
A Comparative Study of Sutured and Stapled Anastomosis in Gastrointestinal Operations

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Citation

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Abstract

Background: Restoring intestinal continuity after partial enterectomy and/or colectomy is central to gastrointestinal surgery. In recent years, mechanical stapling devices have improved and become more versatile so that many surgeons now consider stapling technique as best alternate method of anastomosis to suture technique, for speed, safety, efficiency and easy access.

Materials and Methods: This study included 50 patients; 25 of them were treated by the conventional suture method. The study group included 25 patients in whom anastomosis was done by stapling technique. The two groups were compared on various intraoperative and postoperative fronts.

Results: Duration of procedure was lesser in cases of stapled anastomosis. Postoperative appearance of bowel sounds and thus resumption of oral feeding was earlier after stapled anastomosis.

Conclusion: Thus, stapling technique can be used safely and effectively as a part of the modern surgeon's armory and one should be equally adept with a stapler gun as with needle-holder and suture.

INTRODUCTION

Restoring intestinal continuity after partial enterectomy and/or colectomy is central to gastrointestinal surgery. Lembert described his seromuscular suture technique in 1826 which became the mainstay in gastrointestinal surgery in the second half of the century. Currently, the single-layer extramucosal anastomosis is popular, as advocated by Matheson of Aberdeen, as it probably causes the least tissue necrosis or luminal narrowing. However, in all cases catgut and silk are being replaced by synthetic polymers.

The introduction and widespread application of stapling devices helped revolutionize the technical aspects of surgery that have allowed minimally invasive procedures to be developed.

Thus, in recent years mechanical stapling devices have improved and become more versatile so that many surgeons now consider stapling technique as best alternate method of anastomosis to suture technique, for speed, safety, efficiency and easy access. This study compares the outcome of

gastrointestinal operations done by hand-sewn and stapled anastomosis in M. Y. Hospital, Indore. Although stapled anastomosis is quite common in these days and widely accepted; the surgeon still has doubts when the anastomosis is at critical sites, regarding 100% water- and air-tight anastomosis. It has been noticed that one puts extra hand-sewn stitches with a thought that it will protect the stapled anastomosis.

MATERIAL AND METHODS

This comparative study was carried out in the department of surgery at M.Y. Hospital, Indore from November 2005 to July 2007 between two groups of patients who underwent gastrointestinal surgery. In the control group, anastomosis was done by hand-sewn technique while the study group underwent stapled anastomosis.

This study included 50 patients; 25 of them were treated by the conventional suture method. This group comprised 19 men and 6 women between the ages of 30 and 70 years (mean age: 53.4 years). The study group included 25 patients

in whom anastomosis was done by stapling technique. This group comprised 19 men and 6 women between the ages of 17 and 70 years (mean age: 44.24 years).

In the control group (hand-sewn anastomosis), the conventional suture technique used was either two-layer anastomosis or a single-layered one. In the stapler group side-to-side or end-to-end technique were employed depending on the need, site and access, using GIA instruments.

All patients were carefully monitored with the following parameters: Total duration of operative procedure, appearance of bowel sounds, resumption of oral feeding, postoperative hospitalization, postoperative complications, return to work and mortality.

The following statistical test was used to compare the results of control group and study group:

- The patients were randomly allotted to control or study group.
- Unpaired t-test was applied to find the p-values.
- A p-value less than 0.05 was considered as statistically significant.

RESULTS

In the gastric resection group, the mean operating time was 173.33 min. with the sutured method and 158.75 min. with the stapled method. The mean time to appearance of bowel sounds was 55 hours with the sutured method and 41.5 hours with the stapled method. The mean time to resumption of oral feeding was 6.33 days with the sutured method and 5.5 days with the stapled method. The mean time of mobilization out of the bed was 2.8 days with the sutured method and 2 days with the stapled method. The mean postoperative hospitalization was 13 days with the sutured method and 10.5 days with the stapled method. The mean time of return to work was 46.33 days with the sutured method and 37.5 days with the stapled method.

In the gastrojejunostomy group, the mean operating time was 154 min. with the sutured method and 140 min. with the stapled method. The mean time to appearance of bowel sounds was 52 hours with the sutured method and 39 hours with the stapled method. The mean time to resumption of oral feeding was 5.5 days with the sutured method and 5.16 days with the stapled method. The mean time of mobilization out of the bed was 2.6 days with the sutured

method and 2.16 days with the stapled method. The mean postoperative hospitalization was 11.66 days with the sutured method and 11 days with the stapled method. The mean time of return to work was 49.66 days with the sutured method and 34.16 days with the stapled method.

In the right-hemicolectomy group, the mean operating time was 145 min. with the sutured method and 125 min. with the stapled method. The mean time to appearance of bowel sounds was 54 hours with the sutured method and 44.5 hours with the stapled method. The mean time to resumption of oral feeding was 5.58 days with the sutured method and 4.45 days with the stapled method. The mean time of mobilization out of the bed was 2.5 days with the sutured method and 2.0 days with the stapled method. The mean postoperative hospitalization was 13.83 days with the sutured method and 10.8 days with the stapled method. The mean time of return to work was 47.75 days with the sutured method and 40.18 days with the stapled method.

In the anterior resection group, the mean operating time was 185 min. with the sutured method and 150 min. with the stapled method. The mean time to appearance of bowel sounds was 46.5 hours with the sutured method and 48.5 hours with the stapled method. The mean time to resumption of oral feeding was 6.5 days with the sutured method and 5 days with the stapled method. The mean time of mobilization out of the bed was 2 days with the sutured method and 2 days as well with the stapled method. The mean postoperative hospitalization was 14.5 days with the sutured method and 11 days with the stapled method. The mean time of return to work was 52 days with the sutured method and 50 days with the stapled method.

DISCUSSION

In our study, the mean age of all patients with sutured anastomoses was 53.4 years in contrast to 45 years in those with stapled anastomoses. The age difference between the two groups was statistically significant ($p < 0.05$). Scher et al.^{2,3} had an average age of 58.6 years in the stapled group and of 54.4 years among those undergoing the procedure using sutures. Reiling et al.⁵ had a mean age of 55.1 years in the patients with sutured anastomoses as compared with 56.8 years for stapled cases.

In our study, in the group with gastric resections, there was a significant time reduction in the operating room for the study group (158 min.) as compared with the control group (173 min.; $p < 0.05$). In the study of Scher et al.³, the mean duration of gastric resection with suture was 159.8 min.

while it was 163 min. in stapled gastric resection. The difference was not statistically significant and the time used for staplers was longer than with sutured technique. Reiling et al.⁵ reported no significant difference in mean operating times for the sutured and the stapled group.

The mean duration of gastrojejunostomy in our study was 154 min. and 140 min. with sutured and stapled technique, and the difference was statistically significant ($p < 0.05$). Scher et al.³ found that the mean duration was 155.6 min. for sutured gastrojejunostomy and 157 min. for stapled gastrojejunostomy. No statistically significant difference was found. Reiling et al.⁵ confirmed the insignificant difference.

In the group of right hemicolectomy, in our study, the mean duration of the procedure was 145 min. in the control group and 125 min. in the study group, showing a statistically significant difference ($p < 0.05$). Scher et al.^{2,3} and Reiling et al.⁵ both found insignificant differences in their study ($p > 0.05$).

In our study, the mean duration for anterior resection and colorectal anastomosis was 185 min. with the suture method and 150 min. with the stapler method yielding a statistically significant difference ($p < 0.05$). Scher et al.² found 209 min. for the stapler and 185.5 min. for the suture technique - a slightly longer operative time for staplers, again not significant. Adloff et al.⁴ found that the mean operative time was 176 min. in the sutured group while it was 180 min. in the stapled one, statistically insignificant.

The duration of left hemicolectomy in our study was 150 min. with suture technique and 125 min. with stapler technique, yielding a statistically significant difference. Everett et al.⁷ found that the mean operative time for sutured anastomosis was 17 min. longer than for stapler anastomosis, statistically significant ($p < 0.03$). Scher et al.² found 163 min. with stapler and 147.6 min. with suture technique, which did not prove to be a significant time reduction.

The postoperative appearance of bowel sounds in our study was earlier in the stapler group (41 hours) as compared to the suture group (55 hours) and resumption of oral feeding was earlier in the study group (5 days) than in the control group (6 days) in the group of gastric resection, with statistically significant difference ($p < 0.05$). Scher et al.^{2,3} found that recovery of intestinal function was actually more rapid after gastrectomy with suture than after the stapled procedure. Following gastric resection with suture, the

patients required an average of 3.9 days before resuming oral feeding compared with an average of 5.1 days after the stapled procedure. This was a statistically significant difference ($p < 0.01$). Reiling et al.⁵ found no significant difference in restoration of intestinal function and resumption of oral feeding. The patients required an average of 4.8 days before resuming oral feeding compared with an average of 5.5 days after stapling ($p > 0.05$).

In our study, in the gastrojejunostomy group, there was comparatively early appearance of bowel sounds with stapler (39 hours) as compared to suture method (52 hours) but no statistically significant difference was found ($p > 0.05$). Resumption of oral feeding was also similar in both groups ($p > 0.05$). In the study of Scher et al.³, the patients required a mean of 4.4 days after a sutured gastrojejunostomy before resumption of oral feeding compared with 6 days when staples were used, showing earlier oral feeding with suture technique.

In the group of right hemicolectomy, in our study, we found a significantly earlier appearance of bowel sounds in the stapled group (44 hours) than in the suture group (54 hours), and resumption of oral feeding was 5.58 days with suture and 4.45 days with stapler method, showing a statistically significant difference ($p < 0.05$). Scher et al.² found that recovery of intestinal function did not differ significantly between the two anastomotic methods: patients with stapled anastomoses required an average of 3.8 days before resumption of oral feeding as compared with 3.7 days when the procedure was done with suture technique.

In our study, the time to appearance of bowel sounds with stapled left hemicolectomy was 50 hours as compared to 60 hours with suture. Resumption of oral feeding was similar in both cases and did not show any significant difference, as confirmed by Scher et al. and Brennan et al.¹

In the group of anterior resection, in our study, we found no statistically significant difference in the time to appearance of bowel sounds although earlier resumption of oral feeding was seen in cases of the stapled group ($p < 0.05$). Adloff et al.⁴ did not get any significant difference between both groups. Scher et al. confirmed Adloff's finding.

In the group of gastric resection, in our study, postoperative hospital stay did not show a significant difference between stapler (13 days) and suture method (10 days; $p > 0.05$). Scher et al.³ did not find any significant difference in postoperative hospitalization, either ($p > 0.05$). This was also confirmed by

Reiling et al.5

In the group of gastrojejunostomy, in our study, postoperative hospital stay did not show a significant difference between stapler (13 days) and suture method (10 days; $p>0.05$). Scher et al.2,3 and Reiling et al.5 also found an insignificant difference between the two anastomotic methods.

In the group of right hemicolectomy, in our study, postoperative hospital stay did not show a significant difference between stapler (13 days) and suture method (10 days; $p>0.05$). Scher et al. and Reiling et al. also found an insignificant difference between the two anastomotic methods.

In the group of left hemicolectomy, in our study, postoperative hospital stay did not show a significant difference between stapler (13 days) and suture method (10 days; $p>0.05$). Scher et al. and Reiling et al. also found insignificant differences between the two anastomotic methods.

In the group of anterior resection, in our study, postoperative hospital stay did not show a significant difference between stapler (13 days) and suture method (10 days; $p>0.05$). Scher et al. and Reiling et al. also found insignificant differences between the two anastomotic methods. Adloff et al.4 found no difference in postoperative hospital stay between the two groups as well.

In the group of gastric resection, in our study, a significant difference between the stapler (37 days) and the suture method (46 days; $p<0.05$) was found for postoperative return to work. No other study was found which observed this parameter.

In the group of gastrojejunostomy, in our study, a significant difference between the stapler (34 days) and the suture method (49 days; $p<0.05$) was found for postoperative return to work. No study was found which observed this parameter.

In the group of right hemicolectomy, in our study, a significant difference between the stapler (40 days) and suture method (47 days; $p<0.05$) was found for postoperative return to work. No other study was found which observed this parameter.

In the group of left hemicolectomy, in our study, a significant difference between the stapler (35 days) and the suture method (40 days; $p<0.05$) was found for postoperative

return to work. No other study was found which observed this parameter.

In the group of anterior resection, in our study, a significant difference between the stapler (52 days) and the suture method (50 days; $p<0.05$) was found for postoperative return to work. No other study was found which observed this parameter.

In our study, technique-related complications occurred in 9 of the 25 patients (36%) with suture technique and in 7 of 25 patients (28%) with stapler technique. Two of 12 cases had leakage (16%) with external fistula in the group of right hemicolectomy with suture technique as compared to one case with stapler technique. In the group of anterior resection with colorectal anastomosis, there were 7 out of 25 cases who had wound infection superficial to the fascia in the control group, while this occurred in 6 out of 25 cases in the study group; no statistically significant difference was found ($p>0.05$).

Scher et al.3 found that one leak occurred in the 36 patients who underwent stapled gastric resection, a leak rate of only 2.7%. Four of 36 patients had superficial wound infection developed after stapled gastric resection while wound infection was noted in only one of the 44 patients who underwent resection with the suture technique. In gastrojejunostomy, they found a statistically insignificant difference ($p>0.05$); 4 of 24 patients had superficial wound infection in the stapled group as compared to 2 of 18 in the sutured one.

Scher et al.2 found an anastomotic leakage rate of 2.9% when staplers were used and one of 2.1% when sutures were used in ileocolonic anastomosis, showing no statistical significance ($p>0.05$). Reiling et al. and Adloff et al. also confirmed in their studies that technique-related complications are not significantly different.

CONCLUSION

Several studies conducted earlier have not shown any significant benefits in terms of outcome of either sutured or stapled anastomotic technique. In our study, we found that in well-trained hands stapling technique can significantly reduce the time for the anastomotic procedure. With reduced operating time and less tissue trauma due to less tissue handling, there is early restoration of intestinal function, early resumption of oral feeding and decreased duration of hospital stay which helps ultimately in early returns to work. Technique-related complications do not show significant

differences, which suggests that one can use staplers with the same safety and accuracy as sutures. There is no doubt, however, that stapling techniques are quicker to perform, particularly in situations where access is difficult such as in low colorectal anastomosis or in various gastrointestinal surgeries. Thus, stapling technique can be used safely and effectively as part of the modern surgeon's armory and one should be equally adept with a stapler gun as with needle-holder and suture.

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