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Original Article

Comparison of Side to Side Staple Versus Hand Sewn Gastro Esophageal Anastomosis in Cases of Oesophagectomy in CA Esophagus

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ABSTRACT

Objective: To compare outcomes of side-to-side staple versus hand-sewn esophago-gastric anastomosis in esophagectomy patients with carcinoma of esophagus after subtotal esophagectomy along with gastric tube reconstruction.

Study Design: Retrospective cross-sectional study.

Place and Duration of Study: Lady Reading Hospital, Peshawar Pakistan, from July 2019 to June 2020.

Methodology: After ethical approval, medical records of patients that underwent stapled/hand sewn gastro esophageal anastomosis due to carcinoma esophagus were included. Inoperable Ca esophagus and with thoracic anastomosis were excluded. Each anastomotic technique was applied on 50 patients randomly. The variables of study included demographic, anastomotic leak, anastomotic stricture, operative time, and other complications. All the cases were followed up for 1 year. SPSS version 26.0 was used for data analysis.

Result: From 100 patients, 56 were males and 34 females. Age ranged from 15 to 80 years with mean age of 48.5 and 51.1 respectively in two groups. In 42 cases tumor was present in lower end, middle third in 30 and middle lower third of gastro esophageal junction in 28 cases. Histo-pathologically 58 cases were adenocarcinoma, 31 squamous cell carcinoma and 11 adeno squamous carcinoma. The anastomosis time in group I was 6.8±.22 minutes while in group II was 13.2±1.71 minutes (p-0.04). None of the patients in group I, having stapled anastomosis were found to have anastomotic leakage or stricture formation after 1 year of follow up while 04 patients in group II were reported to have anastomotic leakage and 06 patients had anastomotic stricture formation (p-<0.01).

Conclusion: Side by side stapled anastomosis technique was far superior to hand-sewn technique in terms of the time taken for anastomosis to be completed and patient outcomes (anastomotic leakage and stricture formation).

Keywords: Esophago-gastric anastomosis, Esophagectomy patients, Hand-sewn technique, Stapled anastomosis technique.

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INTRODUCTION

Carcinoma of the esophagus is well-known to be a multi-faceted and complex condition having a rapid rise in incidences leading to rising financial and social burden globally.[1] It is one of the most prevalent gastrointestinal malignancies worldwide, being sixth common cause of cancer-associated mortality. At present, esophagectomy remains to be the standard in treating of esophageal carcinoma.[2] After resection of the esophagus, in order to restore the continuity of alimentary tract, stomach is used. Success of such esophago-gastric anastomosis correlates very closely with the outcome of the patient, which includes anastomotic leakage and/ or stricture formation.[3] Leakage of anastomosis is most feared as well as frequently observed complication that leads to increase in hospitalization stays, playing a substantial role in early post-operative morbidity. Various anastomotic techniques are used for minimizing such risks.[4]

Esophago-gastric anastomosis includes the popularly used variants such as hand-sewn and stapled anastomosis, this approach or method being the most critical part of the procedure during esophagectomy.[5] Regardless of the surgical technique used, prevention of anastomosis related complications is pivotal for minimizing early morbidities and in improving interventional outcomes. Mechanical staplers are also used for esophago-gastric anastomosis for convenience and also being less dependent on the operator.[6] Some researchers have observed stapling method to lead to less incidences of leakage, however being linked with higher risks for anastomotic strictures. Other studies have observed the exact opposite and found such complications more commonly been reported with hand-sewn anastomosis.[7] Multiple studies have been performed in order to compare hand-sewn and stapled anastomotic techniques; however results have yet remained controversial as to which of the two techniques are superior to the other.[8,9]

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Overall, anastomotic leakage is reported to occur in over 10% of patients that undergo esophago-gastric anastomosis, with esophageal carcinoma itself being accompanied by other complications like nourishing discomfort, mediastinitis as well as less commonly observed cervical osteomyelitis.[10] Therefore, an important pre-requisite is to choose a surgical techni-que which is accurate as well as effective in preventing and reducing post-anastomotic complications.[11]

Initially, before the 1980s, mechanical hand-sewn techniques were the mainstay of anastomosis.[12] However in 1980, Berthold *et al.* introduced automatic stapling for intestinal anastomosis and were regarded to minimize anastomotic leakage and stricture formation risk.[13] Nonetheless, majority of studies in comparison of the two techniques have concluded whether the improved technique of anastomosis has superiority over other technique yet remains a matter of debate.[14]

The objectives of this study was to compare the outcomes of side to side staple versus hand sewn esophago-gastric anastomosis in esophagectomy patients with carcinoma of esophagus after subtotal esophagectomy along with gastric tube reconstruction.

METHODODOLOGY

This retrospective cross-sectional research was carried out at the Lady Reading Hospital, Peshawar Pakistan, from July 2019 to June 2020, after ethical approval from the Ethical Review Committee of the hospital.

Inclusion Criteria: Computerized medical records of patients that underwent esophago-gastric anastomosis during esophagectomy for esophageal carcinoma either through hand-sewn or stapled anastomosis techniques were included in the study. Patients of both gender and all ages were included in the research. The age of patients ranged from 15-80 years of age. Retrospectively, the outcome of patients with esophageal carcinoma after esophagectomy and esophago-gastric anastomosis was recorded from the medical records of the hospital.

Exclusion Criteria: Patients having inoperable esophageal carcinoma or with having thoracic anastomosis were excluded from the study. In addition, patients lost to follow up or with incomplete medical records were also excluded.

The technique used in each patient undergoing esophagectomy and esophago-gastric anastomosis was done at random. All of the surgical procedures were carried out by a single surgeon. Esophageal specimen removed was sent for histopathology in each of the case. During surgery, location of the carcinoma was also noted. Patients were followed up for one year and checked for any complications mainly anastomotic leakage and / or stricture formation.

Data Analysis

SPSS version 26.0 was used for analysis of data. Baseline demographics included age and gender. Other variables included were position of tumor at the gastro-esophageal junction, histopathological finding and patients outcomes in terms of anastomotic leakage and stricture formation. Chi-square test and independent t-test was applied to test for significance in between hand-sewn and stapled group of patients keeping *p*-value of <0.05 as statistically significant.

RESULTS

From the total of 100 patients included in the study, 50 patients each underwent side by side stapled esophago-gastric anastomosis and hand-sewn esophagogastric anastomosis. A total of 56 males and 44 females were included with their ages ranging from 15 to 80 years. In 42(42%) patients, the tumor was present in the lower third while for 30(30%) patients in the middle third and in 28(28%) patients, at the middle to lower part of gastro-esophageal junction. 58(58%) of the carcinomas were adenocarcinoma, 31(31%) patients had squamous cell carcinoma and 11(11%) adeno-squamous carcinoma. Overall, 04(4%) patients were reported to have anastomotic leakage while 06(6%) were found to have anastomotic stricture formation on one year follow up [Table-I].

Table-I: Baseline Demographics of patients included in the study (n=100)

Variables	Frequency
Gender	
Male	56
Female	44
Age Range(years)	15-80
Tumor Presentation at Gastro-esophageal Junction Position	
Lower third	42
Middle third	30
Middle lower	28
Histopathological Finding	
Adenocarcinoma	58
Squamous cell carcinoma	31
Adeno squamous carcinoma	11
Anastomotic Leakage	04
Anastomotic Stricture (after1 year)	06

In Group-I, patients who underwent stapled esophago-gastric anastomosis included 29 males and 21 females while Group-II included 27 males and 23 females with an insignificant difference of *p*-0.14. The mean age of patients in Group-I was 48.54±14.22 years while in Group-II was 51.10±9.47 years having an insignificant difference of *p*-0.09 in-between the groups. The anastomosis time in group I was 6.8±1.22 minutes while in Group-II was 13.2±1.71 minutes, having a significant difference of 0.04 in-between them. None of the patients in Group-I, having stapled anastomosis were found to have anastomotic leakage of stricture formation after 1 year of follow up while 04 patients in Group-II were reported to have anastomotic leakage and 06 patients had anastomotic stricture formation. A significant difference of <0.01 was observed in-between the two groups in terms of patient outcomes [Table-II].

Table-II: Baseline Demographics of Patients included in the study (n=100)

Variables	Group I (Stapled) n=50	Group II (Hand Sewn) n=50	*p*-value
Gender			
Male	29	27	0.14
Female	21	23	
Mean Age (years)	48.54±14.22	51.10±9.47	0.09
Mean Anastomosis time (minutes)	6.8±1.22	13.2±1.71	0.04
Anastomotic leakage	0	04	<0.01
Anastomotic stricture (after 1 year)	0	06	<0.01

DISCUSSION

The results of our study showed that stapled esophago-gastric anastomosis were superior in terms of the patient outcomes such as anastomosis leakage and stricture formation but also in terms of the mean time taken for anastomosis to be completed. The mean time taken for anastomosis with side by side stapled technique was 6.8±1.22 minutes as compared to more than double time taken through hand-sewn technique viz. 13.2±1.71 minutes, as demonstrated by the significant difference of *p*-0.04. Likewise, complications such as anastomosis leakage and stricture formation were reported with hand-sewn technique (04 and 06 respectively) as opposed to no such complication reported with staple-technique.

In line with the findings of this study, another retrospective study by Rasihashemi et al, done to compare the outcome of patient with hand-sewn and side to side stapled esophago-gastric anastomosis reported among 433 patients included in the study, 271(62.5 %) underwent hand-sewn anastomosis while 162(37.4%) stapled anastomosis. 38(15%) of patients that underwent hand-sewn anastomosis were found to have anastomotic leakage while only 08(5%) patients in stapled-group reported anastomotic leakage (*p*-0.002). Likewise, higher frequency of anastomotic stricture was observed in hand-sewn group compared to stapled-group (*p*-0.004).[15]

Another study by Hussain T *et al* recorded substantially higher rates of anastomotic leakage and stricture formation in hand-sewn group as compared to stapled anastomosis.[16] On the other hand, Laterza *et al.* in their study compared manual and mechanical anastomosis and observed patients with mechanical or stapled anastomosis were found to have higher rates of anastomotic leakage and benign stricture formation.[17]

A meta-analysis reported that stapled esophago-gastric anastomosis in esophagectomy for esophageal carcinoma has shown to lower rates of anastomotic leakage and formation of stricture in comparison to the traditionally used hand-sewing techniques.[18] In addition, the analysis concluded that stapled technique was easier and more standardized since technical errors were minimized.[19] Contrastingly, hand-sewn technique required more surgical expertise and may not be practical everywhere, as a result stapled technique should be preferred and made standard over hand-sewn technique.[20]

In contrast to our study findings, a study by Mishra *et al,* observed that overall from 140 patients included in the study, 17% were found to have anastomotic leakage with equally observed in hand-sewn and stapled group (12each). However, hand-sewn anastomosis showed higher rates of anastomotic stricture formation (16%) compared to stapled group (4.3%). The study concluded that both hand-sewn and stapled anastomosis techniques were equally effective for esophago-gastric anastomosis, however it was difficult to distinguish as to which technique was better in terms of the complications.[21] Likewise, Sundeep Singh Saluja *et al* also reported that there was no statistical difference in terms of anastomotic leakage and stricture formation in-between hand-sewn and stapled anastomotic technique, therefore ideal technique for esophagogastric anastomosis remain elusive.[22]

The main strength of this study was that it compared hand-sewn with side by side stapled technique for esophago-gastric anastomosis in esophageal carcinoma patients and also noted time taken for

anastomosis to be completed. However, the study was not free from limitations. Firstly, the nature of the study being retrospective and not being a randomized controlled trial was a major limitation. Additionally, this was a single-centered study with limited sample size and all surgeries were performed by a single surgeon.

CONCLUSION

According to the results of the study, side by side stapled anastomosis technique was far superior to hand-sewn technique in terms of the time taken for anastomosis to be completed and patient outcomes (anastomotic leakage and stricture formation).

Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

MAK: Conception, study design, drafting the manuscript, approval of the final version to be published.

AB & TA: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

VA & AA: Critical review, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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