



Comparative Study of Gastrointestinal Anastomosis Stapler V/S Suture

KEYWORDS

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INTRODUCTION

Intestinal Obstruction, peritonitis from a perforated bowel, abdominal trauma, gastric outlet obstruction, malignancy of gastrointestinal tract and other diseases of bowel are common surgical problems throughout the world. These problems must be treated operatively. Unlike joining two areas of skin, where there is powerful incentive to achieve rapid healing, joining two segments of bowel so as to restore intestinal function without leakage of intestinal contents is not easy, accurate approximation of bowel without tension and with a good blood supply to both of the structures being joined are obviously fundamental. Surgical technique is equally important.

Failure of anastomosis with leakage of intestinal contents is still, regrettably, a common surgical experience.. Reported failure rates range from 1.5%-2.2% depending on what type of anastomosis was performed and whether operation was an elective or an emergency procedure. A leaking anastomosis greatly increases morbidity and mortality associated with the operation. It can be double the length of hospital stay and increases mortality as much as 10 folds. Dehiscence, when it occurs, has been associated with 1/5 to 1/3 of all postoperative deaths in patients who underwent an intestinal anastomosis.

Unfortunately, anastomotic dehiscence can occur even in ideal circumstances. The unwelcome fact has stimulated a great deal of debate regarding the reliability of various methods and approaches.

Although abdominal surgery has been practiced for centuries, it is only during last 200 years that intestinal suturing has been performed. The factors that influence this relate both to the systematic characteristics of the individual patient together with local and technical factors, such as the importance of an adequate blood supply, freedom from tension at the anastomosis and the absence of active disease or distal obstruction. The need for good edge-to-edge apposition and adequate luminal patency are self-evident.

This study compared surgical stapling technique with manual suturing in a prospective randomized fashion.

AIMS AND OBJECTIVES

The comparative study of stapler versus suture gastrointestinal anastomosis has been undertaken during the year June 2008 to August 2010, with following aims and objectives.

1. To study the feasibility, accessibility and ease of use of staplers in gastrointestinal anastomosis.
2. To compare safety and effectiveness of stapled and suture anastomosis.
3. To study the comparison of duration of anastomosis in both groups.

4. To evaluate the advantages of stapled over suture anastomosis at difficult accessible sites in abdominal cavity.
5. To compare complication rates in both groups.
6. To study the overall advantages or disadvantages of using staplers and suture methods of gastrointestinal anastomosis.

MATERIAL AND METHOD

The comparative randomized controlled study of 25 cases of suture versus 25 cases of stapler gastrointestinal anastomosis was carried out during June 2008 to August 2010.

Techniques of anastomosis

Suture group:

All operations were done by consultants. Intestinal anastomosis was done in two layers. The affected segment of bowel was divided between two clamps and resected. The bowel ends were cleaned with betadine swab and approximated. Using a double ended suture, stitches were taken in centre of posterior layer, taking full thickness bites in a continuous fashion, with PDS 2-0. The anterior surface was then sutured with Connell stitches. Finally the anterior layer was reinforced with inverting sero muscular lambert suture inserted in an interrupted fashion with silk 2-0. The edges of the mesentery were closed to prevent any internal herniation. The patency of the lumen was confirmed by gently palpating the anastomosis between thumb and index finger. The viability of the anastomotic segment was reconfirmed. The time taken for this whole procedure was noted..

Stapler group:

All operations were done by consultants. The affected segment of bowel was divided between clamps and resected. The bowel ends were cleaned with betadine swab and approximated.

Small enterostomies were made, and the limbs of gastrointestinal stapler were inserted into lumen, closed and fired. The enterostomies were then sutured and the stapler sutureline was oversewn with silk 2-0 in interrupted fashion.

For using circular staplers proximal bowel was first divided and rectum was resected with linear stapler. The anvil was inserted into the proximal bowel end and then by using prolene 2-0 pursestring suture it was fixed. The circular stapler is then inserted through the anus into the rectum with the pointed tip extruding through the mid point of the rectal staple line. These were locked into the place avoiding any twist in the proximal bowel and the gun was then fired. The resected doughnut specimen was inspected to confirm its completeness. Pelvis was filled with saline and rectum insufflated with air, the bubbles were locked for so as to confirm any leakage. The time taken for this whole procedure was noted.

RESULT & ANALYSIS

A total of 52 gastro-intestinal anastomosis were made amongst 50 patients.

50 patients were taken in the study, 25 in the stapler group and 25 patients in the suture group. Out of 25 patients in the stapler group 1 patients underwent two anastomosis hence making a total of 24 + (1*2)=26 anastomosis. Similarly in suture group out of 25 patients, 1 underwent two anastomosis, making a total of 24+ (1*2)=26. So a grand total of 52 gastro-intestinal anastomosis were made in this study. 38 patients operated on emergency basis and 12 electively.

Clinical details:

The median age in stapler group was 45 years, while that of suture group was 65 years. The percentage of female patients in stapler group was 36% while that in suture group was 56%. The net percentage of female patients was 46%.

Associated Conditions:

| Condition | Stapler group | Suture group | Total | (%) |
|------------------------|---------------|--------------|-------|-----|
| COPD | 5 | 5 | 10 | 20 |
| Hypertension | 4 | 3 | 7 | 14 |
| Diabetes Mellitus | 0 | 1 | 1 | 2 |
| Ischemic Heart disease | 1 | 2 | 3 | 6 |
| Hypoproteinemia | 1 | 1 | 2 | 4 |
| Total | 11(44%) | 12(48%) | 23 | 46 |

There were no significant differences between the randomized groups with regards to preoperative variables, such as hemoglobin, white blood cell count, or basic anthropometric data.

Past Operative History:

One patient has been operated previously for carcinoid of appendix in stapler group.

Pathological Condition:

| Sr. No. | Diagnosis | Stapler group | Suture group | Total | Percentage (%) |
|---------|--|---------------|--------------|-------|----------------|
| 1 | Ca stomach/ Ca esophagus/Pyloric stricture | 5 | 1 | 6 | 12 |
| 2 | Volvulus | 2 | 1 | 3 | 6 |
| 3 | Pancreatic neoplasm/ periampullary Ca. | 3 | 0 | 3 | 6 |
| 4 | Ileal stricture | 1 | 3 | 4 | 8 |
| 5 | Perforation | 2 | 2 | 4 | 8 |
| 6 | Ca colon | 2 | 1 | 3 | 6 |
| 7 | Stoma closure | 2 | 1 | 3 | 6 |
| 8 | Faecal fistula | 0 | 2 | 2 | 4 |
| 9 | Intussusception | 1 | 3 | 4 | 8 |
| 10 | Others* | 7 | 11 | 18 | 36 |
| | Total | 25 | 25 | 50 | 100 |

These patients were operated on elective and emergency basis. The majority of them had pathologies involving stomach and small intestine. There were 16 patients who has presented with intestinal obstruction. 13 patients with malignan-

cy and 37 patients with nonmalignant pathology.

In suture group there were 2 patients of intussusception and 2 patients of faecal fistula.

Operative Details:

All the patients were operated under GA. Out of a total 52 gastrointestinal anastomosis, 25 were done with stapler and 25 with suture techniques. In total there were 50 patients included in the study. 25 in stapler and 25 in suture group respectively.

The distribution of the site of anastomosis is shown below:

| Sr. No. | Anastomosis type | Stapler group | Suture group | Total | Percentage (%) |
|---------|------------------|---------------|--------------|-------|----------------|
| 1 | Gastro-jejunal | 6 | 0 | 6 | 11.54 |
| 2 | Jejuno-jejunal | 1 | 5 | 6 | 11.54 |
| 3 | Ileo-ileal | 4 | 14 | 18 | 34.61 |
| 4 | Colo-colic | 3 | 1 | 4 | 34.61 |
| 5 | Stoma closure | 2 | 1 | 3 | 5.76 |
| 6 | Esophago-gastric | 3 | 0 | 3 | 5.76 |
| 7 | Others | 7 | 5 | 12 | 23.08 |
| | Total | 26 | 26 | 52 | 100 |

Amongst all these patients majority of patients underwent gastrojejunal anastomosis for varied reasons. There was only one patient with esophago-gastric anastomosis. A total of 6 gastrojejunal and 6 jejunojejunal were done, while 18 ileo-ileal anastomosis were formed (which includes 3 ileostomy closures).

Duration of GI Anastomosis:

Stapler group in terms of duration of anastomosis had taken average 4.1 mins compared to 29 mins taken in the suture group. The difference was of approximately 25 mins.

Duration of Operation:

Average duration of operation in stapler group noted to be 195 mins compared to 210 mins taken in suture group. Difference of 15 mins is due to anastomotic techniques.

Post-operative complications

| COMPLICATION | STAPLER | SUTURE | TOTAL | (%) |
|-------------------------|---------------------|--------|-------|-----|
| Anastomotic Dehiscence | 0 | 1 | 1 | 2 |
| Stricture | - | - | - | - |
| Wound infection | 2 | 3 | 5 | 10 |
| Septicemia | 1 | 1 | 2 | 4 |
| Pulmonary complications | 0 | 1 | 1 | 2 |
| Electrolyte imbalance | 1 | 0 | 1 | 2 |
| CVS complications | 1 | 2 | 3 | 6 |
| Others | 2 | 0 | 2 | 4 |
| | 1 (biliary fistula) | 0 | 1 | 2 |

The main complication which is worrying a surgeon after GI anastomosis is its leakages, i.e. anastomotic dehiscence. In

our study amongst a total of 52 anastomosis, there was leak found in 1 suture group operated in emergency condition. In the stapler group there was no anastomotic leakage. No anastomotic leakage found in patients operated electively. Leakage was diagnosed on the basis of presence of fecal material or bile in drains or through the wound. This patient was kept conservative without re-exploration and died due to septicemia and electrolyte imbalance.

Apart from dehiscence these patients also had other complications.

Mortality

Total 2 patients had expired, both operated on emergency basis, (1 in suture and one in stapler group). 1 patient died in septicemia due to anastomotic leakage in suture group. A mortality rate of 4% was seen in our study. Septicemia, pulmonary complications were the major cause of death. Mortality is common in patients operated in emergency situation.

There was 1 mortality in stapler group due to respiratory failure ARDS in operated case of ca. esophagus, while one patient died in suture group due to septicemia with electrolyte imbalance as results of anastomotic leakage in operated case of carcinoma colon.

Follow up:

Most of our patients were poor, uneducated agricultural workers who came from rural areas. Hence maintaining a regular follow up with all these patients was a very difficult task. Patients were followed up after 2 weeks, 6 weeks and then 3 monthly. Out of a total 50 patients, about 35 of them regularly visited OPDS for follow up. None amongst them had significant complaints. The remaining 15 were irregular in follow up in spite of reminders through posts. However it could be considered that these patients had no relevant post-operative complications post operatively.

SUMMARY

All the patients were monitored till they were discharged. There were two deaths during this study. All in post op period, the rate being 4%. Patients were followed up post op at three weeks, 6 weeks and then 3 monthly. No significant post op complications were noted.

The use of stapler in gastro jejunal, jejuno jejunal, ileo ileal, colorectal and ileoanal anastomosis was equally effective and safe and easy as compared to the conventional methods. The median length of the operation (anastomosis only) was almost 25 min. shorter when staplers were used. There were no anastomotic dehiscences when staplers were used.

It's evident from our study that staplers are as effective as conventional methods. Time reduction is one of the most attractive features of stapler anastomosis. Of course cost is the negative factor for a country like ours. Moreover the use of staplers in certain anatomical locations like pelvis makes the work more easy n fast. However on reviewing several other studies, it was noted that there was no significant difference in the incidence of anastomotic complications when stapled anastomosis are compares sutured procedures in the gastro intestinal tract.

CONCLUSION

- 1) Staplers are feasible, accessible and easy to use as compared to hand sewn methods, however cost is the major drawback. Learning curve seems to be relatively less in stapler as compare to hand sewn methods. Also there is uniformity in the pattern of anastomosis made with stapler, even when used by different surgeons (a property of all gadgets and mechanical devices).
- 2) Stapler anastomosis is as safe and as effective as other conventional methods for anastomosis.
- 3) The duration for anastomosis using stapler is very much less than that taken by hand sewn anastomosis.
- 4) In our study no difference was found in post op hospital stay. In both studies it was almost same.
- 5) The most dreaded complication of any gastro intestinal anastomosis is anastomotic dehiscence, which in our study was absent in stapler group. However considering various studies it can be said that anastomotic leak rates are same or less in stapler group than in hand sewn group. Due to decrease in total operating time due to use of stapler, certain complications like wound infection, bleeding and general anesthesia complications due to prolonged anesthesia are decreased with staplers.
- 6) Whenever feasible, accessible and available one should go for stapler anastomosis rather than hand sewn anastomosis; especially in critically ill patients in whom curtailment of operating and anesthesia time may be important.

In relation to efficacy, applicability and safety, it has demonstrated that the use of surgical stapling instruments is comparable to that of the conventional hand sewn methods. Bowel anastomosis with staplers is very advantageous in critically ill patients (in whom curtailment of operating and anesthesia time may be important), and situation where manual reconstruction is tough, like pelvis (low rectal anastomosis).

Thus in the study of ours, in a smaller number of patients in a setup like ours, catering to poor and rural patients, these techniques of stapler anastomosis is as effective and much easier than the conventional method of hand sewn anastomosis with an important added advantage, which is significant, and that is reducing the operative time and less leak rates. The decision on which technique to use must remain at the discretion of an appropriate judgment by the surgeon.

Although in our setup the cost of consumables per operation is increased when staplers are used. However we have economized the cost to a larger extent and ultimately this cost should be weighed against the more efficient use of operative time with reduced anastomotic dehiscence. Still much has to be studied as this is a smaller group of patients.

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