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Hand-sewn Versus Stapled Cervical Esophagogastric Anastomosis For Esophageal And GE Junction Carcinoma

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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:.The study was conducted in the department of surgical oncology GMS Srinagar (SSH) and department of cardio vascular thoracic surgery SKIMS Soura Srinagar. All patients who underwent esophagectomy with cervical esophagogastric anastomosis from 2017 to 2020 were included in this study. Both early and late complications were analyzed. Total of 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.

Results: 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 handsewn stricture and all these patients had hand-sewn anastomosis

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: Anastomosis, Handsewn, Carcinoma esophagus, Stricture

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 with5-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 to 15% ^[9,10,11]. Early reports utilizing staplers indicated no distinction in spill rate vet 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 sideto-side stapled anastomosis alongside a lower rate of anastomotic stricture and improved fulfillment in swallowingin contrast with the hand sewn procedure. Ensuing studies^[16-18] have not demonstrated steady outcomes with stapled anastomosis. In these studies, the leak rate was 10-15%, inciting more surgeons to form an anastomosis dependent on their experience and inclination.

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 2017 to 2020 were analyzed and studied.

• Inclusion Criteria:

All patients undergoing esophagectomy with gastroesophageal anastomosis in neck.

• Exclusion Criteria:

a) Patients with metastatic diseases.

b) Patients with multiple comorbidities

c) Patients who refused surgery.

• Operative Technique

After preoperative workup and clearance from anesthesia, surgical procedure was performed either through a trans hiatal approach or through a right posterolateral thoracotomy. The gastric conduit prepared, pyloromyotomy or pyloroplasty done. 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-toside stapled technique(Endoscopic Linear Cutter, EndoGIA. coviden) or end-to-side hand-sewn technique utilizing single layer 3-0 vicryl stitch. A corrigated drain 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 12F Ryles tube was fashioned for postoperative nutrition in few patients and in rest of the ryles tube passed across the pylorous was put in for post operative feeding.

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 obliqueincision around 3 cm long. Single layer full thickness anastomosis was performed utilizing 3.0 vicryl. A 16F 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 60mm 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 30seconds, this formed the posterior layer. At this time 16F 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.16F romovac drain was put in the neck, skin closed.

• Postoperative management

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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 100ml normal saline hourly on the third postoperative day. Gastrografin study was doneroutinely 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 POD7. Leaks were named 'minor' when the leak was negligible, and healed spontaneously without stoppage of oral feeding care of and without prolonged hospital stayof 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:

Continuousvariables were reported as mean with standard deviation. Categorical variables were reported as proportions.Students 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**)

	Hand-Sewn (n=30)	Stapled (n=30)		
Age (years)	65.6±4.3	67.6±4.9		
Sex (M:F)	13:7	20:20		
Neoadjuvant Therapy				
RT CT	20	29		
СТ	0	1		
Upfront	9	1		

Location of Tumor				
Thoracic/Abdominal	22	27		
Esophagus				
G.E Junction	8	3		



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 ± 71.1 ml) vs (Stapled 225 ± 56.8)

Duration of surgery was more in hand-sewn (253 ± 29.1) than 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 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 handsewn 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 su rgical intervention.In our study, none of patients among two groups developed the anastomotic recurrence. This comparison operative and perioperative data is shown in Table no.2

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

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Anastomotic Leakage				
Minor Leak	0	0		
Major Leak	5 (16.6%)	1 (3.3%)		
Mortality	1 (1.6%)	0 (0%)		
Benign Anastomotic Stricture	4 (13.3%)	0 (0%)		





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• 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^[13].

Reasons for the anastomotic leak are multifactorial patient incorporate and both and surgery related components. Properperioperativepreparation perioperative care additionally help and 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 submucous vascular correspondence between the tip and right gastric vessels, gastric while accomplishing satisfactory careful edge instead of restricted cylinder has been supported by Collard, Boarding and Akiyama.

According to surgical anatomy submucosal plexus that interconnect the extra-gastric vessel and permits the stomach to tolerateextensive 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 widetip, 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 curvatureside. 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. А 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 3.

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.

time saving approach.

The most important long term sequalae 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 at al.^[23] 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 handsewn 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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