

## Research Article

# Outcome of Hand Sewn Versus Stapled Anastomosis After Transhiatal Esophagectomy

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### Abstract

**Objective:** To compare the outcome of hand sewn versus stapled anastomosis after transhiatal esophagectomy, in terms of operative time, post-operative bleeding, anastomotic leak, stricture formation and cost of operation.

**Material & Method:** This was a randomized controlled trial on 60 patients conducted at North and East Surgical Wards, Mayo Hospital/King Edward Medical University, Lahore. These patients were divided into 2 groups, 30 patients undergone stapled method and the other 30 undergone hand sewn method anastomosis. Operative and post-operative complications and outcomes were observed including operative time, post-operative bleeding, anastomosis leakage, stricture formation and cost of operation. Patients selection was based on strict inclusion and exclusion criteria and data was analyzed by using SPSS 20.0.

**Results:** Mean operative time for stapled method (Group A) and hand sewn method (Group B) was 152.00±12.99 and 184.10±17.61 minutes. Mean post-operative bleeding for group A and group B was 63.86±14.56 ml and 128.00±16.66 ml. In group A only 2(6.67%) patients had anastomotic leak while in group B 8(26.67%) patients had anastomotic leak. In group A only 3(10%) patients had stricture formation while in group B 2(6.67%) patients had stricture formation. Mean cost for group A and group B was 627.00±43.48 \$ and 270.66±24.76 \$ respectively. Except cost all other post-operative parameters like operative time, post-operative bleeding, anastomotic leak and stricture formation were remarkably decreased in patients who underwent stapled method of anastomosis.

**Conclusion:** That stapled anastomosis after transhiatal esophagectomy is more effective than hand sewn anastomosis in term of operative and post-operative outcome, but the cost of operation is high.

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### Introduction

Transhiatal esophagectomy is a surgical procedure for the carcinoma of esophagus and esophagogastric junction and esophageal strictures due to corrosive intake.<sup>1</sup> After esophagectomy, the continuity can be restored using gastric interposition. The cervical esophagogastric anastomosis may be

performed by the stapled or hand-sewn anastomotic method. Irrespective of the surgical method, reduction in anastomotic complications is necessary for reducing morbidity and ameliorating longstanding functional outcomes. The chance of postoperative mediastinitis related to anastomotic leaks has been nearly eliminated by making the anastomosis in the neck.<sup>10</sup>

The important concerns of the surgeon and patients during and after surgery include bleeding, operative time, anastomotic leakage and stricture formation. Multiple factors, including local and systemic, play role in the outcome and complications.<sup>11</sup> Longitudinal muscles of esophagus grasp sutures badly because the esophagus has no serosa. Furthermore, the difficult surgical exposure can also participate in higher anastomotic leak ratio. Prevalence of cervical esophagogastric anastomosis leakage by hand-sewn method ranges up to 34%.<sup>12</sup> Proposed benefits of stapled technique overhand sewn anastomosis include a water tight anastomosis along with minimal tissue trauma by less tissue handling and quicker anastomosis. A wider anastomosis by the stapled technique would decrease the chance of anastomotic stricture especially after an anastomotic leakage.

Stapled anastomosis is contemplated as more advantageous and causes less trauma to tissue, and poses reduced leak rates and morbidity. Earliest use of a stapler to do end to side anastomosis was reported by Steichen. In the latest technical improvement, the “stapled” cervical esophagogastric anastomosis has been executed in a side-to-side manner with the help of an Endo-GIA 30-2.<sup>5</sup> stapler.<sup>6</sup>

Various postoperative complications were mentioned in the literature regarding outcome of stapled versus hand sewn anastomosis in transhiatal esophagectomy. Very few studies are conducted in our working setup. Keeping in mind the variation in the reported frequency of complications and deficiency of conclusive evidence, this study is designed to see the frequency of various complications of stapled versus hand sewn anastomosis in transhiatal esophagectomy in our working setup.

## Methods

This research was performed in North and East Surgical Wards, Mayo Hospital/King Edward Medical University, Lahore for the period of one year (from February/2014 to February/2015) with one year follow up time. Sample size of 60 patients (30 patients in each group) is calculated by using 95% confidence level and 5% margin of error by using online sample size calculator for comparing 2 proportions by taking expected percentage of anastomotic leak in hand sewn anastomosis as 27%

and 2.7% in stapled anastomosis. This was a randomized controlled trial and randomization of the subjects in either of the groups was done by lottery method. Total 60 patients were included in the study among these patients 30 undergone staple method and 30 undergone hand sewn method anastomosis.

All patients of both genders more than 12 years of age were included with dysphagia (due to benign disease like corrosive intake and etc) not responding to medical and endoscopic treatment presenting in the outdoor patient department, esophageal carcinoma of middle and lower third part and also the patients with benign strictures.

All Patients of both genders more than 12 years of age were excluded who were operated through other approaches (Ivor Lewis, McKeown etc), biopsy proven distant metastatic disease, aortic involvement demonstrated on MRI, CT Scan or endoscopic ultrasound (EUS), patients with American Society Anesthesiologists class IV and V (ASA), previous esophageal surgery causing excessive mediastinal adhesions and previous radiation therapy (more than 6-12 months before).

Data were analyzed by using SPSS 20.0. Quantitative variables (age, postoperative bleeding, operative time and cost of operations) were presented by using mean  $\pm$  SD. Qualitative variables (gender, anastomotic leak, anastomotic stricture) were presented by using frequency tables charts where required. Qualitative variables were compared in both treatment groups by using chi-square test. While quantitative variables were compared in both treatment groups by using independent sample t-test. P-value <0.05 was considered as significant.

## Result

The age of patients who underwent transhiatal esophagectomy via stapled and hand sewn methods varies from 16 to 70 with the mean of  $41.13 \pm 16.80$  and  $40.60 \pm 14.46$  years respectively.

Gender distribution of patients showed that in group A there were 11(36.67%) male and 19(63.44%) patients included while in group B were 13(43.33%) male and 17(56.67%) female patients.

Mean operative time (skin to skin) for group A and

group B was  $152.00 \pm 12.99$  and  $184.10 \pm 17.61$  minutes. Statistically speaking mean operative time for group A was significantly shorter as compared to that of group B.

Mean post-operative bleeding in neck drain for group A and group B was  $63.86 \pm 14.56$  ml and  $128.00 \pm 16.66$  ml. Statistically speaking mean post-operative blood loss for group A was significantly lower as compared to that of group B.

In group A only 2(6.67%) patients had anastomotic leak (saliva from wound at 3rd-5th post-operative day while in group B 8(26.67%) patients had anastomotic leak. In terms of p-value (0.037) anastomotic leak was significantly higher in patients in group B.

In group A only 3(10%) patients had stricture formation (difficulty in swallowing with evidence narrowing of esophagogastric anastomosis on barium swallow) while in group B 2(6.67%) patients had stricture formation. In terms of p-value stricture formation was not significant.

Mean cost for group A and group B was  $627.00 \pm 43.48$  \$ and  $270.66 \pm 24.76$  \$. Statistically speaking mean cost for group A was significantly higher as compared to that of group B.

## Discussion

In a larger population-based research, the transhiatal esophagectomy has conferred acceptable survival in patients treated for esophageal cancer and benign strictures.<sup>23</sup> Multiple factors play role in anastomotic dehiscence in cervical esophagogastric anastomosis.<sup>11</sup> Surgical technique is, of course, significantly important to play role. Stapled anastomosis is contemplated as more advantageous and causes less trauma to tissue, and poses reduced leak rate with reduced morbidity, they are disparaged for being costly and increased stricture rate. Most of the researches manifested no difference of anastomotic leak ratio between stapled and hand sewn anastomosis but increased stricture rate in hand sewn group.<sup>7</sup>

According to Parth Kanaiyalal Patel. et al, after transhiatal esophagectomy the anastomotic leakage was in three patients and chyle leak in two patients. As far as the operative time is concerned, it was 151 minutes (range 93-276 minutes) and over all mean

duration of stay in hospital was 15 days (range 8-95 days).<sup>6</sup>

Recurrent nerve neuropraxia was observed in three patients out of 127 (2%) after transhiatal esophagectomy.<sup>5</sup>

Some researchers studied and showed that formation of esophagogastric anastomosis in neck with a side-to-side stapled anastomosis enormously lowers the rate of anastomotic leaks and subsequent strictures formation.<sup>4</sup> The side-to-side stapled anastomosis is a cardinal technical progress in the development of transhiatal esophagectomy and a cervical esophagogastric anastomosis.<sup>6</sup>

The study by Pramod Kumar Mishra et al, showed no remarkable difference in terms of anastomotic complication among hand-sewn and stapled anastomosis.<sup>7</sup> Less operative time and less hospital stay was required for stapled method, but with increased risk of stricture formation, pulmonary complications and mortality.<sup>8</sup>

The various randomized trial and subsequent meta-analysis comparing hand-sewn and stapled anastomotic method demonstrated the prolonged mean operating time when the hand-sewn technique was used ( $p=0.10$ ).<sup>8</sup>

A big volume meta-analysis showed that stapled anastomosis decreased the rate of anastomotic leak, stricture formation, blood loss, recurrent laryngeal nerve palsy and hospital stay.<sup>9,13</sup>

## Conclusion

**Table :**

	Stapled method	Hand Sewn	p-value
Age	$41.13 \pm 16.80$	$40.60 \pm 14.46$	-
Gender (M/F)	11(36.67%)/ 19 (63.44)	13(43.33%)/ 17(56.67%)	-
Operative Time	$152 \pm 12.99$	$184.10 \pm 17.61$	<sup>(a)</sup> <b>0.000*</b>
Bleeding (Post-op)	$63.86 \pm 14.56$	$128 \pm 16.66$	<sup>(a)</sup> <b>0.000*</b>
Anastomotic Leak	2(6.67%)	8(26.67%)	<sup>(b)</sup> <b>0.037*</b>
Stricture Formation	3(10%)	2(6.67%)	<sup>(b)</sup> <b>0.320</b>
Cost	$627.00 \pm 43.48$ \$	$270.66 \pm 24.77$ \$	-
Note: (a): Independent sample t-test, (b): Chi-Square test, * p-value<0.05 (Significant)			

Results of this study showed that stapled anastomosis after transhiatal esophagectomy is more effective than hand sewn anastomosis in term of operative time, post-operative bleeding and anastomotic leak

with unremarkable increase rate of stricture formation, but the cost of operation is high.

**Ethical Approval: Given**

**Conflict of Interest: None**

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