An Experience of 108 cases of Esophagectomy using left Thoracolaparotomy and Cervical Anastomosis with Feeding Jejunostomy, without Gastric Drainage Procedure

A BILAL M SALIM M S NABI* *M MUSLIM MUQEETULLAH*
Department of Cardiothoracic Surgery, PGMI, Lady Reading Hospital, Peshawar
**Department of Thoracic Surgery, Mayo Hospital, Lahore*
Correspondence to Dr. Aamir Bilal, Associate Professor

Objective: To study efficacy and safety of esophagectomy using left thoracolaparotomy and left neck anastomosis with feeding jejunostomy, but no gastric drainage procedure. **Design**: An observational descriptive study. **Place and Duration:** Department of Cardiothoracic Surgery, Postgraduate Medical Institute, Lady Reading Hospital Peshawar from June 2002 to September 2004. **Subjects and Methods:** Computerized clinical data of 108 surgically treated patients during twenty eight months was retrospectively analyzed. Detailed scrutiny of record was carried out to determine the suitability and safety of the surgical procedure and surgical outcome. **Results:** A total of 108 patients underwent esophagectomy through left thoracolaparotomy and left neck incision. Male: Female was 72: 36, age range was 18 – 72 years with a mean age of 42.3 years. The predominant clinical presentation was dysphagia. Tumor level was upper third of thoracic esophagus in 3 (2.7%), middle third in 48 (44.4%) and lower third in 57 (52.7%) patients. Tumor histology was squamous cell carcinoma in 72 (66.6%) and adenocarcinoma in 36 (33.3%) patients. The mean operative time was 155 (25 ±) minutes. Postoperative morbidity was 19.4% (21/108). The complications were anastomotic leak in 7(6.5%), Hoarseness in 6(5.5%), aspiration in 3(2.7%); reopening in 1(0.9%) and stricture in 4(3.7%) patients. The overall mortality was 8.3% (9/108). Deaths were due to anastomotic leak in 3(2.7%) tracheal injury in 2(1.85%), respiratory failure in 2(1.85%) and pulmonary embolism in 2(1.85%) patients. 28 patients were lost to follow-up while incisional hernia was seen in 1, hoarseness in 3 and stricture in 3 patients over a last one month to 2 years follow-up. Recurrence occurred in 3/108 (2.77%); one developed malignant ascities, after 4 months, one developed nodule in hypopharynx after 18 months, and one developed a subcutaneous nodule on the back after 14 months. **Conclusion:** Left thoracolaparotomy and cervical anastomosis is a safe approach for carcinoma of the esophagus. A 30 day mortality of 8.3% in a large series of 108 oesophagectomies with 2.7% recurrence and 19.4% morbidity speak volumes for the technique. Omitting a gastric drainage procedure does not adversely effect the outcome, while routine placement of a jejunostomy feeding catheter is a safe and cost effective mode of nutrition. Neck anastomosis gives a generous tumor free margin, as all except one resection margin was free of tumor. This is further consolidated by only 3 cases of recurrence out of 80, with 28 being lost to follow up.

Key words: Esophagectomy, Thoracolaparotomy, feeding jejunostomy, cervical anastomosis, gastric drainage procedure.

Czerny performed the first resection for carcinoma of the esophagus in 1877[1]. Attempts at resection of the intrathoracic esophagus were stymied by the inevitable catastrophic pneumothorax and mediastinal tamponade before the introduction of positive pressure ventilation. Nonetheless the first successful transthoracic esophagectomy was performed in New York by Franz Torek (1913) before the advent of intratracheal ventilation. Subsequent attempts by other surgeons met with catastrophic consequences for a variety of reasons including severe intrathoracic anastomotic dehiscence. In the ensuing decades, advances in the evaluation of esophageal resection and reconstruction were made by pioneering thoracic surgeon such as Sweet and Belsy[2]. In 1978 Orringer and Sloan reported their experience with transhiatal esophagectomy[3].

Resection of the thoracic esophagus can be accomplished with a variety of surgical approaches. The commonly used approach for Tumor of lower two thirds of thoracic esophagus is a right thoracotomy and laparotomy as initially proposed by Lewis. A modification was proposed by McKeown whereby an additional cervical incision allows the anastomosis to be performed in the neck. Historically Tumors of the distal esophagus and cardia have been approached through a variety of left chest incisions[4]. The commonly used is a left thoracotomy and transdiaphragmatic approach to the abdomen while others advocate left thoracolaparotomy, thus mobilization of the stomach is greatly facilitated. Resection of the intrathoracic esophagus may be accomplished through a transhiatal approach with an upper abdominal and cervical incision. Transhiatal esophagectomy is best suited for the Tumors of the cardia but is also used for resection of the intrathoracic esophagus[5].

The purpose of this study was to analyse the role and outcome of left thoracolaparotomy and cervical anastomosis for carcinoma of the esophagus. In addition it was aimed at doing away with gastric drainage procedure, and utilizing feeding jejunostomy in our patients.

Materials and methods:

This is a retro spective analysis of patients operated for carcinoma of the esophagus between June 2 002 and September 2004. Computer records of 108 patients who

were operated through left thoracolaparotomy and cervical anstomosis were included in this study. The data base included data regarding the preop workup and staging,histology (endoscopic), op notes, postop ICU and ward stay, morbidity and mortality, postop specimen histology and follow up. All those with irresectable tumors, unfit for surgery were excluded. All patients preop had apart from routine investigations, Barium studies, endoscopy and biopsy, CT Thorax and upper abdomen with oral and IV contrast and pulmonary function tests. Postop all patients were kept in Thoracic ICU (Intensive Care Unit) for 24 hours, then shifted to Thoracic HDU (High Dependency Unit) for 72 hours, and then finally discharged from the ward on the 7-10 postop day. They were all seen in OPD after 2 weeks with the histology result of resected specimen and then followed up at gradually increasing intervals. The hospital records and operation reports of these patients were carefully analyzed for demographic features; operative approach and outcome.

Operative Techniques: The patient was placed in left thoracolaparotomy position. The skin was prepared and draped from mandibles to the pubis and anterior to both mid axillary lines. The operation was carried out in phases; the mediastinal, the abdominal and the cervical. A left thoracolaparotomy incision starting from midpoint of xiphisternum and umbilicus extending through bed of 7th rib towards the posterior axillary line for a variable length was made. The costal arch was divided and a cirmfrential peripheral division of diaphragm was carried out. Abdominal exploration was first made to determine the extent of involvement of stomach by the tumor; involvement, fixation to pancreas and to assess hepatic and peritoneal secondaries. The esophagus was gently swept away from aorta; pericardium and prevertebral fascia. Both the vagal trunks were divided. Anterior esophageal mobilization was carried out similarly and the esophagus was gently swept away from trachea. Finally after dividing the lateral attachment the entire intrathoracic esophagus was circumferentially mobilized. The abdominal phase consisted of mobilization of the stomach and feeding jejunostomy. Pyloromyotomy or pyloroplasty was not performed in any of our patients. The right gastroepiploic artery was identified and the presence of its pulsation confirmed. The lesser sac behind the greater omentum was entered through an avascular area where the right gastroepiploic artery terminates as it enters the stomach. The entire greater curvature of the stomach was mobilized by dividing the greater omentum 2 cm below the right gastroepiploic artery to minimize the chance of injury to this vessel. The gastrohepatic omentum was divided and the left gastric artery was isolated, doubly ligated and divided. Once the entire stomach was mobilized it was transected from the lower esophagus. The transaction was closed with one layer of running hemostatic suture and two layers of running polypropylene Lembert stitches. The highest point of the stomach was temporarily reattached to lower esophagus and the stomach was then mobilized into left chest. Abdominal phase was concluded by inserting a F14 rubber jejunostomy tube and was secured with a weitzel maneuver. The cervical phase of the operation consisted of mobilization of cervical esophagus through a left neck incision along the anterior border of sternocliedomastoid. The stomach was finally pulled up and a single layered cervical esophagogastric anastomosis was performed with 2/O vicryl. After thorough check for hemostasis the cervical wound was closed and the nasogastric tube was secured in place. Postoperatively jejunostomy tube feeding was resumed after 48 hours while oral feeding fluids and semisolids were started on 7th day and the patient was discharged home on 10th postoperative day.

Results:

Out of 108 patients there were 72 males and 36 female. Their mean age was 42.3. The youngest was 18 years old male while the oldest was 71 years old male. Majority of our patients (60) hailed from Afghanistan. Among these 23 patients were from Mazar Sharif, 17 from Kabul, 12 from Jalalabad, 3 each from Harat and Paktia while 1 each was from Uzbekistan and Turkmenistan.

Endoscopic records showed tumour level at upper third of thoracic esophagus in 3 (2.7%), middle third in 48 (44.4%) and lower third in 57(52.7%) patients. Tumour histology was squamous cell carcinoma in 72 (66.6%) and adenocarcinoma in 36(33.3) patient;s of these 28 patients had involvement of adjacent stomach of varying but resectable extent. The mean operative time was 155(25±) minutes. The postoperative morbidity was 19.4% (21/108). The complications recorded were cervical anastomotic leak in 7(6.5%); transient hoarseness of voice in 6(5.5%), wound infection in 6(5.4%), aspiration pneumonia in 3(3.7%), reopening for a displaced jejunostomy catheter in 1 (0.9%), and stricture in 4 (3.7%) patients.

Overall mortality in our study was 8.3% (9/108). Cervical anastomotic leak leading to septicaemia and death was noted in 3(2.7%) patients. Tracheal injury was the cause of death in 2 (1.85%), respiratory failure in 2 (1.8%) and sudden death on fifth postoperative day, most probably due to pulmonary embolism in 2 (1.8%) patients. All the resected specimens were sent for histology. In all except one, resection margins were clear of tumor.

Patients were seen initially after two weeks, then monthly for 3 months, then 3 monthly for six months and then six monthly for one year and will now be followed-up annually after that. 28 patients were lost to follow-up. Of the remaining 80, stricture was noted in 5, hoarseness in 3, chest infection in 9, recurrence in 3 and an incisional hernia which required repair was noted in 1 patient.

Table 1: Preoperative data of patients (n=81)

Variable	n=
SEX	
Male	72
Female	36
AGE (y)	
M	
< 40	38
> 40	34
F	
< 40	16
> 40	20
CLINICAL PRESENTATION	
Progressive dysphagia	108
Weight Loss	83
LEVEL	
Upper third	03
Middle third	48
Lower third	57
HISTOLOGY	
Squamous cell carcinoma	72
Adenocarcinoma	36

Table 2: Morbidity 21 /108 – 19.4%

Complications	n=	%age
Anastomotic leak	7	6.5%
Hoarseness	6	5.5%
Aspiration	3	2.7%
Reopening	1	0.9%
Stricture	4	3.7%

Table 3: Mortality 9/108 – 8.3%

Complications	n=	%age
Anastomotic leak	3	2.7%
Tracheal Injury	2	1.85%
Respiratory failure	2	1.85%
Pulmonary embolism	2	3.7%

Table 4: Follow up 80/108

Recurrence	3/80
Incisional Hernia	1/80
Hoarseness	3/80
Stricture	3/80
Lost to follow-up	28

Discussion:

In North America squamous cell carcinoma of the esophagus represents 1.5 to 2% of all cancers and approximately 5 to 7 % of all gastrointestinal neoplasms. Geographic variation in incidence is striking. Even at the level of world areas, a 15 fold increase exists between high risk Southern African men and low risk Western African men[6]. According to Parkin and associates (1999) other areas of relatively high risk are eastern Africa, South America and South Asia. In certain small geographic areas throughout the world the incidence has almost reached epidemic proportion[7]. In China near the Southern mountain range, cancer of the esophagus is the most common cause of death, an incidence of more than 130/100000 person[8]. In our study we noticed high incidence of esophageal cancer among patients either belonging to Afghanistan or Afghan living in Pakistan. A high incidence belt exists starting from Caspian Sea, extending towards Iran, Afghanistan, North West Frontier of Pakistan and further in the mountains of China[10,11]. Hot fluids (Qahwa), spring water and snuff have been postulated to be the cause in Afghans. However this needs to be studied scientifically and is the subject of a prospective study we intend to start from 01st January 2005.

No unanimity of opinion exists as to what is the best operation for the removal of a cancer of the esophagus. Each surgeon or surgical group has a procedure or procedure of choice for removing tumors at various locations of the thoracic esophagus[1,2]. The controversy as to which is the best operation probably will not be resolved and may as well be of little importance[3,4]. Standard transthoracic esophagectomy is performed through either a right or left thoracotomy depending on the location of the tumour[9]. Lesions of the distal esophagus and gastric cardia have been approached through a variety of left chest incisions which vary in the degree to which they extend into the abdomen. Upper two third of esophagus are most directly approached through a right thoracotomy usually in the fifth interspace. After a standard transthoracic esophageal resection the mobilized stomach is positional in the original esophageal bed. The posterior mediastinum is the preferred position, because it is shortest and most direct route between neck and abdominal cavity and if subsequent anastomotic dilation is required it is usually easy to carryout endoscopy and dilatation. Transhiatal esophagectomy is best reserved for patients in whom palliation is clearly the objective of treatment because of the advanced stage of the disease or the presence of serious co morbidity[12]. Proponents of transhiatal esophagectomy maintain that overall survival rates are not significantly different than standard transthoracic resection, in patient without nodal metastasis. Critics of transhiatal esophagectomy however argue that a complete lymphadenectomy is a necessary component of resection for curative purposes.

Advantages of our approach through left Thoracolaporotomy were that there was adequate exposure of esophagus and stomach. Feeding jejunostomy tube was placed with ease. It is a natural source of nutrition, cheaper than TPN and not associated with metabolic and septic complications which occur with TPN. There was no need for gastric drainage procedure, as due to vertical position of the stomach chances of gastric stasis are markedly reduced. Due to neck anastomosis there is no fear of mediastinitis. The other advantages of a neck anastomosis are (i) it is technically easier to do then an intrathoracic

anastomosis and (ii) you get very generous tumour free margin, resulting in adequate clearance and less chances of recurrence. Finally our results in terms of morbidity and mortality are comparable with other studies[13].

Squamous cell carcinoma is the most common malignancies tumor of the body of the esophagus and represents more than 95% of esophagus malignancies some series. [14, 12] Primary adenocarcinoma is rare, less than 1% to 7% of esophageal malignancies. The common glandular Tumor is an adenocarcinoma that arises in the columnar epithelium of Barrett's esophagus which represents 86% of all adenocarcinoma in one series[4]. In our study 51% patients had squamous cell carcinoma whereas adenocarcinoma was reported in 48% patient. Lower third of esophagus was involved in 58% cases while middle third Tumor was reported in 38% cases.

Several complex surgical procedures have reduced mortality when they are performed at high volume centers. Hospitals that perform a high volume of esophagectomies have better results with early clinical outcomes and marked reductions in mortality compared with low volume hospitals[8]. We have the highest number of patients being operated during two years period when compared with other national studies [8,10]. Our 30 day mortality was 8.3%.

As the vagi are divided, most surgeons perform some form of a gastric drainage procedure. However most of them are doing an Ivor-Lewis procedure with anastomosis in right chest, for a transhiatal[10,11,12]. In our series, with our technique of left thoracolaprotomy and left neck anastomosis, we did not do any drainage procedure. The rational behind it was that when an adequately mobilized stomach is brought up, under vision to be comfortably and anastomized in the neck, it is converted into a vertical tube, which empties by gravity. In our follow-up one month to 27 months no adverse effects regarding gastric stasis were observed. In other series stasis after vagotomy ranges from 0 – 37% [7,9], but was relieved after 3 months[7,9].

We routinely placed a jejunostomy feeding tube in all our patients, using a 14F rubber tube secured in place with a weitzel maneuver. The relatively few potential complications are for out weighed by its advantages: facilitation of early ambulation, supplemental nutritional support and the best means of providing nutrition in the event of an anastomotic disruption[11, 12]. Because esophageal replacement with stomach is essentially an upper abdominal operation that requires minimal manipulations of the intestines, postoperative ileus for more than 48 – 72 hours is unusual. It is therefore possible to begin jejunostomy tube feeding with juices with in 2 – 3 days of the operation and advance to full strength tube feedings soon thereafter allowing discontinuation of IV fluids and greater ease of ambulation for the patient as oral intake is being increased.

Location and technique of esopahgogastric anastomosis is a subject of much discussion. The site of anastomosis is selected upon the location of primary Tumor and preference of the surgeon. The site of anastomosis becomes an issue when the primary Tumor is in the middle or the lower thoracic esophagus. Should it be in the chest or in the neck? Ribet et al[15] reports that a cervical anastomosis provides an average additional Tumor clearance of 3.18cm. Cervical anastomosis avoids the potential hazard of mediastinitis of an intrathoracic anastomosis[16]. Moreover the inverse relation between the height of esophagogastric anastomosis and the degree of subsequent gastroesophageal reflux is well established[17,18]. That is low intrathoracic esophagogastric anastomosis is almost invariably associated with marked gastroesophageal reflux whereas with cervical esophagogastric anastomosis, considerable gastroesophageal reflux is uncommon. In several studies an anastomosis in the neck has a higher incidence of postoperative leak than does chest placement but the incidence of postoperative mortality is lower if a leak occurs in the neck than in the chest[19]. The occurrence of an anastomotic leak after esophagectomy is multifactorial. Blood supply and good surgical technique are the two most important factors in avoiding a leak[20]. The overall anastomotic leak rate following cervical esophagogastric anastomosis with the stomach positional in the posterior mediastinum in the original esophageal bed is 7.9%[21]. The incidence of anastomotic leak in our study was 6.5%. Mathisen et al [22] emphasized the techniques of anastomosis 1: Atraumatic handling of tissue, 2: Preservation of blood supply of both esophagus and stomach, 3: Avoidance of tension at the anastomosis, 4: Avoidance of the use of crushing clamps, 5: Cutting the tissues with a sharp knife[23,24]. In our series cervical anastomosis yielded a tumor free margin in 107/108 cases, and leaks were observed in only 7(6.5%) of which 4 responded to conservative treatment, while 3(2.7%) died.

Conclusion:

Our series of 108 Oesophagectomies in 28 months in one centre is one of the largest in National as well as International Literature [1, 2, 4, 10, 11, 13, 15, 18, 20, 21, 22]. This reflects both the high incidence in NWFP and neighboring Afghanistan as well as the paucity of health services, as our unit is the only Thoracic Centre in NWFP. Thoracolaporotomy with Left neck anastomosis in the hands of a trained thoracic surgeon, with appropriate anesthesia and ICU backup, we find is the best treatment option. A 30 day mortality of 8.3%, recurrence of 2.7% (one month to 27 months follow-up), and a morbidity of 19.4% speak for themselves. Our series reinforces the Royal College of Surgeons recommendation that Oesophageal Surgery is best done in high volume centers, and no surgeon should be doing esophageal surgery if he is doing less than 20 cases a year. Omitting gastric drainage procedure has no adverse effect on the outcome. Finally feeding jejunostomy is safe, cheap and effective mode of nutrition for these patients.

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