

esophagectomy.^{3,4}

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.⁵ The commonly used is a left thoracotomy and transdiaphragmatic approach to the abdomen while others advocate left thoracotomy, 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.⁶

The purpose of this study was to analyse the role and outcome of left thoracotomy 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 & METHODS

This is a retrospective analysis of patients operated for carcinoma of the esophagus between June 2003 and September 2005. Computer records of 200 patients who were operated through left thoracotomy and cervical anastomosis 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. All patients had post-op adjuvant

therapy with both chemo & radio 4 weeks post-op. Patients were followed up at gradually increasing intervals. Abdominal ultrasound, barium studies, chest x-ray & full blood count were done at every follow-up check up.

OPERATIVE TECHNIQUES

The patient was placed in left thoracotomy 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 thoracotomy incision starting from midpoint of xiphistern 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 circumferential 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 en-

TABLE 1
PREOPERATIVE DATA OF PATIENTS (n = 200)

Variable	No. of Patients
Sex	
Male	130
Female	70
Age (year)	
Male	
< 40	61
> 40	69
Female	
< 40	27
> 40	43
Clinical Presentation	
Progressive Dysphagia	193
Weight Loss	175
Level	
Upper third	03
Middle third	88
Lower third	109
Histology	
Squamous cell carcinoma	136
Adenocarcinoma	64

tire 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 transection 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 sternocleidomastoid. The stomach was finally pulled up and a single layered cervical esophagogastric anastomosis was performed with 2/0 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. Two weeks post-op

patient was referred to oncologist and continuation adjuvant chemotherapy was given within 4 – 6 weeks post-op. All patients had check barium studies done at 2 weeks, 3 months and 6 months postop, along with Chest X-ray and abdominal ultrasound at 1 month, 3 months and 6 months postop.

RESULTS

Out of 200 patients there were 130 males and 70 female. Their mean age was 42.3. The age range was 18 to 72 years. Majority of our patients (135) hailed from Afghanistan. Among these 51 patients were from Mazar Sharif, 33 from Kabul, 27 from Jalalabad, 9 each from Harat and Paktia while 3 each was from Uzbekistan and Turkmenistan.

Endoscopic records showed tumour level at upper third of thoracic esophagus in 3 (2.7%), middle third in 98 (44.4%) and lower third in 99 (52.7%) patients. Tumour histology was squamous cell carcinoma in 136 (66.6%) and adenocarcinoma in 64 (33.3%) patients; of these 43 patients had involvement of adjacent stomach of varying but resectable extent. The mean operative time was 115(25±) minutes. The postoperative morbidity was 20% (40/200). The complications recorded were cervical anastomotic leak in 12(6%); transient hoarseness of voice in 8(4%), aspiration pneumonia in 9(4.5%), reopening for a displaced jejunostomy catheter in 1 (0.5%), and anastomotic stricture in 10 (15%) patients.

Overall mortality in our study was 9% (18/200). Cervical anastomotic leak leading to septicaemia and death was noted in 4(2%) patients. Tracheal injury was the cause of death in 6(3%), respiratory failure in 3(1.5%) and sudden death on fifth postoperative day, most probably due to pulmonary embolism in 5 (2.5%) patients. All the resected specimens were sent for histology. In all except one, resection margins were clear of tumor. Adjuvant combination therapy was given within 4 – 6 weeks post-op.

TABLE 2
Morbidity 40/200 - 20%

Complications	No. of Patients	%	Age
Anastomotic leak	12	6%	
Hoarseness	8	4%	
Aspiration	9	4.5%	
Reopening	1	0.5%	
Stricture	10	5%	

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. 40 patients were lost to follow-up. Of the remaining 160, stricture was noted in 3, hoarseness in 3, chest infection in 9, recurrence in 9 and an incisional hernia which required repair was noted in 1 patient. Postop

barium studies done at 2 weeks, 3 months and 6 months showed no gastric stasis / tube distension.

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.⁷ 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.⁸ 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.⁹ 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.^{11,12} Hot fluids (Qahwa), contaminated 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 an ongoing study.

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.^{3,5} Standard transthoracic esophagectomy is performed

through either a right or left thoracotomy depending on the location of the tumour.¹⁰ 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 position 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 morbidity¹³. 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 thoracotomy 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.¹⁴

Squamous cell carcinoma is the most common malignant tumor of the body of the esophagus and represents more than 95% of esophagus malignancies some series.^{15,13} Primary adenocarcinoma is rare, less than 1% to 7% of esophageal malignancies. The com-

TABLE 3
Mortality 18/200 - 9%

Complications	No. of Patients	%	Age
Anastomotic leak	4	2%	
Tracheal Injury	6	3%	
Respiratory failure	3	1.5%	
Pulmonary	5	2.5%	

TABLE 4
Follow-up 160-200

Recurrence	3/160
Incisional Hernia	9/160
Hoarseness	3/160
Stricture	3/160
Malignant Ascities	4/200
Nodule in hypopharynx	1/200
Subcutaneous nodule on the back	1/200
Lost to follow-up	40

mon glandular Tumor is an adenocarcinoma that arises in the columnar epithelium of Barrett's esophagus which represents 86% of all adenocarcinoma in one series.⁵ In our study 68% patients had squamous cell carcinoma whereas adenocarcinoma was reported in 32% patient. Lower third of esophagus was involved in 54.5% cases while middle third Tumor was reported in 44% 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.⁹ We have the highest number of patients being operated during two years period when compared with other national studies.^{9,11} Our 30 day mortality was 9%.

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, or a transhiatal.^{11,12,13} In our series, with our technique of left thoracotomy and left neck anastomosis, we did not do any drainage procedure. The rationale behind it was that when an adequately mobilized stomach is

brought up, under vision to be comfortably 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%^{8,10}, but was relieved after 3 months.^{8,10}

Severe post operative gastric stasis, occurs only occasionally after intrathoracic or cervical esophagectomy so role of routine gastric drainage procedure is questionable. Although the vagi are invariably resected during esophagectomy but post operative pylorospasm occurs only rarely.¹⁶ In all the postop barium studies done at 2 weeks, 3 months and 6 months postop no gastric / tube distension was noted. Studies of gastrointestinal function at different periods after resection of carcinoma of esophagus without drainage procedure, show hyperperistalsis of stomach and rapid passage of barium through the pylorus.¹⁷ Post operative gastroesophageal reflux or reflux esophagitis has not been a problem in our experience.

CONCLUSION

Our series of 200 Oesophagectomies in 39 months in one centre is one of the largest in National as well as International Literature.^{1, 2,4,10,11,13,19,20,21} 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. Thoracotomy 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 9%, recurrence of 4.5% (one month to 36 months follow-up), and a morbidity of 20% speak for themselves. Our series reinforces the Royal College of Surgeons recommendation that Oesophageal Surgery is best done in high volume centres, and no surgeon should be doing oesophageal surgery if he is doing less than 20 cases a year. Omitting gastric drainage procedure has no adverse effect on the outcome.

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