

Cervical Esophagogastric Anastomosis for Esophageal and GE Junction Carcinoma Hand-Sewn Versus Stapled

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Abstract

Introduction: Anastomotic leak is one of the main causes of morbidity following esophageal resection for carcinoma of the esophagus and gastroesophageal junction. We compared hand sewn and stapled cervical esophagogastric anastomotic techniques in terms of postoperative complications. **Methods:** All patients who underwent esophagectomy with cervical esophagogastric anastomosis at SKIMS soura department of cardio vascular thoracic surgery from 2018 to 2020 were included in the study. Both early and late complications were analyzed. **Results:** 60 patients underwent resection for carcinoma of esophagus and gastroesophageal junction with cervical esophagogastric anastomosis. 30 patients underwent a hand-sewn anastomosis and 30 patients underwent stapled anastomosis. Both groups were compared with respect to morbidity mortality. **Conclusion:** Both hand-sewn and stapled anastomotic techniques are equally effective way of performing a cervical esophagogastric anastomosis. However, patients with stapled anastomosis had less anastomotic leak and stricture formation compared to hand-sewn.

Keywords: Esophagogastric; Hand-sewn; Carcinoma

Introduction

Esophageal cancer is one of the most common gastrointestinal malignancies. [1] The incidence of esophageal cancer varies according to geographical locations' two most common pathological types are squamous and adenocarcinoma. Squamous cell carcinoma is most prevalent in eastern countries and adenocarcinoma in western countries. [2] Despite the multimodality treatment, the prognosis of ca esophagus is still poor with 5-year survival rate of less than 50%. [3]

The surgical resection is one of the treatment protocols of carcinoma esophagus, where esophagogastric anastomosis is the basic component and aims to restore continuity. The anastomosis can be performed by using handsewn or stapled suture. Anastomotic leak is main cause of mortality and morbidity. [4,5] The surgical procedure includes dissection of the esophagus, formation of conduit and creation of gastroesophageal anastomosis either by hand sewn, or stapled. [6]

Nonetheless, the strategy for anastomosis-hand sewn or stapled (absolute stapled or halfway stapled); stays as issue of conflict. Among the hand sewn anastomosis, single layer anastomosis is the most generally utilized strategy. [7,8] The announced hole rate fluctuates from 10%-15%. [9-11] Early reports utilizing staplers indicated no distinction in spill rate yet higher occurrence of injury. [12,13] This was most likely identified with the utilization of circular staplers and it hence prompted the acquaintance of the side with side stapled strategy. [14] Orringer et al. [15] announced a leak rate beneath 3% following side-to-side stapled anastomosis alongside a lower rate of anastomotic stricture and improved fulfillment in swallowing in contrast with the hand sewn procedure. Ensuing studies have not demonstrated steady outcomes with stapled anastomosis. In these studies,

the leak rate was 10%-15%, inciting moresurgeons to form an anastomosis dependent on their experience and inclination. [16-18]

Therefore, the point of this study was to analyze and compare the results of esophagogastric anastomosis between hand sewn and side to side stapled method.

Patients and Methods

All patients who underwent total esophagectomy with gastroesophageal anastomosis between 2018-2020 were analyzed and studied.

Inclusion criteria

All patients undergoing esophagectomy with gastroesophageal anastomosis in neck.

Exclusion criteria

- Patients with metastatic diseases.
- Patients with multiple comorbidities
- Patients who refused surgery.

Operative technique

After preoperative workup and clearance from anesthesia, surgical procedure was performed either through a Tran's hiatal approach or through a right posterolateral thoracotomy. The gastric conduit prepared pyloromyotomy or pyloroplasty done.

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The gastric tube would be constructed by linear cutter stapler along the lesser curve end. The stomach tube was brought up into the left half of the neck through back mediastinal course. The esophagogastric anastomosis was done either by a fractional side-to-side stapled technique (Endoscopic Linear Cutter, EndoGIA, covidien) or end-to-side hand-sewn technique utilizing single layer interrupted 3-0 vicryl stitch. A romovac drain of 14 F was put near the anastomosis and the skin approximated with skin staplers. Respective Chest tubes were put in all cases. A Feeding jejunostomy (Witzel's sort) with 12 F Ryles tube was fashioned for postoperative nutrition.

Cervical Esophagogastric Anastomosis

Hand sewn anastomosis

A suitable site was chosen on the posterior wall of gastric tube 3 cm away from the stapled line to guarantee great vascularity. The conduit was then opened through slightly oblique incision around 3 cm long. Single layer full thickness anastomosis was performed utilizing 3.0 vicryl. A 16 F nasogastric tube was passed over the anastomosis into the stomach tube to decompress it.

Stapled anastomosis

After gastric conduit was pulled in to the neck anastomosis was performed with linear cutter stapler of 60 mm size with blue cartridge no extra suture applied. Opening was made on the posterior wall of the tube 3 cm away from the stapled line. One limb of linear cutter was placed in gastric tube through previously made opening and another limb in to the proximal cut end of esophagus and stapler locked and fired after wait of 30 seconds, this formed the posterior layer. At this time 16 F ryles tube was put in to decompress the gastric tube. Now anterior layer was fashioned by firing the same stapler transversely, thus completing the anastomosis. 16 F romovac drain was put in the neck, skin closed.

Postoperative management

All the patients were managed in the intensive care ward on the first day and after that in the postoperative ward. Feeding jejunostomy was started with 100 ml normal saline hourly on the third postoperative day. Gastrografin study was done routinely on the 7th postoperative day and if study was normal, showing no leak, nasogastric tube was removed and oral feeding started with liquid and soft diet. We would keep neck drain for two more days once orals were started and remove drain on the 9th or 10th postoperative day.

Follow up

All the patients were followed after surgery, initially weekly and after that one monthly for 3 months. Patients who had leak were put on nothing per oral and feeding jejunostomy started till anastomotic leak healed. Patients who had difficulty in swallowing underwent endoscopy with biopsy to rule out recurrence. And strictures were dilated as per protocol from the department of medical gastroenterology.

Outcome measures

The essential result measure was anastomotic leak. The secondary

result estimates included surgery time, and development of anastomotic stricture. Anastomotic leak was evaluated by radiographic contrast (Gastrografin) study performed on POD.^[7] Leaks were named 'minor' when the leak was negligible, and healed spontaneously without stoppage of oral feeding care of and without prolonged hospital stay of less than 14 days. All leaks causing neck wound dehiscence, plentiful release of salivation/refluxed bile, requiring stoppage of oral intake and prolonged hospital stay of more than 14 days were named 'major'. Anastomotic stricture was characterized by anastomotic narrowing expecting dilatation to ease postoperative dysphagia or inability to go the esophagoscope through the anastomosis. Those patients who died in hospital or developed anastomotic recurrence were excluded from the analysis.

The surgical procedure details, operating time, blood loss, post-operative complications, duration of hospital stay and, operative mortality were analyzed. Mortality included patients who died within 30 days of surgery. Perioperative complications include all which occur within 30 days of surgery.

Statistical analysis

Continuous variables were reported as mean with standard deviation. Categorical variables were reported as proportions. Student's t test and Fisher exact test were used where appropriate for comparison between groups. A p value of 0.05 or less was considered as significant. All calculations were performed with Statistical Package for Social Sciences programme (SPSS).

Results

60 Patients were operated for esophagectomy from 2018 to 2020 at our centre. Out of these 60 patients 30 underwent hand-sewn cervical esophagogastric anastomosis and 30 patients underwent linear stapled anastomosis. The two groups were comparable in terms of demographic profile and perioperative outcome [Table 1 and Figure 1].

Mean age of the patients was 66 years (Range 50-70). There were 27 females and 33 males. Tumor location was mostly thoracic esophagus (35) and Gastroesophageal Junction (15).

Most of the patients had squamous cell carcinoma. 50 Patients underwent MCKeown's esophagectomy and 10 patients underwent orringer's procedure.

Total blood loss was compared among both the groups. (Hand-sewn 310 ml ± 71.1 ml) vs. (Stapled 225 ± 56.8)

Duration of surgery was more in hand-sewn (253 ± 29.1) than

Table 1: Demographic profile and perioperative outcome.

	Hand-Sewn (n=30)	Stapled (n=30)
Age (years)	65.6 ± 4.3	67.6 ± 4.9
Sex (M:F)	13:07	20:20
Neo-adjuvant Therapy		
RT CT	20	29
CT	0	1
Upfront	9	1
Location of Tumor		
Thoracic/Abdominal	22	27
Esophagus		
G.E Junction	8	3

stapled (192 ± 18.6)

Leak rate was 16.6% in hand-sewn and 3.3% in stapled.

Overall Mortality was 1.6% and the mortality among stapled group was nil. The patient who died within 1st week had handsewn anastomosis and died within 1st week due to internal hemorrhage. The leak rate was significantly different among patients who had received neoadjuvant chemoradiation than those who had undergone upfront surgery. The most common

delayed complications were stricture formation. Out of 60 patients, 4 patients (13.3%) developed anastomotic stricture and all these patients had hand-sewn anastomosis. None of the patients with stapled anastomosis developed stricture. All patients with stricture underwent endoscopy dilatation as per protocol. None of the patients with stricture underwent surgical intervention. In our study, none of the patients among two groups developed anastomotic recurrence. This comparison operative and perioperative data is shown in Table 2 and Figure 2.

Discussion

Following esophagectomy, restoration of alimentary tract is normally performed by gastric transposition and esophagogastric anastomosis. However, this anastomosis is associated with both early and late complications. Among the early complications, the anastomotic leak is the main reasons for perioperative morbidity and mortality. [19]

Reasons for the anastomotic leak are multifactorial and incorporate both patient and surgery related components. Proper perioperative preparation and perioperative care additionally help in diminishing the hazard identified with these elements and accomplishing good outcome. Planning of gastric tube and anastomotic technique are two significant surgery related elements to be changed. Different gastric tubes have been proposed to keep up the blood supply at the gastric tip. Broad gastric tip safeguarding adequate tissue for keeping up sub mucous vascular correspondence between the gastric tip and right gastric vessels, while accomplishing satisfactory careful edge instead of restricted cylinder has been supported by Collard, Boarding and Akiyama.

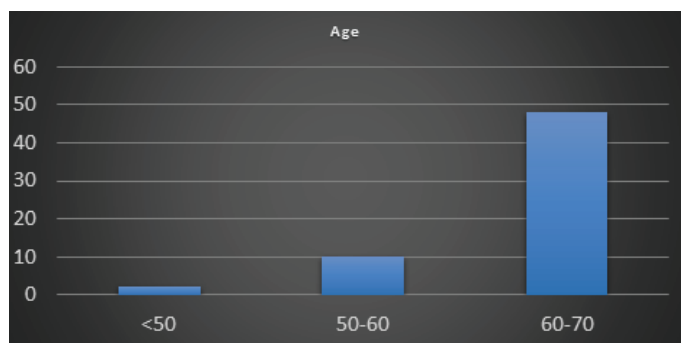


Figure 1: Demographic profile and perioperative outcome.

Factor	Hand-Sewn (n=30)	Stapled (n=30)	p Value
Operative time (in mins)	310 ± 71.1	225 ± 56.8	0.0001
Blood loss (in ml)	253 ± 29.1	192 ± 18.6	0.0001
Anastomotic Leakage			
Minor leak	0	0	
Major leak	5 (16.6%)	1 (3.3%)	
Mortality	1 (1.6%)	0 (0%)	
Benign anastomotic structure	4 (13.3%)	0 (0%)	

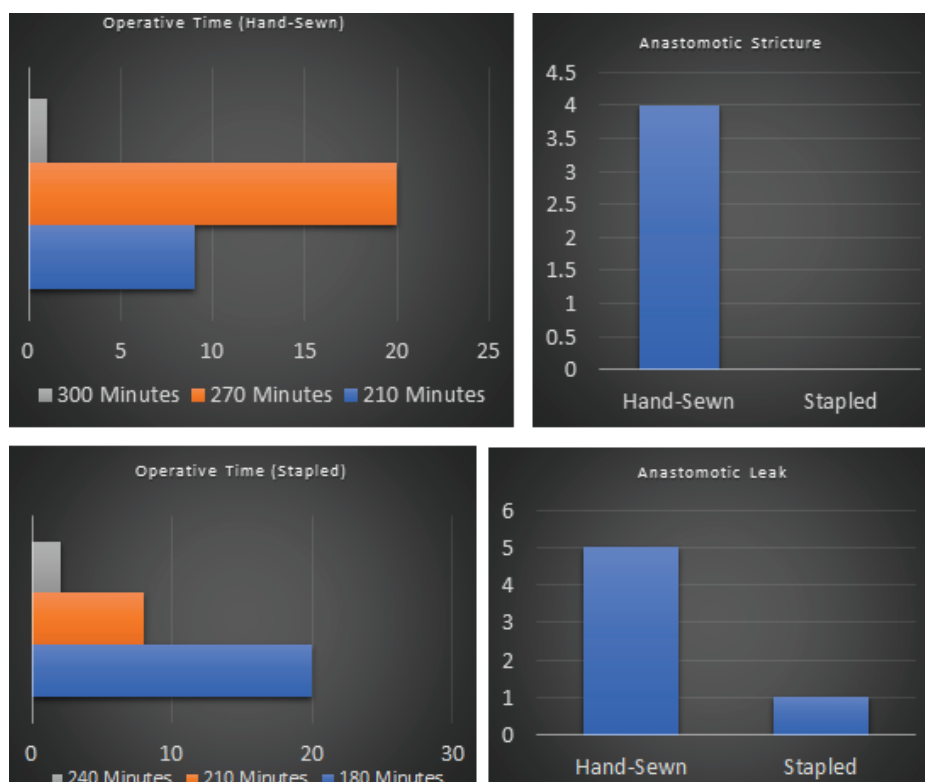


Figure 2: Operative and perioperative data.

According to surgical anatomy submucosal plexus that interconnect the extra-gastric vessel and permits the stomach to tolerate extensive ligation of its extrinsic blood supply. It ought to be noticed that the mucosa of the lesser curve is supplied by small extrinsic branches of right and left gastric arteries rather than vessels from submucosal plexus.^[20]

So, despite the fact that we made a narrow tip or wide tip, the commitment from the privilege gastric supply route to the fundal tip is meagre or unimportant. Regardless of whether it is a narrow tip or wide tip, the extra-gastric blood vessel interconnections along the lesser shape are separated by partitioning, the lesser curve by using the stapler for gastric tub formation. So normally, the blood gracefully of the gastric conduit is essentially from the right gastroepiploic vessels and extra-gastric arcades framed between right and left gastroepiploic vessels. Again, the blood supply is additionally increased by broad submucosal plexus in the greater curvature side. From the above studies, the narrow tip is all around vascularized than the broad tip. Staplers have been acquainted with diminish the occurrence of anastomotic leak. Proposed advantages of stapled procedure over hand sewn anastomosis incorporate a watertight anastomosis along with minimal tissue injury by less tissue dealing with furthermore, snappier anastomosis. A wider anastomosis by the stapled procedure would diminish the opportunity of anastomotic stricture, particularly after the anastomotic leak. The utilization of side to side stapled anastomosis was first developed by Collard and later modified by Orringer. In spite of the fact that Orringer et al. shows a decrease in leak rates from 14% to 2.7%. Saluja et al, revealed the first randomized trial comparing hand sewn anastomosis with side to side partial stapled method which tossed no distinction in leak rate (16% vs.18%).

In our study operative time was lesser in patients undergoing stapled anastomosis than patients underwent hand sewn anastomosis (192 mints vs. 253 mints). However, difference in operative time cannot be attributed to anastomosis alone, though a very time saving approach.

Overall mortality in our study was 1.6%, which is very less compared to the literature (6%). Only one patient died and the reason was postoperative bleeding. The most important long term sequelae of anastomotic leak is stricture formation and results in dysphagia and which impairs the quality of life. Incidence of stricture formation varies from 26% to 42%.^[9,21,22] The circular stapler has been seen associated with high anastomotic stricture rate as compared to hand sewn.^[12,13] In our study we have not used circular stapler for any patient. This trend has changed with linear stapler, where stricture formation is very low.^[13] In our study we found stricture more often with patients who had developed leak Harustaik et al. Showed similar leak rate in thoracic anastomosis but less leak rate in cervical anastomosis in patients with linear stapled anastomosis. They also found less stricture rate after stapled anastomosis. We also found high stricture rate in patients with hand sewn anastomosis especially after leak (4/5 with hand sewn anastomosis). Major leak was found to be predictor for formation of anastomotic stricture in the hand-sewn group.

This study is not a randomized control trial. The study has

small sample size, and the single center design, so it might have biased results.

Conclusion

In our study, both hand sewn and stapled anastomotic techniques are an effective way of performing a cervical esophagogastric anastomosis. However, Stapled anastomosis reduces the operative time and the incidence of anastomotic leave and stricture.

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