 (26.8)	55	30

^aValues are expressed as No. (%).

3. Results

All three surgical procedures were done by the same surgeon.

Non-resectable tumor was diagnosed in 56 patients who were excluded from the study. A total of 36 deaths occurred. 22 deaths occurred using Ivor-Lewis (61%), 10 deaths occurred using Mc Keown (27.7%) and 4 deaths occurred after Oringer (11.1%). In terms of prevalence of complications, the most common early complication after surgery was pleural effusion in 29 patients (11%). This complication occurred by transthoracic (Ivor Lewis type) approach in 19 patients (65.5%). For Trans-Hiatal (Oringer) and Mc Keown procedure, the complication of pleural effusion occurred in 2 patients (6.8%) and 8 patients (27.5%), respectively. The most common late complication was anastomotic stricture in 46 patients (17.8%). For Trans-Hiatal (Oringer), Mc Keown procedure, and transthoracic, the complication of anastomotic stricture occurred in 25, 19, and 2 patients. The complication of anastomotic leak occurred in 16 patients (6.1%): 10 patients by anastomosis in the neck (6 patients by Mc Keown and 4 patients by Trans-Hiatal (Oringer)) and 6 patients by transthoracic (Ivor Lewis type). Wound infection and pneumonia occurred by esophagectomy in 3 and 5 patients, respectively.

They were completely cured by remedial measures (Table 2).

4. Discussion

According to the aim of this study, this section discusses the evaluation of the complications of these three techniques and their comparison. According to the obtained results, most complications occurred by transthoracic (Ivor Lewis type) approach and least complications occurred using Trans-Hiatal (Oringer). Since this study was a retrospective one, it was necessary to carry out prospective studies in order to be closer to reality.

All three methods of esophageal surgery are similar on the one hand and different on the other hand; for example, they are different in terms of pathological type and lymph node metastasis because the pattern of lymph node metastasis in adenocarcinoma which is in cardiac region is different from squamous carcinoma (14).

In Ivor Lewis technique, GI anastomosis is carried out in thorax and anastomotic leak can be dangerous and cause high mortality in comparison with the anastomosis in the neck. While leak in the neck is more, because it is not entered into the mediastinum and not limited to the neck, it is usually closed by protective measures.

On the other hand, in thorax, negative pressure, lack of protection around esophagus, and the rapid spread of bacterial infection caused by anastomosis leak can suggest that anastomosis in thorax is dangerous. Mediastinal connective tissue resistant against infection, if the first sign is mediastinitis, quick action will be necessary for treatment. The delay in the treatment causes mediastinitis to spread in a short time, resulting in high mortality (15). For Trans-Hiatal (Oringer) and Mc Keown procedure, because esophageal anastomosis is in the neck, leak does not cause mediastinitis, resulting in no mortality. It can also occur by Trans-Hiatal (Oringer). Trans-Hiatal (Oringer) has an advantage over Mc Keown procedure because Thoracotomy is not needed in Trans-Hiatal (Oringer). Due to the fact that anastomosis mortality in thorax is more than cervical anastomosis, average length of stay for patients who are hospitalized for thoracic anastomosis, especially in the ICU, is more than those with anastomosis in the neck (16). Treatment of fistula and anastomotic leak without symptoms of mediastinitis and Sepsis is conservative containing the appropriate antibiotic through feeding tube into the esophagus (17). For discharge drainage, if there is not enough drain, it will be possible to insert extra drain for better drainage (18). If the discharge is relatively high, and there is no tissue necrosis in esophagus and anastomosis region, proper drainage will be mandatory and sutured

Table 2. The Complications Found in 260 Patients Undergoing Surgery^a

Complications (Early and Late)	Number	Surgery Techniques
Anastomotic stricture	46 patients (17.8)	25 patients by Trans-Hiatal, 19 patients by Mc Keown procedure, and 2 patients by transthoracic
Anastomotic leakage	16 patients (6.1)	10 patients by anastomosis in the neck and 6 patients by transthoracic (Ivor Lewis type).
Pleural effusion and Chylothorax	29 patients (11)	19 patients by thoracic anastomosis, 2 patients by patients by Trans-Hiatal, 8 patients by Mc Keown procedure
Other cases (such as wound infections)	3 patients (2.6)	2 patients in the neck, 1 patient in thorax
pneumonia	5 patients (1.9)	4 patients by transthoracic and 1 patient by Trans-Hiatal

^aValues are expressed as No. (%).

mesh and fibrin glue can be used in some appropriate conditions (19). If there is tissue necrosis and Sepsis, gastroesophageal junction is removed after debridement through gastrostomy tube. If mediastinitis and Sepsis are successfully performed, the next decisions can be made.

Incision (thoracotomy) will be annoying and painful for cancer patients who have general weakness. The esophageal stenosis is a rare complication and is almost equal for Trans-Hiatal (Oringer) and Mc Keown procedure. Esophageal stricture is usually seen after 3 months of surgery, causing dysphagia and patients' referring to clinics to relieve the pain. In the treatment of dysphagia, endoscopy and biopsy from tight spots are necessary. After ensuring the absence of tumor, treatment including bouginage using Savary-Gilliard and balloon may be repeatedly necessary (20). In the absence of treatment and recurrence of stenosis, surgical procedures such as flapping are recommended to relieve stenosis in the neck. Stenosis after surgery may be related to anastomotic and it is possible to reduce stenosis (21). Anastomotic stricture is seen in 5% - 50% of cases within the first year after the surgery (22). Ischemia is one of the reasons for Stenosis. Basically, postoperative stenosis is caused by a microleak, resulting microabscess. These responses lead to stimulation of fibroblast and stenosis. These complications bring inappropriate results for the patient's life (23, 24). The exact mechanism of complications such as leaks or anastomotic stricture is not entirely clear (15, 25), but some conditions and factors are effective such as Tension on the anastomosis, flaws in the arterial system that cause ischemic in anastomosis region, impairment in returning venous blood, and the expertise of the surgeon. Forasmuch as there is no comprehensive definition, incidence of postoperative stenosis for esophageal cancer shows drastic changes. For example, some statistics have reported 0% - 21% and other statistics have reported 5% - 50% (26). As mentioned, incidence of anastomosis in the neck is higher than the thorax (27, 28). In fact, there is no connection when using stapler instead of anastomosis by hand or there is the least degree of

connection; thus, surgeons prefer anastomosis by hand to mechanical techniques (stapler) (29-31). However, the type of anastomosis is known as the most important factor for postoperative benign strictures (32).

Chylothorax after esophagectomy is a rare but potentially fatal complication which have been reported 0.4% - 4% (33, 34).

In adults, four liters of chyle, which is a milky bodily fluid consisting of lymph and emulsified fats, or free fatty acids, are transported each day (35). Chylothorax of this complication is seen after thoracotomy and dissection in mediastinum region. As stated, esophageal cancer is a rare complication after surgery. Incidence of Chylothorax in Trans-Hiatal (Oringer) is less than Mc Keown and Ivor-Lewis technique. In many cases, the treatment method is conservative. If the conservative treatment method is not effective, the surgery should be carried out to prevent the death (36, 37). If chyle is not stopped, patients will faced immune deficiency, resulting in infection and mortality (35). Some studies have shown the superiority of surgery over conservative treatment (34, 38-40). Thus, the treatment method of Chylothorax is conservative but when the outlet of the chest tube is more than 800 cc per day and it will continue for 4 to 5 consecutive days, waiting for stopping the leak may be dangerous due to leukopenia and malnutrition; therefore, surgery is required in these circumstances.

Wound infection is one of the difficulties seen in cancer patients. In esophageal cancer, the existence of dysphagia followed by weakness in the immune system as the underlying cause of bacterial invasion and spread of infection can increase the rate of wound infection (41, 42). Contamination with saliva secretions, especially in the cervical esophagus, can spread the infection (43). The long-term hospital stay can be considered as a factor in wound infection, especially in - cancer patients (44). Trans-Hiatal and Transthoracic techniques cause severe interruptions of monocytes and reduction of cytokine production by T-lymphocyte. Surgical procedures in esophageal cancer patients reduce the level of safety in the immune system (45).

Moreover, the excessive tissue damage and handling of the patient during anesthesia and blood transfusion can be effective in infection after esophagectomy (46, 47). Many studies have shown that Trans-Hiatal and Transthoracic techniques significantly reduce the level of safety (48, 49).

Respiratory problems and pneumonia may be observed in the actions of esophagectomy. Preoperative physiotherapy and the reduction of blood loss during surgery and corticosteroid therapy can prevent the infections (50). Many studies have reported pneumonia after esophagectomy between 7.3 to 50% (51-54). However, according to the patients' records, the rate of pneumonia after esophagectomy is 1.9%. Thus, it is concluded that preoperative preparation and selection of the patients with an indication for esophagectomy are effective in the reduction of pneumonia after esophagectomy. Furthermore, preoperative spirometry is effective in reduction of pneumonia (55). It is recommended that FEV₁ > 75 to prevent breathing problems after surgery. Hence, modifying preoperative criteria can prevent complications after esophagectomy. The criteria include the equipped ICU, accurate anesthesia, protection after surgery, proper nutrition, and positive nitrogen balance before surgery (56-58). As stated, anesthesia should be strictly in accordance with the opinions of the American Society of Anesthesiologists (59, 60).

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Footnotes

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