

Left Sided Trans-thoracic Esophagectomy for Resectable Esophageal and Gastro-esophageal Junction Cancers: Experience from Addis Ababa, Ethiopia

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Background: Surgery is the main stay of treatment for Esophageal Cancer but there is no standard Esophagectomy accepted by all authorities to be superior. The main objective of this study is to present our experience with the left sided trans-thoracic approach in patients with a lower third Esophageal and Gastro-Esophageal junction cancer.

Methods: We retrospectively reviewed 22 patients at the Tikur Anbessa Specialized Hospital in Addis Ababa Ethiopia between January 2013 and 2015. Data collected included the socio-demographic status, diagnostic modalities, the operative details, post operative outcome and follow up.

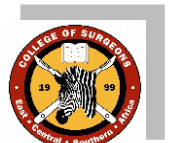
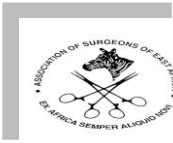
Results: The majority of the patients were males aged between 35-45 years, and had a clinical stage IIIa cancer. Average duration of surgery was 111 minutes (+ 17.4 minutes). Resection without macroscopical residual was achieved in 18 of 22 patients (81.8%). A total of 16 complications were recorded among 10 (45.4%) of the patients. One patient died in hospital (Mortality of 4.5%). All the remaining 21 patients were seen at least three times over the subsequent 6 months and were in good post operative condition.

Conclusion: Our finding is in agreement with the collected evidence the Sweet's procedure offers several advantages for tumors in the lower third of the esophagus including the gastro-esophageal junction. The short-term outcome of this procedure is also found acceptable.

Key Words: Sweet's procedure, left sided trans-thoracic esophagectomy, Esophageal and Gastro- esophageal cancer

Introduction

Esophageal cancer (EC) is the sixth most common cancer worldwide¹. It kills approximately 400,000 people annually and has a five-year survival rate of approximately 20% ^{1,2}. Sub Saharan African countries suffer from the highest burden of esophageal cancer, with more than eight out of ten (83%) cases diagnosed in these nations in 2008 ². According to a projection by the WHO cancer registry GLOBCAN, the highest incidence of Esophageal cancer is registered in Ethiopia, where standardized incidence rates in 2002 reportedly as high as 28.1 per 100,000 in males, and 19.6 per 100,000 in females ². Research related to EC in Ethiopia has also shown that the disease is one of the most common gastro-intestinal cancers seen at the Tikur Anbessa referral Hospital in Addis Ababa, Ethiopia ³. It is also



shown that most of these patients come from two particular regions in the country⁴ and most patients present to the hospitals at an advanced stage⁵.

Despite recent advances in the field of neo-adjuvant and adjuvant treatment, radical esophagectomy plus lymphadenectomy with curative intent still remains to be the mainstay of treatment for EC. Recent publications have currently established that neo-adjuvant chemo and radiotherapy resulted in better 5-year survival in early esophageal cancer but the overall response to all treatment modalities is unfortunately very low^{6,7,8}. There is no standard form of esophagectomy accepted by all authorities to be superior, but the surgical approach depends on curative intent, anatomic location of the tumor, the pre-operative patient condition, and probably availability of expertise and facilities. An international survey has shown that the Ivor-Lewis (abdominal and right thoracic) approach is the most commonly performed procedure^{9,10}. In addition, the left thoracic approach (Sweet's procedure) is a less commonly performed procedure in the world, except in China.^{10, 11}

Reports from Ethiopia have shown that the trans hiatal (THE) and Ivor-Lewis procedures are the two most commonly performed procedures^{4,5}. The Sweet's approach, however, is not practiced widely. Therefore, the main objective of this study is to present our experience with this approach in patients with a lower third esophageal and gastro-esophageal junction cancer.

Patients and Methods

This was a study done at the Tikur Anbessa Specialized Hospital (TASH) in Addis Ababa Ethiopia. The thoracic surgery unit at the hospital is a high-case load esophageal cancer treatment unit where an average of 150-200 patients undergoes surgical treatment for esophageal cancer annually. All patients with EC who underwent left sided thoracic esophagectomy between January 2013 and December 2015 were retrospectively reviewed. Data collected included the socio-economic characteristics of the patients, presentation and clinical findings, the anatomic location, histology and stage of the disease, the details of the surgical procedure and post-operative follow up. For this study, the Ivor-Lewis approach with thoracic anastomosis, McKweon approach with cervical anastomosis, and THE were excluded. All patients were diagnosed with lower esophageal cancer, located within 8 cm margin of the diaphragm

The Sweet (Left Thoracic) Operation

In the Sweet approach, after the patient is intubated (preferably double lumen), the patient is placed in a right lateral position and a soft pillow is placed under the right chest to ease access into the inter-costal spaces. In case double lumen intubation was not successful, a single lumen tube advanced into the right main bronchus was found sufficient. A left postero-lateral thoracotomy is performed along the left seventh or eighth inter-costal space. Once the thoracic space is entered, the deflated left lung is retracted superiorly and anteriorly and pushed out of the way. Cutting the inferior pulmonary ligament may sometimes be necessary. Sharp and blunt dissection around the esophagus is performed to

isolate the esophagus and the tumor, and then the esophagus is suspended with a sling. An NG tube already inserted before intubation eased the identification of the esophagus. Dissection is then continued at least 5 cm proximal to the lesion. Care is taken to avoid injury to the thoracic duct and the left phrenic nerve. Care was also taken to avoid excessive dissection of the esophagus from its bed unnecessarily.

Once the esophagus is completely freed, the diaphragm is entered through a 5-to 6-cm radial incision, taking care to avoid the phrenic nerve and its branches. The stomach is mobilized through the left thoracic cavity, preserving the right gastric and right gastro-epiploic artery and arcades; the short gastric (s) and the left gastric artery/vein are ligated at their origins.

If possible, a complete upper abdominal and mediastinal lymph node dissection is performed with en bloc resection of the distal esophagus and proximal stomach. Standard preparation of the stomach tube is performed in the left chest through diaphragmatic incision and a hand sewn single layered interrupted esophago-gastric anastomosis is done below the level of the aortic arch. A feeding jejunostomy tube was inserted in selected patients and a nasogastric tube positioned in the gastric tube in all.

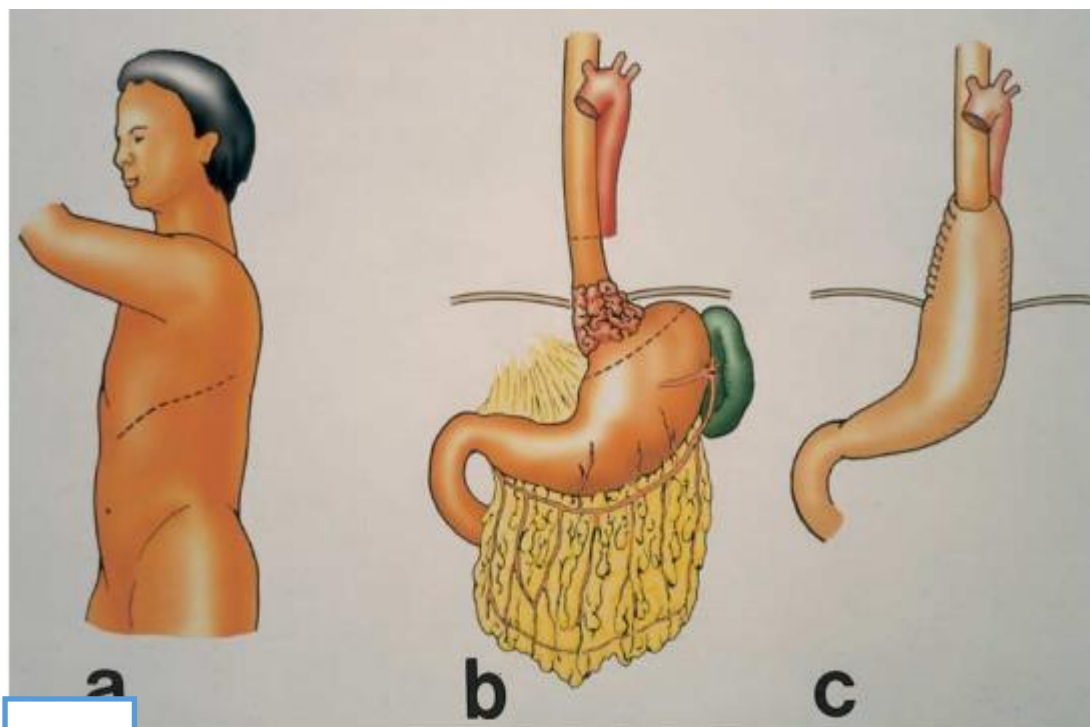


Figure 10. Drawings illustrate transthoracic esophagectomy through a left thoracotomy. Drawing *a* shows how the thorax is usually entered through the left sixth intercostal space. To further expose the esophagus, the incision may be extended posteriorly (as in posterolateral thoracotomy). The incision may be extended anteriorly across midline or inferiorly as a midline incision. Drawings *b* and *c* show how resection of the lower esophagus and cardia is performed with end-to-side esophagogastrostomy.

Figure 1. This picture is adopted from Seong Hyun Kim, MD • Kyung Soo Lee, MD • Young Mog Shim, MD Kwhanmien Kim, MD • Po Song Yang, MD • Tae Sung Kim, MD “Esophageal Resection: Indications, Techniques, and Radiologic Assessment”

Results-

During the study period (3 years), a total of 455 esophagectomies were performed in the hospital and THE and Ivor-Lewis esophagectomies were found to be the two most commonly used procedures. A total of 25 patients underwent left sided esophagectomy during the three years period. However, the complete records of only 22 patients were recovered and hence were included in the study. The majority of the patients were males, aged between 35-45 years, and had a clinical stage of IIIa cancer. The mean age was 40.4 years and the M:F ration was 2:1. (Table 1 and 2).

Table 1: Socio-demographic characteristics of patients who underwent left sided esophagectomy at the Tikur Anbessa Specialised Hospital, Ethiopia, January 2013-2015.

Characteristics	Frequency (N=22)	Percentage
Sex		
Female	7	31.9
Male	15	68.1
Age		
25-35	1	4.5
36-45	11	50
46-55	6	27.2
56-65	3	15.6
66-75	1	4.5
Residence		
Addis Ababa	1	4.5
Arsi	5	22.7
Gurage zone	3	15.6
Bale	4	18.1
Somalia/Jijiga	5	22.7
Others	4	18.1

The universal presenting symptom was progressive dysphagia of at least grade 2/4 and significant weight loss in all patients. All patients were diagnosed with lower esophageal cancer, located within 8 cm margin of the diaphragm. Oncological evaluation included upper gastrointestinal barium swallow in all patients, endoscopy with histologic examination in 17 (77.2%), and computerized tomography of the chest and upper abdomen in 15(68,1%). Ultrasound of the abdomen was done in patients where CT was not available (Table 2). Average duration of surgery was 111 minutes (+ 17.4 minutes) and the average recorded blood loss is around 500 ml. No patient required blood transfusion. Resection without macroscopically residual tumor was achieved in 18 of 22 patients (81.8%)

A total of 16 complications were recorded among 10 (45.4%) of the patients (Table 3) and the average post-operative duration of stay was 9.4 days. All except one patient were discharged improved. One patient died in hospital (4.5%), this was a 64 years old male patient who was re-admitted with left sided pyo-pneumothorax 11 days after discharge (20th post-operative day). Immediate chest tube was put in and very offensive bloody pus

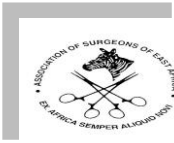
containing gastric content and profuse air bubbles was drained. A diagnosis of delayed anastomosis break down was made and the patient was started with antibiotics, and kept NPO. However, the patient passed away on the 2nd post admission day due to the uncontrolled sepsis.

Table 2: Diagnostic characteristics and complications seen in patients who underwent left sided esophagectomy at the Tikur Anbessa Specialised Hospital, Ethiopia, January 2013-2015

Characteristics	Frequency (n =22)	Percentage
Diagnostic tool used		
Barium swallow	22	100
Endoscopy and biopsy	17	77.2
Chest and upper abdominal CT	15	68.1
Histologic sub-type		
Squamous cell carcinoma	17	77.2
Adeno-carcinoma	5	22.8
Stage of the disease		
IIb	10	45.4
IIIa	10	45.4
IIIb	2	9.0
Complications seen		
Prolonged atelectasis	6	27.2
Pneumonia	5	22.8
Pleural effusion	3	15.6
Post operative edema	1	4.1
Wound infection	1	4.1
Anastomotic leak	1	4.1

Discussion

There is consensus at the present moment that the mainstay of treatment for esophageal cancer is surgery. However, there is no consensus regarding the “gold standard” surgical procedure. Literature tends to favour esophagectomy coupled with lymph node dissection (radical esophagectomy) as it may be associated with prolonged disease free survival than the standard esophagectomy (with limited lymph node dissection) (10, 12, 14). Although the Ivor-Lewis esophagectomy is advocated by the Chinese Anti-Cancer Association (10), the sweet’s approach with limited lymphadenectomy remains a priority in China given the debate on the extent of lymphadenectomy necessary and, more importantly, concern about the Ivor-Lewis esophagectomy being associated with higher post-operative complications. In addition, there is a belief that lymph node spread of esophageal cancer is a sign of a systemic disease with little hope of cure; hence the primary intent of surgery is palliation, augmenting the argument that radical lymphadenectomy doesn’t add much to prognosis. Therefore, procedures with low morbidity and mortality such as the trans-hiatal approach and the Sweet’s procedure are preferred.

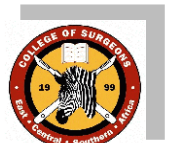
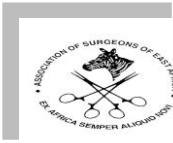


The Sweet approach was first described by Churchill and Sweet ¹⁴. Collected evidence from many publications and our findings from this report indicate that it offers several advantages for tumors in the lower third of the esophagus. Wound opening and closing are rapid and simple; it requires simple patient positioning with a single incision, reducing operative times and the related post-operative morbidity and mortality are reduced. Exposure of the operative field in the chest cavity, esophagus and hiatus is very good. It also provides adequate exposure of the stomach and excellent access to the short and left gastric arteries through the diaphragm ^{3,4, 10,14}.

Lymph node spread in patients with EC occurs early and may be located in the abdominal, mediastinal or cervical region, owing to the extensive sub-mucosal lymphatic drainage of the esophagus. In this line, several studies have shown a significant survival benefit for patients having undergone a 3-field lymph node dissection compared to 2-field ¹⁴⁻¹⁹. However, these studies are non-randomized and, therefore, the optimal extent of LND still remains a matter of international debate. LND in the middle and lower peri-esophageal portion, sub-carinal region, lower posterior mediastinum, perigastric region, and those along the left gastric and splenic arteries is possible through the left chest ^{3, 4, 19-22}. But clearance of the upper mediastinal nodes is not easy. However, we still recommend the sweet's procedure in patients with lower third esophageal carcinoma because only a small number of patients have superior mediastinal lymph node metastasis. In addition, whether patients with middle or lower third esophageal lesions benefit from superior mediastinal lymph node dissection is not yet clearly established ^{10,11, 22}.

When the Ivor-Lewis and sweets approaches are grossly compared, the Ivor-Lewis approach required an additional abdominal incision, which needs to be done after re-positioning the patient in the middle of the procedure from supine to left lateral. This is associated with an additional surgical insult by violating two separate body cavities, increased operative times, more blood loss and subsequent transfusion. The reported pulmonary complications in such patients are also increased ^{21, 22, 23}. In contrast, some reports have indicated that during the Ivor-Lewis procedure, total lymphadenectomy can be performed including lymph nodes along the bilateral recurrent nerves. In addition, a recently published paper from china¹⁰, suggests the superiority of the Ivor- Lewis esophagectomy over the Sweet procedure with regard to short-term outcomes such as lymph node retrieval and overall morbidity for patients with squamous cell cancer in the middle and lower third of the thoracic esophagus. It also stated that further follow-up may elucidate whether the Ivor-Lewis procedure also has an advantage in disease control and long-term survival ¹⁰. However, in the literature, no conclusive evidence is there regarding which surgical approaches has made any significant difference in long-term survival.

In our series, we had one patient who passed away as a result of a possible delayed anastomosis site leak. This is comparable to the 5% leak rate reported by other publications¹⁰. Reasons for leakage include tension in the anastomotic site, local sepsis, edema and ischemia of the gastric wall and tumor reminisce in the site. Esophageal cancer patients also have significant weight loss, lower serum proteins, and generally reduced



immunity, hence contributing to the leak rate. However, it remains difficult to distinguish between anastomotic leakage and perforation of the stomach caused by ischemia.

The literature tends to agree that anastomotic methods (hand sewn Vs stapler) were not associated with the incidence of leakage. Intra-thoracic leakage usually leads to severe infection, fluid imbalance and malnutrition. Treatment usually involved adequate control of infection, thorough drainage of the thoracic cavity, maintenance of nutrition and correction of fluid imbalance. Although parenteral nutrition was increasingly used in later years, the preferred current method is feeding jejunostomy.

The current modern surgical approach to esophageal resection is laparoscopic. Minimally invasive esophagectomy has many advantages in lymph node dissection, such as reducing pulmonary infection, shortening hospital stay, and improving short-term quality of life^{24, 25}. However, in hospitals like ours and in many developing countries with limited such access to minimally invasive facilities, and for patients with advanced esophageal cancer, the author still advocate open trans-thoracic esophagectomy.

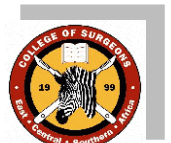
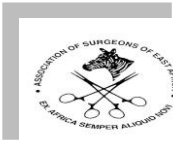
Conclusion

It is our experience that the Sweet approach is safe, effective, learnable and worthwhile in modern thoracic surgery. It has many advantages in the treatment of lower third esophageal and gastro-esophageal junction carcinoma, especially in terms of reduced intra operative time, lesser blood loss, lower incidence of postoperative complications and shorter hospital stay. In a country like Ethiopia where the disease burden is very huge and the number of thoracic surgeons very low, this procedure can be learnt by general surgeons to be performed at reasonably set up surgical facility.

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