

## EVALUATION THE RESULTS OF THORACOSCOPIC ESOPHAGECTOMY FOR ESOPHAGEAL CANCER

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### ABSTRACT

**Objective:** To access the outcomes of thoracoscopic esophagectomy for intrathoracic esophageal cancer

**Methods:** Retrospective study on the esophageal cancer patients who underwent thoracoscopic esophagectomy at Abdominal surgery department of Hue Central Hospital – Viet Nam from 1/2009 to 1/2014

**Results:** 182 esophageal cancer patients were operated thoracoscopic esophagectomy. Mean age: 63 (range 43-73), mean times operation: 3.6h (3.2-5.6), thoracix times 85 minutes (65-130), no conversion, intraoperative complications: 5.49%, postoperative complications: 7.69, mean hospitalization: 14 days (11-28), biopsy results: squamous cell 96.7 cases, mortality rates: 0%, long-term outcomes in 24 months: obstructive anastomosis: 10 cases, death rates: 13.19% in 12 months, 25.27% in 24 months.

**Conclusion:** Thoracoscopic esophagectomy for esophageal cancer is a feasible and safe procedure with perioperative complications are acceptable.

**Key words:** thoracoscopic esophagectomy, esophageal cancer.

### I. INTRODUCTION

Esophagectomy for benign or malignant disease is associated with high morbidity and mortality but the best choice for esophageal cancer is also esophagectomy. Although the best approach to esophagectomy remains controversial, the most frequently performed operations are transthoracic (TT) and blunt transhiatal esophagectomy (THE). The transthoracic approach allows the surgeon to perform a wide mediastinal lymphadenectomy and provide adequate hemostasis that cannot be secured by THE. However, THE avoids a thoracotomy and therefore reduces associated pulmonary complications. With the recent advances in laparoscopic and thoracoscopic surgery, it is possible to apply minimally invasive surgical techniques to esophagectomy. This article was written with the purpose to share our experiences in

right thoracoscopic esophagectomy combined with a standard upper-midline laparotomy and cervical anastomosis.

### II. PATIENTS AND METHODS

**2.1. Patients:** All patients were diagnosed esophageal cancer and underwent esophagectomy at Hue central hospital – Viet Nam between January 2009 and January 2014.

**2.2. Methods:** The results have been analyzed retrospectively using our esophageal resection database and follow-up through personal interviews and examinations, written correspondence, and telephone contacts with patients and families.

**Indications:** Indications are the same as open surgery, as far as the stage of the concerned: 1) Absence of extensive pleural adhesions, 2) Pulmonary function capable of sustaining single lung ventilation,

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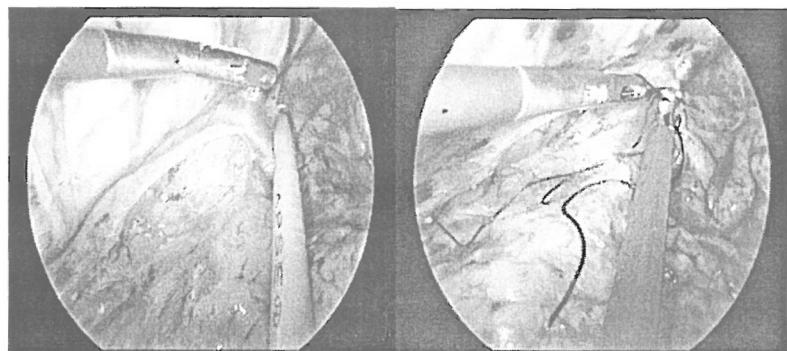
3) Absence of the concomitants serious medical conditions such as liver cirrhosis, 4) patients preference of the procedure, 5) Absence metastasis.

**Preparation and Approach:**

The Patients have been done colon preperation, prophylaxis antibiotic, is intubated with a double lumen tube to block right lung and is positioned in 120 degree left lateral position. The surgeon stand in front of patient, the assistant stand on the right of the surgeon. The procedure was performed 3 stages:

Thoracoscopic stage was completed through 4 trocarts: 12mm trocart at fifth inter-costal space on the middle axilla line, 10mm trocart at seventh inter-costal space on the posterior axilla line, two 5mm trocarts at thirth and eighth inter-costal

space on the anterior axilla line. The first step, we open the mediastinal pleural above and below the azygos vein and the vein was divided, the proximal esophagus is circumferentially dissected free. By using retraction, the esophagus is dissected free from the aorta and chest wall. The thoracic duct should be preserved, peri-esophageal and mediastinal lymphadenectomy are included in the specimen. A complete lymphadenectomy is performed in the carina region, from hiatus to the carina anteriorly. In this way, entire esophagus from the thoracic outlet to the hiatus is mobilized. After leaving a drain, the lung is expanded fully and the patient's position was changed to the supine for the laparotomy part of the operation.



Abdominal stage was done by upper middle-line laparotomy, mobilization of the stomach, remove the specimen and gastric tube formation : Mobilization of the left lateral liver lobe for optimal visualization of the diaphragmatic esophageal hiatus. gastrocolic ligament, spleenocolic ligament, short gastric arteries, left gastric

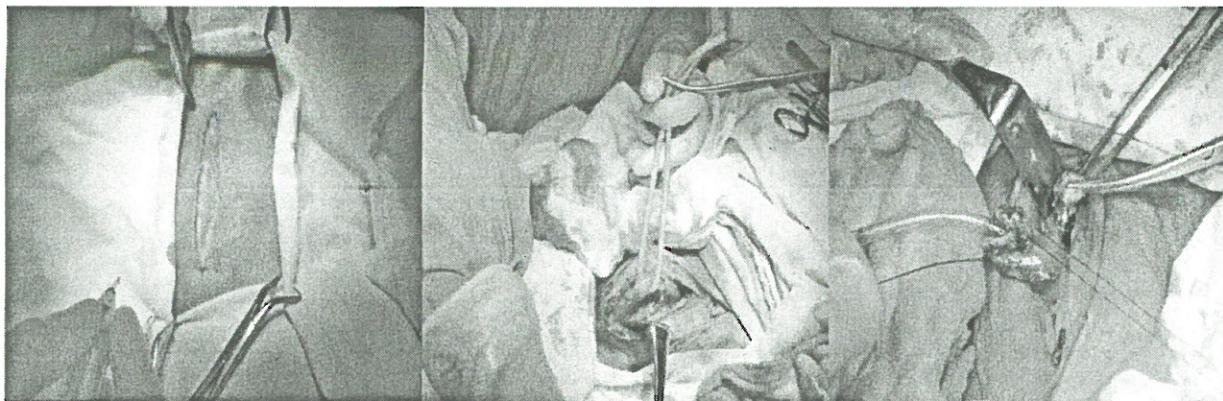
artery were devived. Right gastric artery and right gastro-epiploic vessel avoid damage. The esophagus is mobilized anteriorly by blunt dissection of the plane .The fingers are used to separate the diaphragm and pericardium from the esophagus. Pyloric plasty and jujenostomy. Perihiatus drainage.



Cervical stage: The patient is placed with an extended neck and head turned to the right. Oblique incision of the skin extending from the jugular notch to

the level of the thyroid cartilage along the anterior rim of the sternocleidomastoid muscle. Sharp dissection of the subcutaneous fatty tissue, Sharp transaction of

the omohyoid muscle, carotid sheath pull medially, identification of the left laryngeal recurrent nerve in the tracheoesophageal groove. The cervical esophagus is dissected and divided, mobilization the distal part of the esophagus and transpose into the abdominal cavity. Transposition of the gastric tube the neck and make end to side gastroesophageal anastomosis. Upper posterior mediastinal drainage.



### III. RESULTS

Within the time period of this study, 91 esophagectomies were performed at the abdominal surgery department of Hue central hospital, Viet Nam. Among these 91 patients, male/female: 88/3, there were 3 women and 88 men with a median age of 63 (range, 43 to 73) years. Total clinical presentation of patients are list in table 1.

*Table 1. Total clinical presentation of patients.*

Presenting sign	n	%
Retrosternal discomfort	52	28.57
Dysphagia, odynopatia	182	100
Weight loss	156	85.7
Starvation	62	34.1
Pain (retrosternal, epigastric)	42	23.1

All patients were done general examination, especially esophagoscopy and biopsy, barium swallow, multislice computer tomography, bronchoscopy and respiratory functional examination. The diagnostic technique results (see table 2).

*Table 2. The diagnostic technique results*

		n	%
Esophagoscopy	Upper third	30	18.31
	Middle third	102	57.75
	Lower third	50	23.94
Biopsy	adenocarcinoma	20	11.10
	Squamous cell	162	88.90
CT scanner	Tumor length	6.3 cm (4-9)	
	Invasive grade	Invasive	22
		no	160
			87.01

Bronchoscopy	Invasive		0	0
	no	182	100	
TMN classification	T	T1	0	0
		T2	14	7.69
		T3	148	81.32
		T4	22	12.09
	N	N0	52	28.57
		N1	130	71.43
	M	M0	182	100
		M1	0	

Mean time operation: 3.6h (3.2- 5.6), thoracix times 80 minutes (65- 130), intraoperative complications: 5.75% (10/182), no conversion, these intraoperation ' characteristics are listed in table 3

Table 3. The data of the intraoperation:

Sign	n	%
Hemorrahge*	5	2.75
Left Broncheal rupture	2	1.2
Tracheal rupture	1	0.6
Pulmonary injure	2	1.2
Open conversion	0	
Mean time operation	3.6h (3.2-5.6)	
Mean thoracix time	80 (65-130)	

Early postoperative major complications : 7.69% (14/182), mean hospitalization: 15 days (11-28), biopsy results: squamous cell 88.90%, cases, mortality rates: 0%, Table 4 . Early postoperative complications

Sign	n	%
Hemorrahage	0	0
Anatomotic leakage	12	6.59
Pneumonia	2	1.10
Pleural effusion	2	1.10
Subcutaneal emphysemias	2	1.10
Rec. laryngeal Nerve Parasis	4	2.20
Death	0	0
Feeding jujenostomy	Second day	
Oral Feeding	9 <sup>th</sup>	
Chest drain remove	Second day	
Abdominal, cervical drain remove	Third day	
Mean hospitalization	15 (11- 28)	

Long-term outcomes in 24 months: obstructive anastomosis : 2 cases, death rates: 12.08% (22/182) in 12 months, 23.08% (42/182) in 24 months.

#### IV. DISCUSSION

Although the overall survival rate for the patients with esophageal cancer is low, esophagectomy remains the standard treatment of choice esophageal carcinoma in the past, the most widely used methods for esophageal cancer resection is transthoracic esophagectomy according to the method of Lewis. This method is combined large thoracotomy, laparotomy and intrathoracic anastomosis so that the patient fell so pain, may long term discomfort and respiration dysfunctions in postoperative time. As well as the hazards of an intrathoracic anastomosis, contribute in large part of high mortality rate of procedure. In 1978, Orringer and Sloan reintroduced transhiatal procedure, which was first performed successfully by Grey-Turner and Dorch in 1933 for resection of thoracic esophageal carcinoma. This procedure is performed laparotomy, blunt dissection transhiatal and cervical anastomosis. Blunt transhiatal esophagectomy appears to decrease the evidence of the pulmonary dysfunctions. However, this is a blunt procedure so that the surgeon does not provide adequate cancer staging and resection. Also, it is an inherently unsafe procedure because of the complications such as hemorrhage from azygos vein trauma and chylous leakage following thoracic duct injury.

Video-assisted thoracoscopic surgery has rapidly developed in recent years, and these new technique have also been applied to esophageal cancer surgery. Right thoracoscopically assisted esophagectomy is advantageous because it avoids a large thoracotomy and because the dissection and hemostasis can be performed under direct observation. As well as, the mediastinal dissection and lymphadenectomy can be done under direct visual control. Thoracoscopy has advantage of reduced thoracotomy related morbidity, better cosmetic, avoid blunt dissection,

ensure the principles of oncological surgery principal, reduced pain, earlier postoperative mobilization, and even short operation time and hospitalization in some cases. Especially, no large thoracotomy necessary into the cases the tumor can not dissected but we do not truly access before.

Esophageal cancer is a common disease in male, ratio male/female is 88/3. L.van de Schoot: 44/6, Trieu Trieu Duong: 19/1, Somkiat Sunpaweravong: 22/6. Mean age of the patients in our report is 63; Jeffrey Rentz: 63, Mark B.Orringer: 64. The most common sign of patient when they came: dysphagia, odynophagia, weight loss, digestion,.... Our result had 100% cases appeared dysphagia, 85.7% weight loss within a month before go to the hospital. All the patients had been diagnosed and staged preoperatively by endoscopy with biopsy to define the location of tumor and kind of carcinoma, X-ray of the digestive tract with barium swallow, CT scan of the chest and abdomen to access the invasion and resectable. In addition, all patients completed respiratory function tests and a cardiological assessment to determine the surgical risk. Bronchoscopy make routine to detect the main airway invasive. With our results of diagnosis techniques: upper third 18.31%, middle third 57.75%, lower third 23.94%. Orringer: 12.45% (28/225) upper, 53.78% (121/225) middle, and 33.77 (76/225) lower third. Trieu trieu duong : middle 60% (12/10), lower 40% (8/20). Squamous cell carcinoma is mainly type of esophageal cancer. Biopsy of our patients is 61/67 squamous cell, adenocarcinoma 6/67. This result is as same as the results of authors.....About CT scanner and bronchoscopy, we detect 11/19 invasive to surrounding organs (T4). But with experience more than 20 years in esophagectomy we believe that we can be done also we performed incompletely radical esophagectomy.

In our study, mean operation time is 3.6h and mean thoracic time is 80 minutes, major intraoperative complication occurred in 5 (5.5%)

patients. Azygos vein arch injury occurred in one patient. Hemostasis was achieved using an endoclip. No patients need blood transfusion. The membranous portion of the left bronchial was injured in 2 (2.98%) patients. In 2 patients, the laceration was repaired with direct suture closure by 3.0 prolene. In one patient with about 2cm laceration in the membranous portion of the tracheal and one (1.10%) patients of pulmonary injury is incorrect lung collapse (mistake in anesthesia). both of cases were closed with thoracoscopy thoraco-scory sutures. Conversion rate is 0%. Satoshi Yamamoto: intraoperative complications occurred in 4 (3.6%) patients: tracheal injury in 3 (2.7%) and azygos vein injury in 1 (0.8%). The average thoracoscopic time was 111 minutes (range, 45 to 210 minutes). Chu - Yu Lai: the average operation time was 5.2h (range: 4.5-6.2). The thoracoscopic esophagectomy and mediastinal lymph node dissection took about 154 minutes (100-190), the average blood loss during the operation was 210ml (110-350). Joris J G scheepers et al: the mean operating time for the thoracoscopy phase was 180 min (120-240min) being median the blood loss 400ml (150- 700), no conversion. Palanivelu et al, described in 2006 a series of 130 patients who underwent a right thoracoscopic esophagectomy with the prone position : mean operationg time 220 min, no conversion. Akasi et al performed en bloc total esophagectomy with radical lymphadenectomy by right thoracoscopy in 39 patients with esophageal cancer, operating time was  $200 \pm 41$ min, blood loss was  $270 \pm 157$ ml.

One of benefits of minimal invasive surgery in short time stay and thoracoscopic esophagectomy is like that. The mean time hospitalization of patients in our report is 15 days (range, 11-28 days). The patients had not postoperative complication, they were be done oral feeding at 9<sup>th</sup> day and out of the hospital at 11<sup>th</sup> day. Some patients have long time hospitalization because the major post complications.

Postoperative complications anh early outcome

result. Although, thoracoscopic esophagectomy is a minimal invasive surgery so that it have advantages of endoscopic surgery: less pain, less inflammatory response, faster recovery gastrointestinal functions, reduced medical costs, better quality of life (71). Satoshi Yamamoto (13) : The 30-day mortality rate was 0.8% .Early postoperative complications occurred in 29 (25.9%) patients including the following: recurrent nerve palsy in 10(8.9%), respiratory complication in 7 (6.3%), anastomotic leakage in 9 (8.0%) with major leakage requiring reanastomosis in 4 (3.6%) of these 9, and chylothorax in 3(2.7%). Luketich et al reported that the incidence of pneumonia was 7.7% in their studies of 222 patients. A prospective study of 945 patients when Jeffrey Rentz *et al* compare transthoracic versus transhiatal esophagectomy: Morbidity occurred in 47% (266/562) of patients after transthoracic esophagectomy, thirty-day mortality was 10.0%. Lukechi et al reported 222 patients underwent esophagectomy with the right thoracoscopy and three stage procedure: overall complication is 32%: anatomic leak in 26 patients (11.7%), chylothorax in 7 (3.2%), pneumonia in 17 (7.7%). In our report, the overall postoperation complication is 12.09 %. The death rate is 0%. In four anatomic leak patients, we had just used gastrorral feeding 2 patients (small leaking appear at 10<sup>th</sup> and 11<sup>th</sup>) and another patients (leaking appear at 8<sup>th</sup> and 13<sup>th</sup>) must be reanatomosis. All of them are well. Pneumonia patient was successful with internal treatment. One (1.10%) patient occurred severe left pleural effusion so we had must been refeeding jujenostomy and intravenous, gastrorral tube drain, left chest drainage, out of hospital at 28<sup>th</sup> day.

Long term outcome in 24 months (2-40 months). Obstruction in 2 (2.20%) patients, anatomic recurrent in 2 (2.20%) patients, one port site metastasis at 5mm trocarts at eighth inter-costal space on the anterior axilla line, one upper middle line metastasis, lung metastasis in 2 cases. death

rates: 12.08% (11/91) in 12 months, 23.08% (21/91) in 24 months. Really condition, to access the metastasis and overall survival of esophageal cancer, the clinical physician must be consume the factors : patient general conditions, location of tumors, disease grade, methods and technique surgery, neoadjuvant therapy, experiences of surgeon, equipment of surgery... and 24 months are not enough length to access, evaluate the right thoracoscopic esophagectomy for esophageal

cancer. So that we hope in that reports will be more exacttley in the future.

### IV. CONCLUSION

Right thoracoscopic esophagectomy for esophageal cancer is a a feasible and safe procedure with perioperative complication, operation time, time stay are acceptable, the survival are hopeful. May be, this procedure can apply for the tumors which invasive surrounding organs.

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