The Results of Esophagogastrectomy Without Thoracotomy for Adenocarcinoma of the Esophagogastric Junction

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Between 1980 and 1988, 98 patients with adenocarcinoma of the esophagogastric junction were seen at the University of Western Ontario. Eighty-two patients underwent resection of the celiac lymph nodes, lesser curve and cardia of the stomach, and thoracic esophagus through abdominal and neck incisions avoiding thoracotomy. The esophagus was replaced by a stomach tube in 80 patients or by a colon tube in two patients. Two of 82 patients died while hospitalized. Early postoperative morbidity included anastomotic leaks that closed spontaneously (13), transient hoarseness (10), myocardial infarction (2), pulmonary embolus (6), and atelectasis or pneumonia (13). Late postoperative complications included delayed gastric emptying (4), symptomatic reflux (4), diarrhea (10), and anastomotic strictures (17). The 2-year survival of 30% was significantly affected by the stage of disease ($p = 0.003$), depth of tumor penetration ($p = 0.02$), lymph node metastasis ($p = 0.001$), tumor differentiation ($p = 0.008$), and tumor DNA ploidy ($p = 0.02$). Local recurrences appeared initially in 20 patients: anastomotic (3), peritoneal (14), mediastinal (3); distant metastasis occurred in 27 patients: bone (15), liver (5), brain (2), and multiple organs (5). Swallowing was restored and maintained in 75 patients. Esophagogastrectomy without thoracotomy provides a safe, effective method of restoring swallowing in patients with adenocarcinoma of the esophagogastric junction. This technique provides acceptable survival and local recurrence rates.

ADENOCARCINOMA OF THE esophagogastric junction is one of the most difficult malignancies to cure. The patients usually present with dysphagia late in the course of the disease. At the time of diagnosis, there is often spread of the tumor to adjacent structures and regional lymph nodes.[1-3] If the disease is localized, surgical resection is considered the optimal treatment because resection provides a chance to remove all local disease for cure. If the disease is advanced at the time of diagnosis, effective palliation is the primary goal of treatment. Although there have been recent reports of promising regimens offering palliation and some chance for cure with radiation and/or chemotherapy,[4,5] the primary treatment modality for adenocarcinoma of the esophagogastric junction has been surgery.

Controversies connected with operations for adenocarcinoma of the esophagogastic junction relate to the type and extent of resection to be performed. The classical operations carried out for this tumor include total gastrectomy,[2] or partial esophagogastrectomy done through either a thoracoabdominal incision on the left side,[6] a left thoracotomy with incision of the diaphragm,[3] or a laparotomy and right thoracotomy.[7] Death associated with these operative techniques is usually due to anastomotic leaks into the pleural cavity or mediastinum or respiratory complications.[8,9] Because these cancers often spread submucosally up the esophagus, there is a high incidence of residual tumor at the proximal resection line, with associated gross tumor recurrence.[7] Furthermore when the esophagogastric anastomosis is carried out within the thoracic cavity, regurgitation and reflux esophagitis are common.[7]

With the aim of minimizing these complications, and reducing operative mortality for the past 8 years, we have treated adenocarcinoma of the esophagogastric junction with *en bloc* resection of the lesser curvature and cardia of the stomach, celiac lymph nodes, diaphragmatic crura, and the thoracic esophagus. The esophagus is replaced by a tube made from the greater curve of the stomach or colon, which is brought through the posterior mediastinum and anastomosed to the cervical esophagus. The procedure is done through an incision in the upper part of the abdomen and left neck, thus avoiding thoracotomy and intrathoracic anastomosis. The purpose of this report

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TABLE 1. *Gastric Staging*

TNM Clinical Classification			
T—Primary tumor			
TX	Primary tumor cannot be assessed		
T0	No evidence of primary tumor		
Tis	Carcinoma *in situ:* intraepithelial tumor without invasion of the lamina propria		
T1	Tumor invades lamina propria or submucosa		
T2	Tumor invades muscularis propria or subserosa		
T3	Tumor penetrates the serosa (visceral peritoneum) without invasion of adjacent structures		
T4	Tumor invades adjacent structures		
N—Regional Lymph Nodes			
NX	Regional lymph nodes cannot be assessed		
N0	No regional lymph node metastasis		
N1	Metastasis in perigastric lymph node(s) within 3 cm of the edge of the primary tumor		
N2	Metastasis in perigastric lymph node(s) more than 3 cm from the edge of the primary tumor or in lymph nodes along the left gastric common hepatic, splenic, or coeliac arteries		
M—Distant Metastasis			
Stage Grouping			
Stage 0	Tis	N0	M0
Stage IA	T1	N0	M0
Stage IB	T1	N1	M0
	T2	N0	M0
Stage II	T1	N2	M0
	T2	N0	M0
	T3	N0	M0
Stage IIIA	T2	N2	M0
	T3	N1	M0
	T4	N0	M0
Stage IIIB	T3	N2	M0
	T4	N1	M0
Stage IV	T4	N2	M0
	Any T	Any N	M1

is to document the risks and effectiveness of the operation and to evaluate factors responsible for tumor recurrence and death.

Materials and Methods

Adenocarcinoma of the esophagogastric junction is defined as an adenocarcinoma arising in the upper one third of the stomach and involving the esophagogastric junction or an adenocarcinoma in a columnar-lined esophagus involving the esophagogastric junction. Adenocarcinomas arising in the fundus, diffuse cancers of the linitis plastica type, and squamous cell carcinomas of the esophagus were excluded from the study.

Between 1980 and 1988, 98 patients with adenocarcinoma of the esophagogastric junction were seen at the University of Western Ontario. Seven patients had conservative management because of advanced distant metastases or medical contraindication to operation. Ninety-one patients had laparotomies as the first step of a planned resection. In nine of these patients the tumor was nonresectable because of invasion of the aorta by the tumor,[3] peritoneal metastasis,[4] and multiple liver metastasis.[2] The remaining 82 patients underwent resection of the celiac lymph nodes, lesser curve and cardia of the stomach, and thoracic esophagus through abdominal and neck incisions, thus avoiding thoracotomy. The esophagus was replaced by a tube fashioned from the greater curvature of the stomach in 80 patients and left colon in two patients. No patients received postoperative chemotherapy and four patients received postoperative radiotherapy for residual disease.

After surgery the patients were evaluated at 3-month intervals until the time of this writing or death. The site and the time of the first recurrence of cancer and the long-term complications were carefully documented during the evaluation visits. No patients were lost to follow-up.

Statistics

Actual survival analysis was performed using the Kaplan-Meier product limit estimates and comparison of survival curves were evaluated using the Mantle-Cox test. Multivariate analysis was performed using Cox regression analysis. Statistical significance was defined as $p < 0.05$ for Mantle-Cox and $p < 0.15$ for Cox regression analysis.

Pathology

Tumors were evaluated for differentiation, depth of invasion, size, vascular invasion, lymph node involvement, flow cytometric DNA analysis, and the presence of a columnar-lined esophagus. Pathologic staging was performed according to the U.I.C.C. staging system for gastric carcinoma (Table 1).

Local recurrence was considered to occur if there was convincing evidence of recurrence of cancer at the site of the anastomosis, in the posterior mediastinum, or in the peritoneal cavity.

Systemic recurrence occurred when there was evidence or recurrence of cancers in the cervical lymph nodes, liver, lung, bone, or brain.

Preoperative Staging and Care

After the clinical examination, histologic diagnosis of the tumor was made by endoscopic biopsy. Distant metastasis were ruled out. Since 1983 all patients have had a CT scan of the chest and upper abdomen to determine the size and extension of the tumor.

Nutritional status was assessed in all patients. Those patients who lost more than 10 pounds or demonstrated hypoalbuminemia were given enteral or parenteral alimentation at least 1 week before the operation. Clinical contraindications to operation included diminished pulmonary function with a forced expiratory volume at 1 second of less than 1 L or evidence of uncontrolled congestive heart failure.

Operative Technique

The goals of this operation are to remove completely the celiac lymph nodes, the lesser curvature of the stomach around the tumor, the cardia, the tumor, the intrathoracic esophagus, as well as any adherent local structures such as the diaphragmatic crura. Extrathoracic anastomosis minimizes the harmful effects of an anastomotic leak by permitting drainage of gastrointestinal contents out of the neck drain. A further aim is to decrease the incidence of tumor recurrence at the site of anastomosis by removing the intrathoracic esophagus. Finally by avoiding a thoracotomy we anticipated a decreased incidence of respiratory complications.

Under general anesthesia, a double lumen tube is placed in the tracheobronchial tree so that, if the chest had to be entered, one of the lungs can be collapsed. The abdomen, right chest, and left side of the neck are then prepared and draped. The abdomen is entered through an upper midline incision and the resectability of the tumor is determined. If the tumor is resectable, the stomach is completely mobilized by dividing the gastrocolic omentum while preserving the right gastroepiploic vessels. The gastrohepatic omentum is then divided close to the liver. The left gastric artery and vein are identified, ligated, and divided. Celiac and left gastric lymph nodes are removed and the diaphragmatic crura of the hiatus are resected in continuity with the esophagogastric junction. With the retraction of the enlarged hiatus, the lower part of the esophagus and surrounding pleura are dissected under direct vision up to the carina, and all vessels to the esophagus are clipped and divided. The vagus nerves are divided just below the carina. During this intrathoracic dissection, care is taken not to compress the heart and decrease the venous return.

Attention is then turned to the neck where an incision is made along the left sternocleidomastoid muscle down to the suprasternal notch. The middle thyroid vein is ligated and divided and the cervical esophagus is exposed and isolated, taking care not to injure the recurrent laryngeal nerves. The thoracic esophagus is carefully dissected from the back of the trachea, clipping all arterial branches going into the esophagus. The cervical esophagus is then divided and the proximal end of the distal portion of the esophagus is delivered into the abdomen. Any vessels that are left going into the esophagus can be exposed, clipped, and divided through the hiatus. The duodenum is then well mobilized and a pyloromyotomy is carried out. A tube, approximately 3 cm to 4 cm in diameter, is then made from the greater curve of the stomach using a stapling device. Care is taken to excise the lesser curve of the stomach as well as at least 4 cm of normal stomach around the tumor. The staple line of the gastric tube is inverted with nonabsorbable sutures.

The stomach tube is brought up through the posterior mediastinal esophageal bed to the neck and sewn to the prevertebral fascia and an end-to-end or end-to-side anastomosis is then carried out between the cervical esophagus and stomach using a two-layered anastomosis. The gastric tube is brought up in the retrosternal position if gross tumor is left behind to avoid local recurrence into the gastric tube.

A nasogastric tube is then placed across the anastomosis into the stomach for decompression. A chest tube is placed in the pleural cavity if the pleural space is violated. A small drain is placed close to the cervical anastomosis and brought out through the skin. A feeding jejunostomy is usually carried out for early postoperative nutrition.

Postoperative Care

Most patients are extubated after the operation. Prophylactic antibiotics are given before operation and for 48 hours after the operation. Jejunostomy tube feedings are started three days after the operation. A gastrografin swallow is carried out seven days after operation. If there is no anastomotic leak, the nasogastric and chest tubes are removed. If a leak is shown, the patient is given nothing by mouth for another five days and then begun on an oral diet. All fistulas closed spontaneously with no operative intervention. This operative technique has been described in detail by our group in a previous paper.[10]

Results

There were 72 men and 10 women, with a median age of 62 years (range, 37 to 81 years). Presenting symptoms in the 82 patients included dysphagia (69), weight loss greater than 10 pounds (56), heartburn (31), regurgitation (27), odynophagia (18), and bleeding (4). Significant preoperative risk factors included previous myocardial infarction (8), ventricular arrhythmia (5), smoking (68), chronic obstructive pulmonary disease (11), diabetes (8), thromboembolic disease (3), and heart failure (2).

Mortality and Morbidity (Table 2)

There were two hospital deaths, both from pulmonary emboli, 14 and 15 days after operation. The patients took a median time of 11 days before they began eating a solid diet and the median time to discharge was 15 days.

Twenty-three patients had one or more complications in the postoperative period. Eleven patients developed a new arrhythmia and two of these patients had an associated myocardial infarction. Six patients had a documented pulmonary embolus after the operation. Seven patients required more than 24 hours of mechanical ventilation after the operation. Thirteen patients had atelectasis and/or pneumonitis in the postoperative period.

TABLE 2. *Early Complications of the Resection*

Complication	Number	Per Cent of Resected Patients
Azygos vein tear	1	1
Cardiac arrhythmia	11	13
Pulmonary embolus	6	7
Myocardial infarction	2	2
Atelectasis or pneumonitis	13	16
Respiratory failure	7	9
Anastomotic leak		
Radiographic diagnosis only	8	10
External fistula	5	6
Transient hoarseness	10	12
Delayed gastric emptying	4	5
Dysphagia	17	20

Ten patients developed transient hoarseness. One of these patients had a permanent left vocal cord paralysis. One patient had an intraoperative hemorrhage from a tear in a branch of the azygos vein requiring a right thoracotomy to stop the bleeding. Eight patients had an anastomotic leak documented by gastrograffin swallow that did not drain externally. Five patients developed an early fistula from an anastomatic leak. All of the anastomotic leaks closed spontaneously with conservative management. Four patients had temporary delayed gastric emptying but no patients required a pyloroplasty to supplement the pyloromyotomy. No patients developed chylothorax, subphrenic abscess, empyema, or required an incidental splenectomy at the time of operation.

Seventeen of the surviving patients needed an esophageal dilatation in the postoperative period. Five patients required more than three esophageal dilatations to maintain swallowing. Three months after the operation, 94% of the patients were swallowing at least a soft diet (Table 3). Four patients complained of symptomatic reflux in the supine position. Postprandial diarrhea was controlled by a postgastrectomy diet in ten patients.

Pathology (Table 4)

Adenocarcinoma was found in association with a columnar-lined esophagus in 28 of the 82 patients. Tumor differentiation was accurately examined in 76 patients. Twenty-one patients had a well- differentiated tumor, 21 patients had a moderately differentiated tumor, and 34 patients had a poorly differentiated tumor. Of the 75 tumors that underwent flow cytometric DNA analysis, 61 tumors were aneuploid and 14 tumors were diploid. Vascular invasion was seen in 37 of 73 tumors. Lymph node metastases were found in N1 nodes in 35 patients and in N2 nodes in 26 patients. Twenty-one patients had no lymph node metastases. There was partial esophageal wall invasion in 28 patients (T1 or T2) and 64 patients had full-thickness involvement. Using the UICC gastric staging technique, 12 patients were stage I, 18 patients were stage II, 47 patients were stage III, and 5 patients were stage IV.

Survival

The overall survival rate for the resected group was 55% at 1 year and 31% at 2 years (Fig. 1). The median survival time was 16 ± 1 month. The disease-free survival rate was 46% at 1 year and 23% at 2 years.

The 2-year survival for patients with stage I and II disease was 50% and that of patients with stage III and IV disease was 21% ($p = 0.003$). The 2-year survival rates for each stage were stage I, 73%; stage II, 37%; stage III, 21%; there were no 2-year survivals in stage IV ($p = 0.001$; Fig. 2).

Patients with a columnar lined esophagus had a slightly better 2-year survival rate of 45% compared to patients with no associated columnar-lined esophagus whose survival rate was 25% at 2 years ($p = 0.1$).

The 73% 2-year survival rate for patients with well-differentiated tumors was significantly different than those with moderate (23%) and poorly differentiated tumors (15%) ($p = 0.008$).

The 2-year survival rate for patients with partial esophageal wall invasion (46%) was significantly different than those with full- thickness invasion (23%; $p = 0.02$). Two-year survival rate for the 21 patients with no metastasis (53%) was significantly better than the survival rate for patients with positive lymph node metastasis (21%) ($p = 0.001$). Two-year overall survival of patients with diploid tumor was 66% compared to 9% for aneuploid tumors ($p = 0.02$).

Using Cox regression analysis, the significant prognostic independent variables for predicting overall 2-year survival from adenocarcinoma of the esophagogastric junction were tumor differentiation ($p = 0.08$), depth of wall invasion ($p = 0.03$), and lymph node metastasis ($p = 0.001$).

Tumor Recurrence

Forty-seven patients have developed a recurrence of their cancer (Table 5). The median time from the operation to the recurrence of the tumor was 11 months. Twenty patients recurred locally either at the anastomosis (3) or in the esophagogastric bed (17). All of these patients

TABLE 3. *Late Complications of the Resection*

Complication	Number	Per Cent of Surviving Patients
Dysphagia	5	6
Gastroesophageal reflux	4	5
Postprandial diarrhea	10	13
Recurrent nerve paralysis	1	1

TABLE 4. *Pathologic Features*

	Number of Resected Patients	Median Survival Time (Months)	Per Cent of Patients Who Survived 2 Years	p Value
Overall		13	31	
Stage				
I	12	24	73	0.001
II	18	18	37	
III	47	11	21	
IV	5	6	0	
Lymph node metastasis				
Yes	61	12	21	0.001
No	21	39	53	
Depth of penetration				
Partial thickness	28	22	46	0.02
Full-thickness	64	11	23	
Tumor differentiation				
Well	21/76	24	73	0.008
Moderate	21/76	14	23	
Poor	34/76	9	15	
DNA ploidy				
Diploid	14/75	22	66	0.02
Aneuploid	61/75		9	
Columnar-lined esophagus				
Yes	28	16	45	0.1
No	54	11	25	

either had lymph node metastasis or transmural spread of their tumor at the time of resection. Two of the three patients with anastomotic recurrences had microscopic evidence of tumor in their gastric resection margins. Twenty-seven patients had tumor recurrence in the bone, liver, or brain.

Palliation

Before operation 69 of the 82 patients could not eat solids and of these, 27 also had difficulty swallowing liquids. Fifty-six patients had lost more than 10 pounds in weight. Of the 80 patients who survived the resection, 17

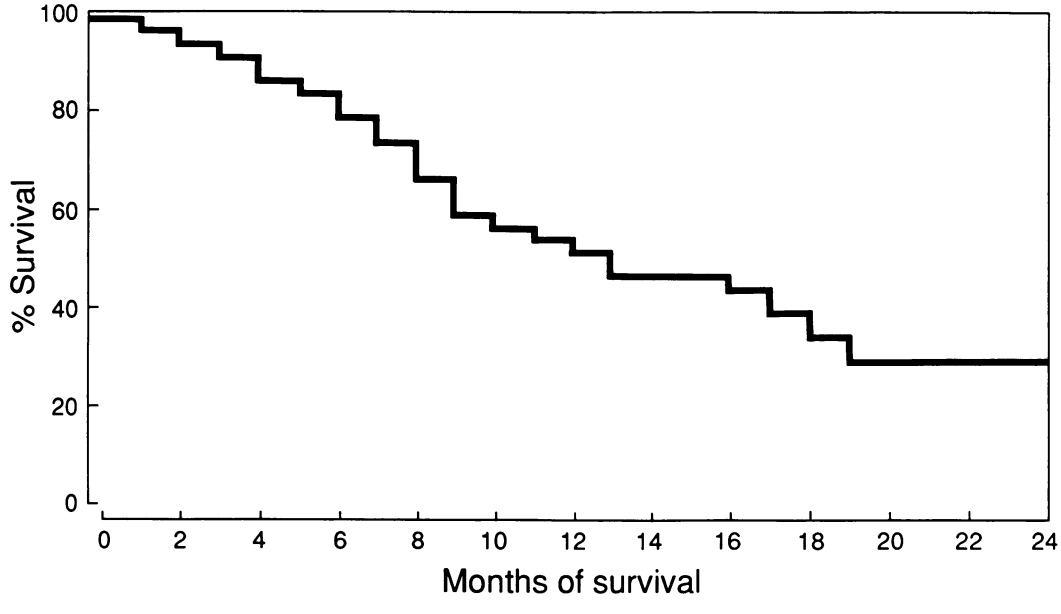

FIG. 1. Overall survival rates of 82 patients with resected adenocarcinoma of the esophagogastric junction. Operative deaths are included.

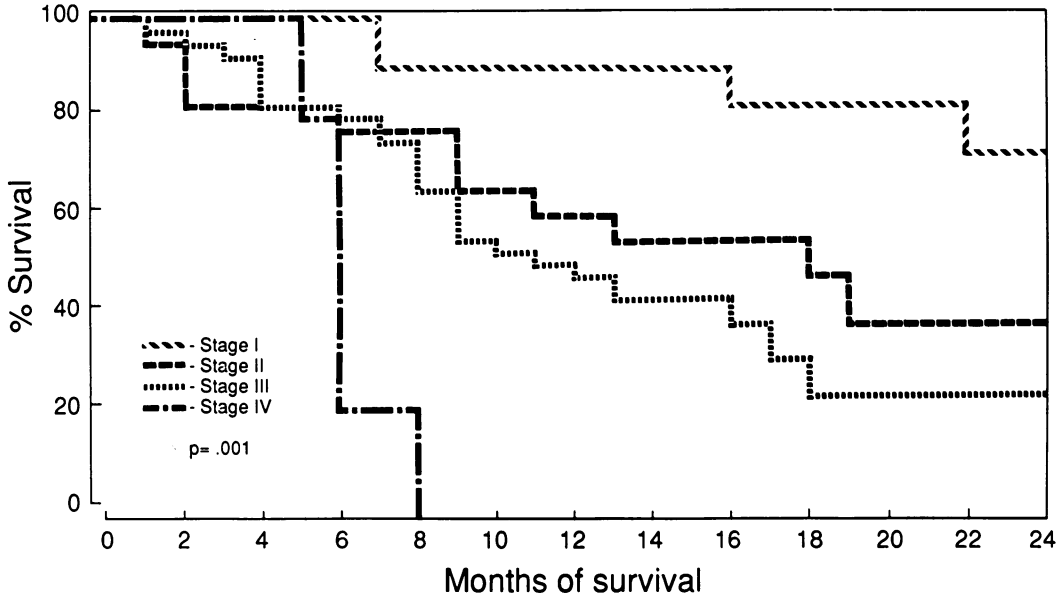

FIG. 2. Overall survival showing a significant difference in survival rates between the stages.

patients required esophageal bouginage to swallow a soft diet. Five of these patients required more than three bouginages, two on a chronic basis secondary to reflux esophagitis. Three patients developed dysphagia for solids at 10, 11, and 14 months after the operation because of recurrent tumor at the anastomosis. Swallowing was maintained until the present time or death in 75 patients. Six patients could not gain weight in the early postoperative period because of anastomotic structures[4] and delayed gastric emptying.[2]

Discussion

The ideal operation for adenocarcinoma of the esophagogastric junction should relieve dysphagia, bleeding, and pain with minimal morbidity and mortality. Furthermore there should be complete resection of the tumor and surrounding tissues to avoid local recurrence and improve long-term survival. Transhiatal esophagogastrectomy without thoracotomy, popularized by Orringer in North America,[11] has been criticized as a dangerous operation that contravenes the basic surgical principles of adequate exposure and *en bloc* resection of cancer.[12] The hospital operative mortality rate of 2.4% in this series equals the best operative mortality rates for partial esophagogastrectomy[3,13] and is better than operative mortality rates for total gastrectomy,[2,14] and *en bloc* resection.[15] Most of the deaths in these other series have been due to leaking of the anastomosis into the mediastinum and respiratory complications.[8,9] Although 13 patients have evidence of anastomotic leaks on x-ray examination in this study, only five developed fistulas. The harmful effects of the anastomotic leak were minimized by drainage of gastrointestinal contents out of the neck drain. All the anastomotic leaks closed spontaneously. The incidence of pulmonary complications was no different than that reported for partial esophagogastrectomy and total gastrectomy.[8,9] However, unlike Postlethwait's report,[9] there were no deaths from pneumonia in this study. The two deaths in this series resulted from pulmonary emboli occurring 14 and 15 days after the operation. Four more patients had nonfatal pulmonary emboli. The high incidence of pulmonary emboli in this series suggests that the use of prophylaxis against venous thrombosis is indicated during the hospital stay. Cardiac dysrhythmias were common after this operation. Thirty-two patients developed supraventricular tachycardias. Eleven of these patients had evidence of atrial fibrillation and two had an associated myocardial infarction. This high incidence of cardiac dysrhythmias could be secondary

TABLE 5. *Site of First Cancer Recurrence*

	Number	Per Cent of Recurrences
Local recurrence	20	43
Anastomosis	3	
Peritoneal	14	
Mediastinal	3	
Distant recurrence	22	47
Bone	15	
Liver	5	
Brain	2	
Synchronous local and distant recurrence	5	10

to retraction of the pericardium at the time of surgery, intravascular volume changes, or pericarditis.

Although there is complete resection of the intrathoracic esophagus, lesser curve of the stomach, and the celiac, left gastric, pericardiac, and lower mediastinal lymph nodes with this procedure, a potential disadvantage of this operation is the failure to clear completely the subcarinal lymph nodes.[10] However, Castrini's study[1] has shown that only 1% of adenocarcinomas of the esophagogastric junction have spread to the subcarinal lymph nodes at the time of resection. If resection of metastatic subcarinal lymph nodes is critical for long-term survival, then the frequency of incompletely removing these nodes with this operation is low and probably does not affect long-term survival. In this study 84% of the patients seen with adenocarcinoma of the esophagogastric junction underwent resection. This resectability rate was equal to that of Ellis'[3] and greater than that of all other reports.[2,6,13-15] The number of patients with either transmural spread of tumor or metastasis to the regional lymph nodes in this study was equivalent or greater than other reports.[2,3,13,15] Despite the frequency of advanced disease, 55% were alive 1 year and 31% were alive 2 years after the resection. Patients with early stage disease also had survival rates equivalent to those of Ellis[3] and Paolini[2] and better than the results of Skinner.[15] This survival rate suggests that resection of these early cancers was not compromised by the esophagogastrectomy without thoracotomy. In fact if the resectability rate, operative mortality rate, and survival statistics are taken into account, more patients in this study were alive at 2 years than in those studies where patients underwent total gastrectomy[2] or *en bloc* esophagogastrectomy.[15]

Adenocarcinomas at the esophagogastric junction often spread submucosally up the esophagus, leading to a high incidence of residual tumor at the resection margin. The resection of the total intrathoracic esophagus and lesser curve of the stomach in this series resulted in three local recurrences at the esophagogastric anastomosis. Unlike local recurrence occurring after total gastrectomy[2,14] or transthoracic esophagogastrectomy,[3,7] the site of recurrence appeared to be from the stomach in this study. The low incidence of recurrent tumor at the esophagogastric anastomosis is similar to that observed by Skinner[15] but lower than that observed with limited esophagogastrectomy[3] or total gastrectomy.[2,14] The anastomotic recurrences observed in this study could be avoided by more radical resection of the stomach as proposed by De Meester.[16] Besides the three patients who developed local anastomotic recurrences, 17 patients recurred locally in the esophagogastric bed or peritoneal cavity. This local recurrence rate is similar to that observed by Barber[17] after transhiatal esophagectomy for esophageal cancer and Gunderson[18] after radical gastrectomy for adenocarcinoma of the stomach. The latter reoperation series following curative resection suggested that the extent of the initial operative procedure had little effect on either the incidence or type of subsequent tumor recurrence. Lymph node failures were found in a high percentage of patients who supposedly had radical lymph node dissections. Thus all these data suggest that although systemic therapy is clearly important,[19] the development of an effective local therapy,[20,21] which is an adjuvant to surgery, could potentially benefit some patients with adenocarcinoma of the esophagogastric junction.

Analysis of treatments for adenocarcinoma of the esophagogastric junction suggests that outcome generally reflects the biologic behavior of the cancer rather than the extent of the operation. In this study, 2-year survival was significantly affected by the stage of disease, depth of tumor penetration, lymph node metastasis, tumor differentiation, and the nuclear DNA content of the tumor. Similar to observations by Ellis[3] and Skinner,[15] cancer arising in a columnar- lined esophagus had survival rates equal to adenocarcinoma of the cardia. Tumors with abnormal nuclear DNA content were associated with increased incidence of lymph node metastasis, advanced stage disease, and poorer survival. However using Cox regression analysis tumor ploidy was not an independent prognostic variable in predicting death from adenocarcinoma of the esophagogastric junction. This finding could be explained by the advanced stage of cancers observed in this report.

Before the esophagogastrectomy only 16% of the patients could swallow a solid meal. The 20% incidence of early postoperative dysphagia could be explained by scarring secondary to anastomostic leaks, ischemia, or gastroesophageal reflux. However 3 months after the operation 94% of the patients had normal swallowing restored and 90% maintained this diet until the time of this writing or death. Palliation provided by this operation was better than all other reported techniques for management of adenocarcinoma of the esophagogastric junction.[2,3,4,5,15]

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Discussion

Dr. F. G. Pearson (Toronto, Canada): In a very short period of time a great deal has been presented in this 10-minute paper, and I can assure you that the information has been very thoroughly documented and evaluated. The results obtained in an impressively large series of well-staged consecutive patients are, in fact, as good or better than any other reported data on operative mortality, morbidity, and survival by stage in patients managed by resection with adenocarcinoma of the EG junction.

Importantly the survival data in these 82 patients managed by total thoracic esophagectomy without thoracotomy (or transhiatal esophagectomy) are as good or better than the best results using more extensive exposures and operative procedures that describe a more radical mediastinal dissection.

In Toronto we have had a fairly extensive experience with this technique of transhiatal esophagectomy beginning in 1960 with patients managed by gastric substitution after pharyngolaryngectomy, and for some years now we have used this approach in selected patients with adenocarcinoma at the esophagastric junction. I can confirm that with experience it is absolutely clear that adequate exposure of the distal esophagus from the hiatus to the carina can be achieved using appropriate techniques of retraction through the dilated hiatus. I would emphasize, as the diagram did, that the esophageal relationships are visualized, and vessels are ligated and divided under direct vision.

What are the advantages of this approach? The functional results obtained by using gastric substitution and a high esophagogastric anastomosis are very good. Indeed I don't think any other substitute provides such predictably good functional results. Reflux is a minimal problem. Should a leak occur, the cervical anastomosis is less morbid and potentially lethal than a leak from an intrathoracic anastomosis.

The potential for local recurrence is minimized, and with experience there is no simpler alternative operation. Indeed, if two surgical teams are used, this operation can regularly be done in less than 3 hours.

What are its disadvantages? There is a learning curve for the technicalities of the operation, but I am not certain that this is significantly more than for any other operation to remove the thoracic esophagus. There may be a bias to the limit of the extent of proximal gastric resection, and all three of Dr. Finley's local recurrences occured on the gastric side of the anastomosis. I would ask Dr. Finley to comment on your management of the level of proximal resection to minimize this problem of local recurrence.

I would also ask for comment on the complication of recurrent nerve palsy. Although transient, you report a high incidence. Do you have technical suggestions as to how this can be reduced? Finally how do you manage anticoagulation to try to reduce the incidence of pulmonary embolism that was also a rather frequent complication in this series?

I think this is a very important contribution and documents the effectiveness of this approach better than any other previous report.

Dr. Robert E. Condon (Milwaukee, Wisconsin): Our series is not as extensive, but in many ways is comparable, and I rise primarily to emphasize a couple of points. One is the relative safety of the cervical esophagogastric anastomosis. It really makes a remarkable difference, as compared with an intrathoracic anastomosis, in terms of both the morbidity and mortality risk of a leak. Second the cervical esophagogastric anastomosis avoids the very real problem in patients who survive more than 6 months of reflux esophagitis in the residual esophagus.

A patient with an intrathoracic esophagogastric anastomosis after a more classic left thoracotomy resective procedure, if that patient survives 6 months, is often very significantly disabled by reflux esophagitis; some patients cannot eat and their inability to maintain oral nutrition recurs, but on a different basis than before operation.

I would like to raise with Dr. Finley perhaps a minor point of disagreement. In patients who are not obviously so preterminal that we refuse operation, that is, in all patients whom we explore, we resect tumor regardless of the presence of peritoneal or liver metastases because our primary objective of the operation is palliation and restoration of ability to swallow food by the oral route. I wonder if Dr. Finley could discuss why he apparently does not resect some patients with peritoneal and hepatic metastases after exploration.

Finally I can suggest to Dr. Pearson that there is a way to avoid the liability of recurrent nerve problems, and that is to use the posterior approach, dissecting behind the sternomastoid and along the transverse processes of the cervical vertebrae to approach the esophagus. The nerve at risk with the posterior approach is, of course, the cervical symphathetic.