Ivor Lewis Esophagectomy: Experience at Jinnah Hospital, Lahore

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Introduction: Although different approaches have been used for surgical resection of esophageal cancer, the Ivor Lewis approach is the standard technique at most centers for resection of the diseased middle and lower third esophagus. This procedure has historically been associated with significant morbidity and mortality. However, modern literature suggests that Ivor Lewis esophagectomy can be performed with an acceptable complication rate and mortality. **Patients and methods:** We conducted a case series of thirteen consecutive patients who underwent an Ivor Lewis esophagectomy at Jinnah Hospital Lahore from January, 2001 to December, 2002. The objective was to examine the morbidity, mortality and short-term outcome of this surgical procedure. **Results:** The mean age of the patients was 45.9 years +/- 18.3 years (median: 44.5 years; range: 22 to 78 years). 7 patients were men and 6 patients were women. 6 patients (46.2%) were operated for benign corrosive esophageal strictures whereas seven patients (63.8%) had esophageal cancer. The median age of the patients with benign strictures was 28 years (range: 20 – 35 years). The median age of the cancer patients was 58 years (range: 54-70 years). Of these patients, one had Stage I cancer (9.29%), two had Stage II a (28.57%), two had Stage II b (28.57%), and two had Stage III disease (28.57%). Five patients (71.42%) had adenocarcinoma and two (28.57%) had squamous cell carcinoma. Seven patients (53.8%) had one or more co-morbid conditions, including diabetes, hypertension, cardiovascular disease and chronic obstructive pulmonary disease. Four patients (30.77%) had history of smoking. The mean operative time was 270 minutes +/- 31 minutes. The mean operative blood loss was 1500 ml +/- 102 ml. The median ICU stay was one day (range: 1 to 7 days). The median hospital stay was 19 days (range: 15 to 38 days). Eight patients (61.54%) developed post-operative complications. Most of these complications were medical (60%) rather than surgical (40%). Respiratory complications were the commonest (30.77%). Of the surgical complications, the most common was the development of an anastomotic leak (23.08%). All of these were managed conservatively and none proved fatal. There were two mortalities on post operative days 7 and 8, due to ARDS and multi-organ failure respectively. The operative mortality was 15.39%.**Conclusion:** Ivor Lewis esophagectomy represents a major physiological and surgical insult. However, careful patient selection, perioperative monitoring and early aggressive treatment of complications can significantly reduce morbidity and mortality.

Key words: Ivor Lewis esophagectomy

Esophageal resection represents a major surgical and physiological insult carrying significant morbidity and mortality. The four most commonly used routes for esophageal resection include transhiatal, transthoracic (Ivor Lewis), tri-incisional and left chest routes. There is no statistical evidence, either in retrospective comparative series or in prospective randomized trials that shows a difference in outcome with any particular route [1,2,3]. However, the Ivor Lewis approach has been the procedure of choice at many centers for the resection of carcinoma of the middle and lower-third of the esophagus[1,4]. It is our standard technique for esophagectomy since it is a safe operation with an acceptable morbidity and mortality and offers better exposure of the operation field, making lymph node dissection and anastomosis easier to perform[1].

We reviewed our experience with Ivor Lewis esophagectomy to examine the morbidity, mortality and short-term outcome with this technique.

Patients and methods:

We conducted a case series of 13 consecutive patients who underwent an Ivor Lewis esophagectomy at Jinnah Hospital Lahore from January, 2001 to December, 2003. Prospective data were collected using a specially designed form that took into account the age, gender, co-morbid conditions, symptoms at diagnosis, details of the surgical procedure, pre-operative work-up and the postoperative course.

Preoperative Assessment: All patients underwent a thorough preoperative assessment including chest radiograph, arterial blood gases, EKG, pulmonary function tests and specialist cardiopulmonary opinion when appropriate.

Operative Technique: All operations were carried out by the same approach which included an initial midline laparotomy and mobilization of the stomach followed by a right-sided 5th intercostal space posterolateral thoracotomy and resection of the esophagus and proximal stomach. Gastrointestinal continuity was restored using the stomach as the conduit. The esophagogastric anastomosis was fashioned at the apex of the thorax. The stomach tube was anchored with delayed absorbable suture to posterior mediastinal tough tissue to prevent drag.

A radical upper abdominal and en-bloc mediastinal lymphadenectomy was performed for the cancer patients. The abdominal component of this lymphadenectomy comprised of en-bloc resection of nodes along the common hepatic and proximal splenic arteries, together with those at the origins of the left gastric and celiac axis. The lesser omentum was divided to dissect the nodes along the lesser

curve and en-bloc hiatal dissection was performed, removing the left and right paracardial nodes.

Within the thorax, the esophagus was mobilized and the middle and lower paraesophageal nodes were removed, baring the aorta and pulmonary veins of any connective tissue. A meticulous lymphadenectomy of the paratracheal, carinal and left and right bronchial nodes was performed. This was followed by the ligation of the thoracic duct with resection of the adjacent Para-aortic nodes. At this stage, sleeve resection of the lesser curve and the associated nodes was undertaken. The nodes in the aortopulmonary window were also removed but a full dissection of the left recurrent laryngeal nerve chain of lymph nodes was not routinely carried out. No cervical lymphadenectomy was undertaken. Two chest drains were placed at the apex and base of the right hemithorax at the end of the procedure.

Postoperative Care: Patients were ventilated in the ICU overnight and if their clinical condition was satisfactory, extubated and returned to the ward the next morning.

Nasogastric suction was usually continued till five days post operation. Chest drains were removed on days 5 and 6 in most cases. As peroperative feeding jejunostomy was performed in all cases, nutritional supplementation was instituted early in the post- operative period. The sequence of post-operative care is outlined in Table 1.

Results:

Demographics: The sample consisted of 13 patients, 7 were men and 6 were women. The mean age of the patients was 45.9 years +/- 18.3 years, the range being 22 to 70 years.

Indications: All patients had disease of the middle and lower-thirds of the esophagus. 6 patients (42.7%) were operated for benign disease, i.e. corrosive esophageal strictures, whereas 7 patients (53.8%) had esophageal cancer.

The median age of the patients with benign corrosive strictures was 28 years (Range 22 to 35 years). The median age of cancer patients was 58 years (Range 54 to 70 years). 5 patients (71.42%) had adenocarcinoma and 2 had squamos cell carcinoma of the esophagus (28.57%). 1 patient (14.29%) had Stage I disease, 2(28.57%) had Stage II a, 2(28.57%) had Stage II b and 2 (28.57%) had Stage III tumors. 2 patients (28.57%) had node positive disease compared to 5 patients (71.43%) with node negative cancer.

Preoperative Status: 7 patients (53.85%) had one or more co-morbid conditions at the time of diagnosis, including diabetes, hypertension, cardiovascular disease and chronic obstructive pulmonary disease (Table 2). 2 patients (15.38%) were diabetics, and 1 (7.69%) was hypertensive. 3 patients (23.04%) had cardiovascular disease which included a history of myocardial infarction, ischemic heart disease or coronary bypass grafting.

Four patients (30.77%) had a history of smoking, out of which 2 were active smokers at the time of diagnosis. The mean preoperative serum albumin was 3.7g/dl. 23% patients reported weight loss greater than 10% of their normal body weight.

Operative Parameters: Mean total operative time (excluding anesthetic preparation time) was 270 minutes +/- 31 minutes. The mean operative blood loss was 1500ml +/- 102ml. Perioperative blood transfusion was not required in any patient.

Median ICU stay was 1 day (Range 1 to 7 days). The median hospital stay was 19 days (mean 19.38 days; Range 15 to 38 days).

Postoperative Complications: 8 patients (61.54%) developed postoperative complications out of which 60% were medical and 40% were surgical complications (Table.3).

Medical complications included pulmonary complications that occurred in 4 patients (30.77%). These included bronchopneumonia in 3 patients and ARDS in 1 patient. All 4 patients were above 55 years of age, 2 were active smokers and 2 had pre-existing chronic obstructive pulmonary disease. The 3 patients with bronchopneumonia were managed successfully with intravenous antibiotics and did not require ventilatory support. However, the patient with ARDS required ventilatory support in the ICU and died on the 8th postoperative day.

Other medical complications included myocardial infarction in 1 patient, cardiac failure in 1 patient and transient arrhythmias in 2 patients (Table 3).

The commonest surgical complication was the development of an anastomotic leak in 3 patients (23.08%). All 3 were managed conservatively with early drainage and enteral feeding (feeding jejunostomy) in 2 and TPN in 1 patient. There was no leak associated mortality.

Other surgical complications included minor gastrointestinal bleeding, not requiring re-intervention or transfusion, in 2 patients, minor pneumothorax, that resolved spontaneously, in 1 patient and wound infection that responded to antibiotics in 4 patients (Table 3).

Table 1: Sequence of Events in Postoperative Management

Extubation after overnight stay in ICU
Sips of water from Day 1
Antibiotics days 0-2
Mobilization at day 2
Nasogastric suctions for days 1-5
Chest drains removed on days 5 & 6

Table 2: Preoperative status of patients.

Comorbid	n=	%age
History of smoking	4	30.77
Diabetes	2	15.38
HTN	1	07.69
Cardiovascular disease	3	23.08
COPD	2	15.39
Weight loss (10% of body weight)	3	23.08

Table 3; Postoperative complications

Complications	n=
Medical complications	
Major	
Bronchopneumonia	3
Respiratory failure/ARDS	1
MI/Unstable angina	1
Cardiac failure	1
Minor	
Arrythmias	2
Psychiatric	1
Infective diarrhea	3
UTI	3
Surgical Complications	
Major	
Anastomotic leak	3
GI Bleed	2
Minor	
Wound infections	4
Minor pneumothorax	1

Table 4: Diagnosis and outcome of patients with esophageal cancer.

Age/ Sex	Histological diagnosis	TNM Stage	Initial Swallow	Signs of Leak	Outcome
68/M	Adenocarcinoma	I	Normal	None	Discharged on day 22
62/M	Sq. Cell Ca	III	Normal	None	Discharged on day 23
58/F	Adenocarcinoma	IIa	Normal	Day 6	Discharged on day 38
55/M	Adenocarcinoma	IIb	Not done	None	Died on Day 8
58/M	Adenocarcinoma	III	Normal	None	Discharged on day 19
54/F	Sq. Cell carcinoma	IIa	Normal	Day 10	Discharged on day 32
70/F	Adenocarcinoma	IIb	Not done	None	Died on Day 7 (ARDS)

Table 5: Diagnosis and outcome of patients with corrosive esophageal stricture

Age/ Sex	Initial swallow	Signs of leak	Outcome
22/F	Normal	None	Discharged on day 18
30/F	Normal	Day 10	Discharged on day 35
28/F	Normal	None	Discharged on day 15
32/F	Normal	None	Discharged on day 19
25/M	Normal	None	Discharged on day 15
35/F	Normal	None	Discharged on day 16

Discussion

Esophageal carcinoma is an aggressive disease with a poor prognosis[1,4]. Despite advances in the treatment for esophageal tumors, including the use of a multi modality approach, surgical resection remains the mainstay of treatment[1] . Although different approaches have been described for the surgical resection of esophageal cancer, there is no statistical evidence that shows a difference in outcome with any particular approach[1,2,3]. We use an Ivor Lewis approach for resection of esophageal carcinoma for several reasons. This approach allows complete visualization of all perigastric and paraesophageal lymph nodes. It also allows direct visualization of the thoracic esophagus, thus virtually eliminating the uncommon but potentially disastrous occurrence of damage to the adjacent structures that can occur during transhiatal esophagectomy[1]. We favor the Ivor Lewis approach over the left thoraco-abdominal approach because construction of the anastomosis high in the right chest is technically easier than performing an anastomosis high in the left chest.

Esophageal resection has historically been associated with substantial morbidity and mortality [1,5]. In a literature review of 122 series from 1953 to 1978 by Earlam and Cunha-Melo in 1980, the average mortality was 33%[5]. Although this figure fell substantially in the last major review from 1980 to 1988 by Muller and colleagues[6], certain institutions continue to report very high mortality rates for this commonly performed procedure[7]. In addition to the nutritional problems associated with advanced malignancy, the majority of patients with esophageal cancer is elderly and often has co-morbid cardiorespiratory disease. Hence, it is not surprising that most studies report a high incidence of complications and a high mortality rate after esophagectomy[8,9] .

As other authors have already pointed out, respiratory complications are an important cause of morbidity after esophagectomy[4,10]. Of all the risk factors associated with post-operative pulmonary complications, the surgical site is the most important, with the risk being highest for upper abdominal surgery and for thoracic surgery[11]. The combination of these two approaches, as in Ivor Lewis esophagectomy, means that pulmonary complications remain the main cause of morbidity after this procedure[8,12,13] . Patient-related factors such as chronic lung disease and smoking also contribute to major post-operative pulmonary morbidity. All 4 of our patients who developed pulmonary complications were above 55 years of age and 2 had pre-existing chronic obstructive pulmonary disease. 3 had a history of smoking (average of 20 pack years). Although little can be done about the long-standing history of smoking, those being considered for esophageal resection should be encouraged to stop smoking immediately because there is evidence that cessation of smoking 8 weeks pre-operatively is beneficial[14] .

All 4 of our patients developed pulmonary complications, i.e. bronchopneumonia and ARDS, within the first five post-operative days when a nasogastric tube was in situ. This suggests that aspiration played little role in these pulmonary complications. Also, it is our routine practice to perform pyloroplasty to facilitate gastric drainage and to prevent complications related to outlet obstruction and aspiration.

Considerable attention has been drawn to the nutritional aspects of risk prediction because patients being considered for esophageal resection are often malnourished as a result of long-standing dysphagia and malignancy associated weight loss. It has been shown that protein deficiency is associated with poor respiratory muscle strength and hence a higher incidence of post-operative pulmonary complications[4,15]. The lack of association found in our series between pulmonary morbidity and crude measures of nutrition, such as serum albumin and percentage weight loss is probably because of the inadequacy of these parameters for the assessment of protein energy malnutrition. More accurate anthropometric and biochemical measurements may prove more useful.

Most reports concerning the complications of esophagectomy have focused on anastomotic leak because historically, the incidence of leaks was high and often fatal[4,6]. There is a wide variation in the anastomotic leak rate reported in literature. Much of this variation can be attributed to the different techniques and sites of esophagogastric anastomosis and the non-uniform definitions of anastomotic leaks[1,4]. 3 of our patients (23 %) developed anastomotic leaks. 2 of these patients had undergone esophagectomy for malignant disease and 1 for corrosive stricture. All were managed conservatively with early drainage and enteral or parenteral feeding. None of these leaks proved fatal.

There was no operative mortality in the group of patients operated for benign corrosive strictures. However, 2 patients in the esophageal cancer group died within 8 days post operation. Both deaths were due to medical rather than surgical causes. The overall 30-day mortality was 15.39 %, which is higher than reported in modern literature[4,9,16]. The fatalities were notably older and had a history of cardiorespiratory disease, suggesting a decreased reserve to deal with the complications that developed.

Several studies have shown that most patients with esophageal cancer have advanced disease at presentation and despite radical surgery, their long term survival remains poor[4,9,13]. Hence, only by careful patient selection and optimization of perioperative care can resection be justified, since non-surgical palliative measures are also available now.

Minimizing the operative mortality in patients undergoing esophageal resection not only requires surgical expertise but also development of a multidisciplinary team to assess these patients preoperatively and manage the postoperative complications. In a large review of 30-day mortality after resection for liver, pancreatic, esophageal, lung and colorectal cancers in various American hospitals, the discrepancy between low volume and high volume hospitals was the widest for esophagectomy[7]. Hence, there is evidence to suggest that complex surgical procedures such as esophagectomy should be performed in hospitals that have a high specialty case load.

In conclusion, Ivor Lewis esophagectomy can be performed with an acceptable complication rate, both for benign and malignant disease of the esophagus. Careful patient selection, perioperative monitoring and early aggressive treatment of complications can further reduce morbidity and mortality.

References:

1. Visbal AL, Allen MS, Miller DL et al. Ivor Lewis Esophagectomy for esophageal cancer. Ann Thorac Surg. 2001 Jun; 71 (6): 1803-8.
2. H.W.Pinotti, I.Cecconello, M.A De Oliveira. Transhiatal esophagectomy for esophageal cancer. Semin Surg Oncol 1997; 13: 253-58.
3. M.B.Orringer. Transthoracic versus transhiatal esophagectomy. What difference does it make? Ann Thorac Surg 1987; 44: 116-118.
4. Griffin SM, Shaw IH, Dresner SM. Early Complications after Ivor Lewis Subtotal Esophagectomy with two-field lymphadenectomy: Risk factors and management, J Am Coll Surg. 2002 Mar; 194 (3): 285-97.
5. Earlam R, Cunha-Melo JR. Oesophageal squamous cell carcinoma, critical review of surgery. Br J Surg 1980; 67: 381-390.
6. Muller J M, Erasmi H, Stelzner M, et al. Surgical therapy of Oesophageal Carcinoma. Br J Surg 1990; 77: 845-57.
7. Begg CB, Cramer LD, Haskins WJ et al. Impact of hospital volume on operative mortality for major cancer surgery, JAMA 1998; 280: 177-51.
8. Whooley BP, Law S, Murthy SC et al. Analysis of reduced dearth and complication rates after esophageal resection, Ann Surg 2001: 233: 338-344
9. Karl RC, Shreiber R, Boulware MS et al. Factors affecting morbidity, mortality and survival in patients undergoing Ivor Lewis esophago-gastrectomy. Ann Surg 2000; 231:635-643.
10. K.M.Chu, S.Y.Law, M.Fok et al. A prospective randomized comparison of transhiatal and transthoracic resection for lower third esophageal carcinoma. Am J Surg 1977; 174: 320-24.
11. Smetana GW, Preoperative pulmonary evaluation. New England J Med 1999; 340: 937-944.
12. Dummont P, Wihlm KM, Hentz JG et al. Respiratory complications after surgical treatment of esophageal cancer. A study of 309 patients according to the type of resection. Eur J Cardiothorac. Surg 1995; 9: 539-543
13. Watson A. Operable esophageal cancer: current results from the West. World J Surg 1994; 18: 361-366
14. Warner MA, Offord KP, Warner ME, et al. Role of preoperative cessation of smoking and other factors in postoperative pulmonary complications: a blinded perspective study of coronary artery bypass, patients. May Clin Proc 1989; 64: 609-616.
15. Windsor JA, Hill GL. Risk factors for postoperative pneumonia. The importance of protein depletion. Ann Surg 1988; 208:209-214.
16. Swanson SJ, Linden P. Esophagectomy for esophageal cancer. Minerva Chir, 2002 Dec; 57 (6): 795-810.