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Bowel Anastomosis - Hand Sewn Versus Stapler: A Comparative Study.

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ABSTRACT

Background: Intestinal obstruction, peritonitis from a perforated bowel, abdominal trauma and diseases of bowel are common surgical problems throughout the world. The most commonly used method is Sutured anastomosis hand-sewn technique. To perform rapid intestinal anastomosis an alternative option like newer stapling devices has been provided. The main drawbacks of stapling devices are increased cost and less familiarity with its usage. Anastomosis can be done by suturing or stapling. Therefore, it is meaningful to study the two approaches to bowel anastomosis. **Methods:** This study was conducted in the Department of General Surgery at Teerthanker Mahaveer medical college and hospital, Moradabad. A total of 80 cases (40 in each group) which fulfill the inclusion and exclusion criteria were included in this hospital based prospective comparative study conducted for duration of 18 months. **Results:** The mean total operating time for group I (hand sewn anastomosis) was 270.36 minutes. On the other hand it was revealed from the results of the current study that the mean total operating time for group II (stapler anastomosis) was 250.42 minutes. The p value was insignificant >0.05. Findings of the current study suggest that both techniques of anastomosis hand sewn and stapler are safe with a little risk of anastmotic leak in oesophagogastricanastomosis. However, this risk of leak is statistically insignificant for both methods. Further, there was no difference in the time of appearance of bowel sounds, resumption of oral feeds and in total post-operative hospital stay. In addition results of the present study showed that stapler method is quicker in comparison of hand sewn technique. Therefore, stapler method can be helpful for the patients with poor health and for the patients who cannot tolerate prolonged anaesthesia. This study concludes that both techniques of anastomosis are equally effective and favourable for the patients. **Conclusion:** ?.

Keywords: Hand sewn anastomosis, nowel anastomosis, GI staplers, GI surgeries.

INTRODUCTION

Intestinal obstruction, peritonitis from a perforated bowel, abdominal trauma and diseases of bowel are common surgical problems throughout the world. These problems usually must be treated operatively hence it is frequently necessary to join two section of bowel together. Perfect approximations of this bowel without tension and with a good blood supply to both of the structures being joined are obviously fundamental.[1]

Anastomosis of the intestine is a surgical method to set up communication between two formerly secluded portions of the intestine. After removal of a pathological condition affecting the bowel, this procedure restores intestinal continuity.[2]

The hand-sewn technique using absorbable or non-absorbable sutures, mechanical stapling devices or biological glues were used to perform an intestinal anastomosis.[3] The most commonly used method is Sutured anastomosis hand-sewn technique. To perform rapid intestinal anastomosis an alternative option like newer stapling devices has been provided. The main drawbacks of stapling devices are increased cost and less familiarity with its usage.[4] The selection of anastomotic procedure is influenced by the diameter of the bowel ends, accessibility, edema, and site of anastomosis, available time and equipment, contamination and underlying pathology. However, the most important factor in the decision to perform particular anastomosis depends on individual surgeons experience and personal preference.[5]

It has been stated that the key to a successful anastomosis is the accurate union of two viable bowel ends with total evasion of tension.[2] Indisputably, two of the most significant complications related to intestinal anastomosis is a gaping and anastomotic leak. Breakdown of the anastomosis is associated with considerable perioperative morbidity and mortality. That being said, if certain surgical tenets are respected the odds of creating a protected and dependable anastomosis can be significantly increased.[6] These comprise of careful technique, tension-free anastomosis,

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maintaining fine tissue vascularity, perioperative nutritional optimization and effective management of systemic diseases, perioperative optimization of medical comorbidities, and avoidance of certain drugs such as steroids and vasopressors.[7]

To restore continuity almost all elective resections of gastrointestinal organs are followed by anastomosis.from the early 20th century surgical staples have been there, but their use in routine surgery has not been prevalent until 40 years ago when their design became much more expedient and proficient. Today in most major abdominal operations the staplers are an integral part of the procedure.[8]

To be acquainted with the advantages of staplers anastomosis over conventional hand-sewn anastomosis in respect to time taken for the procedure, an appearance of bowel sounds resumption of oral feeds, postoperative hospital stay, the incidence of leakage and anastomotic bleeding this study has been taken up. Anastomosis can be done by suturing or stapling. Therefore, it is meaningful to study the two approaches to bowel anastomosis.

MATERIALS AND METHODS

This study was conducted in the Department of General Surgery at Teerthanker Mahaveer medical college and hospital, Moradabad. A total of 80 cases (40 in each group) which fulfill the inclusion and exclusion criteria were included in this hospital based prospective comparative study conducted for duration of 18 months. All patients who underwent elective gastrointestinal surgeries were included in this study.

According to the type of anastomosis, hand sewn and stapler the subjects were allocated into two groups. Group A were in hand sewn group and Group B in stapler group. For the hand sewn group the suture material and type of anastomosis was done according to the individual surgeon's choice and preference. For the stapler group anastomosis was done using Linear cutting stapler, Linear anastomosing staplers or Circular anastomosing staplers, based on the need. The data was entered in the proforma prepared for the purpose and analyzed both as single group and subgroup analysis and compared with the other studies in the literature.

Inclusion criteria

All patients admitted to the surgery wards requiring elective gastro-intestinal surgeries who undergo bowel anastomosis for various benign and malignant conditions. Male or female subjects (between the ages of 12 and 80 years) undergoing various gastrointestinal surgeries. Subjects who gave written informed consent after reviewing the informed consent document.

Exclusion Criteria

Patients with indications for surgery other than mentioned in inclusion criteria, Age less than 12 years of age, All pregnant patients, Patients undergoing radiotherapyand patients of coagulopathy and patients on anti-coagulation

Data Collection Method

All the patients had body mass index in the moderately built range. All of them had good nutritional reserve preoperatively with total plasma protein (in the normal range).They had standard preoperative bowel preparation and prophylactic antibiotic was given .All the patients were studied for the parameters such as total operating time, time of return of bowel sounds, day of resumption of oral feeds, postoperative hospital stay, and postoperative complication—anastomotic leak. C-morbid conditions such as hypertension, diabetes among the patients were under control and fitness for surgery was taken by physician and cardiologist.

The patients who were admitted for elective resection and anastomosis for various illnesses are selected after thorough clinical examination and investigations to confirm the diagnosis and comorbid conditions. Details were recorded in the proforma prepared.

All patients had average body mass index. Pre-operatively anemia, diabetes and hypertension were controlled. They had standard preoperative bowel preparation and prophylactic antibiotic was given. Fitness for surgery by physician and cardiologist obtained. Preanesthetic clearance was obtained. When planned for resection and anastomosis patients were randomly chosen for hand sewn and stapler anastomosis. The various observations made like the time taken for the procedure, time taken for bowel sounds to return, resumption of oral feeds, post-operative hospital stay and post-operative complications like bleeding, and anastomotic leak and mortality are recorded in the charts.

The patients were assessed till discharge from the hospital for development of complications by physical examination of wound and clinical examination. The reports were compared between the hand sewn and stapler anastomosis groups and also compared with other studies.

The following statistical tests are used to compare the results of hand sewn group and stapler group.

1. Independent samples T-Test to compare mean values between methods.
2. Chi-Square test to compare proportion of the two values.

The observation analyzed statistically and concluded. (P-value <0.05 – significant)

RESULTS

Present study included total eighty cases (80) of resection and anastomosis. Among them group I had

forty patients (40) of hand sewn whereas, group II had forty patients (40) of stapler anastomosis. In the present study different surgeons performed operations in all cases. It was the decision as well as choice of the surgeon's whatever method he want to use among these two methods.

The current study included all types of GI anastomosis cases both benign and malignant cases.

Majority of patients in the present study were between 40 to 80 years of age. Out of 80 cases, 45 casa were males while 35 cases were females. Patients of hand sewn group and stapler group had mean age of 55.84 years and 55.26 years respectively.

All patients underwent pre anaesthetic clearance with 40 patients classified under ASA I, 32 patients under ASA II and 8 patients classified under ASA III.

Results of the present study show that the mean total operating time for group I (hand sewn anastomosis) was 270.36 minutes. On the other hand it was revealed from the results of the current study that the mean total operating time for group II (stapler anastomosis) was 250.42 minutes. The p value was insignificant >0.05.

Further, the mean anstomosis time for group I (hand sewn anastomosis) was 34.6 minutes and for group II (stapler anastomosis) it was 13.62 minutes.

Bowel sounds appearance earlier in group I hand sewn anastomosis (3.34 days) in comparison of group II stapler anastomosis (3.92 days). On the other hand oral feed was started in 4.6 days in group II (stapler anastomosis) whereas in 5.6 days in group I (hand sewn anastomosis).

Furthermore, results of the present study showed that there was anasotmotic leak in only two patients of group I (hand sewn anastomosis). Both of these patients had pancreatic carcinoma and underwent Whipples procedure. However, the leaks were managed conservatively.

Out of eighty cases (80), eight patients (8) had other complications like burst abdomen, wound dehiscence, myocardial infarction and pneumonia. Among these eight patients (8), four patients (4) belong to group I and four patients (4) belong to group II. All these patients were managed by conservative treatment. No causality was recorded in either group.

[Figure 1] shows that mean anastomosis time in group I hand sewn cases was 34.6 minutes and in group II stapler cases was 17.72 minutes. In the stapler group 80 % of anastomosis was done within 10-20 minutes which included loading the stapler gun, alignment of the tissues and firing of the gun. In 20 % of the patients in stapler group the anastomosis time was slightly longer (between 20 – 30 minutess) due to the added time required to set up the circular stapler.

Present study included 60 malignant cases and 20 benign cases. Among benign cases (15) majority of cases were incorporated hand sewn anastomosis. Among 60 malignant cases 25 cases underwent for hand sewn anastomosis while 35 cases underwent stapler anastomosis.

In the hand sewn group, for 50% of patients the anatomosis time was between 21-30 minutes and in 40 % of patients the anastomosis time was between 31-50 minutes. Anasomosis of rest of the 10% patients were done more than 50 minutes.

Table 1: comparison of total operating time in both groups.

Duration	Group I (hand sewn anastomosis)	Group II (stapler anastomosis)	Total Cases
150 – 200 count % within group	5	4	9
201 – 250 count % within group	20	26	46
251 – 300 count % within group	9	5	14
Above 300 count % within group	6	5	11
Total	40	40	80

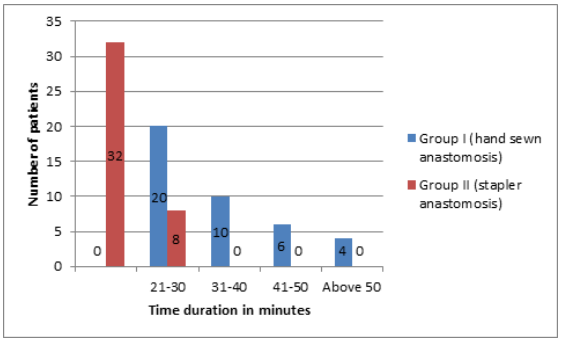

Figure 1: Comparison of anastomosis time in both groups.

Table 2: comparison of leak in both groups.

Leak	Group I (hand sewn anastomosis)	Group II (stapler anastomosis)	Total Cases
Absent	38	40	78
Present	2	0	2
Total	40	40	80

DISCUSSION

Findings of the current study suggest that resumption of oral feeds were same for both groups. Time duration of bowel sound appearance was earlier in group II (stapler anastomosis) compare to group I (hand sewn anastomosis). However, clinically it did not make much difference.

Total operation time was shorter in group II (stapler anastomosis) in comparison of group I (hand sewn anastomosis). Further, results of the current study showed that leak was recorded in two patients in

group I (hand sewn anastomosis) while no leak was observed in group II (stapler anastomosis). These findings were similar to the previous study of Afsar Ali Bhatti et al,[2] in which they recorded leak of 8.6% in hand sewn anastomosis while 2.9% of leak in stapler anastomosis group.

Contrary to the current study, Hassanen et al,[3] recorded a significant difference between the leak of hand sewn anastomosis group in comparison of stapler anastomosis group. They recorded significantly high incidence of leak in hand sewn anastomosis group compare to stapler anastomosis group. Their study was different from the present study as they conducted a clinical trial and population of size was larger compare to the present study.

Kracht M et al,[4] recorded an insignificant difference in clinical leak incidence of both groups. MacRae HM et al 8 recorded an insignificant difference in incidence of leak in colorectal anastomosis and stapled anastomosis in a meta- analysis.

Hand sewn group had two anastomotic leak when compared to stapler group but it was statistically not significant. Regarding other complications hand sewn group had two complications, whereas stapler group had three complications.

Further, any mortality was not recorded in both the groups. Kracht M et al,[4] observed an significant difference in mortality in hand sewn anastomosis group and stapler anastomosis group. Similarly, an insignificant difference in rate of mortality was recorded by MacRae HM et al,[8] in their meta-analysis study.

There was an significant difference between total mean operating time for group I (hand sewn anastomosis) compare to total mean operating time for group II (stapler anastomosis). These findings are very similar to the previous studies of Bangaru H et al,[5] Dameshaet al,[6] George et al,[7] and Hollender et al.[8] as they recorded an insignificant difference between the total mean operating time for both groups.

Similarly, Mac Rae et al,[9] observed an insignificant difference in total mean operating time for both groups in their systematic review and meta-analysis of 17 studies comparing hand sewing and stapling in ileocolonic, colocolonic and colorectal anastomosis.

Moreover, they concluded that although intraoperative technical problems were more common in those that were stapled, no evidence of differences between the two groups was found in the other variables, and they considered the two techniques to be equally effective.

There was a significantly shorter time of anastomosis for group II stapler anastomosis compare to group I hand sewn anastomosis. This was mainly due to different surgeons and different suturing techniques employed by the surgeon. Whereas in the stapler group, alignment and firing of the stapler was uniform with different surgeons.

This shorter time period of anastomosis in stapler group as observed in the current study was similar to the previous studies of Quan et al,[10] Scher KS et al,[11] and Scher KS et al.[12]

In the present study sixty (60) malignant cases and twenty (20) benign cases were included. Among benign cases (15) majority of cases were incorporated hand sewn anastomosis. Among 60 malignant cases 25 cases underwent for hand sewn anastomosis while 35 cases underwent stapler anastomosis. Most of the benign cases underwent hand sewn anstomosis.

Contrary to the current study, most of the other studies have taken only malignant cases.[13-16]

Return of bowel sounds was significantly earlier in group I hand sewn cases compare to group II stapler cases. These observations are very similar to the earlier study of Bangaru H et al and Damesha et al.[5,6]

In our study there were two anastomotic leak in group I hand sewn cases post Whipples procedure. Which were managed conservatively. However, there was no statistical difference in anastomosis leak in both groups. Similarly, Quan Wand et al,[10] did not recorded any significant difference in both hand sewn group and stapler group in their study. However, high incidence of leakage were recorded in the previous studies of Docherty et al,[14] Lustosa et al,[15] Khan N et al and Goulder F et al.[16,17]

Current study showed difference in incidence of anastomotic leak between the two groups which is very similar to the study of SuzanaAngélicaet al,[18] in which they recorded no difference in incidence of anastomotic leak between both groups. Similarly, there was no bleeding from the anastomotic site which is similar to Himabinduet al5 study.

CONCLUSION

Findings of the current study suggest that both techniques of anastomosis hand sewn and stapler are safe with a little risk of anastmotic leak in oesophagogastricanastomosis. However, this risk of leak is statistically insignificant for both methods. Further, there was no difference in the time of appearance of bowel sounds, resumption of oral feeds and in total post-operative hospital stay. In addition results of the present study showed that stapler method is quicker in comparison of hand sewn technique. Therefore, stapler method can be helpful for the patients with poor health and for the patients who cannot tolerate prolonged anaesthesia. This study concludes that both techniques of anastomosis are equally effective and favourable for the patients. Therefore, surgeons can select the technique of their choice depending on the availability of facilities. Nevertheless, more studies on larger populations are required to assess the differences between the efficiency of both techniques.

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