

Are Staplers Safer During Emergency Intestinal Anastomosis

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Abstract

Intestinal anastomosis is a surgical procedure performed to establish communication between two formerly distant portions of the intestine. This procedure restores intestinal continuity after removal of a pathologic condition affecting the bowel. Intestinal anastomosis has been effectively performed for more than 150 years using a assortment of techniques, materials and devices. This study included 50 patients, Out of them, 24 underwent hand sewn anastomosis, 26 underwent stapler technique. This study was conducted in the Department of General Surgery, Shri M.P. Shah Govt. medical college and Guru Gobind Singh Government Hospital, Jamnagar. In terms of mortality, 3 patients(12.5%) of handsewn anastomosis were expired and 3 patients(11.5%) of stapler anastomosis were expired. Rest all were discharged. In this study we found that stapler technique is quicker to perform, so duration of surgeries was less than that in the handsewn technique. We can say that stapler can be used in patients with poor general condition and in emergency surgeries. Low complication rate and lesser hospital stay makes the stapler patient friendly. However, the only limiting factor for stapler is its cost. Availability of cheaper stapler with reusable gun will make stapler more patient friendly. A day may come when as far as bowel anastomosis is concerned, people may not remember or require the art of suturing!

Keywords: Intestinal anastomosis; Stapler technique; Hand sewn technique, Emergency GI anastomosis.

Introduction

Intestinal anastomosis dates back to 1000 B.C the era of Sushruta "The great Indian surgeon". He described the use of black ants during the suturing of intestinal anastomosis. Intestinal anastomosis has been effectively performed for more than 150 years using a assortment of techniques, materials and devices.¹

Lembert then described his seromuscular suture technique in 1826 which became the main stay of gastrointestinal anastomosis in second half of century.²

Intestinal obstruction, peritonitis from a perforated bowel, abdominal trauma, gastric outlet obstruction and other diseases of the bowel are common surgical problem which must be treated operatively. Unlike joining two areas of skin, where there is a powerful evolutionary 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.³

Reported failure rates range from 1.5% to 2.2% depending on what type of anastomosis was performed. "A leaking anastomosis greatly increases the morbidity and mortality associated with the operation it can double the length of the hospital stay and increases the mortality as much as 10- fold. Dehiscence, when it occurs has been associated with one fifth to one third of all

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postoperative deaths in patients who underwent an intestinal anastomosis.

Unfortunately, anastomotic dehiscence can occur even in ideal circumstances. Single layer extramucosal anastomosis is more commonly used in present era which is described by Matheson of Aberdeen. The stapler devices recently introduced and this helps anastomosis of bowel loops with less tissue injury and less time duration of procedure. It also decreases the anastomotic leak. For the past years stapler technique is commonly used by many of the surgeons. Its more useful than the handsewn anastomosis for safety, easily accessibility, duration of procedure, efficiency.

Although the first clinically useful stapling device was developed by DePets in 1927, further progress was not remarkable until early 1960's when the institute for Experimental Apparatus and Instruments in Moscow developed a group of instrument capable of performing gastrointestinal anastomosis. Since these instruments were somewhat cumbersome and required that individual staples inserted into the instruments prior to its use they didn't receive widespread acceptance. Ravitch and his associates were responsible for this gift to medical world in the year 1959.

A great advance in the utility of stapler device was achieved with development of instant loading with sterile cartridge containing as many as 33 staples. Ravitch also reported further studies in animals and humans and described techniques for performance of gastrectomy as well as small bowel and colonic anastomosis. Gritsman one of the pioneers in the development of Russian stapling apparatus in the year 1966, reported a collective series of 1663 stappled gastric resection, performed by a large number of surgeons in USSR with a mortality rate of 2%. He compared these with a second series which he had taken from world literature, of 52886 gastrectomies done with suture technique by 62 surgeons with mortality rate of 4.4%.

Steichen and Ravitch reported 147 stappled gastrointestinal operations of their own in the year 1973 with 11 complications. Latimer and associates studied 112 stapled procedures with stapled related complication rate of 1.9%. Lawson and associates reported 122 operations on alimentary canal done with stapling devices with complication rate of 4%. Through these years numerous studies has been conducted comparing staplers with other conventional techniques. This study conducted in our hospital is an effort made to add to the list of those studies done to test the efficacy of these mechanical suturing devices. Indeed its

an invaluable gift given to medical fraternity by biotechnology.

This study compares the hand sewn anastomosis with stapler anastomosis in emergency surgery and it was conducted in Shri M.P. Shah Government medical college and Shri Guru Gobind Singh Government hospital, Jamnagar.

Indication of intestinal anastomosis

- Perforation.
 1. Infective or inflammatory
 2. Traumatic
 3. Neoplastic
 4. Ischemia.
- Fistula.
- Ulcer or bleeding.
- Obstruction or stricture.

Contra indication of intestinal anastomosis

- Poor blood supply to bowel ends (ie, radiation-injured bowel or ischaemic bowel).
- Unclear bowel viability after a revascularization procedure.
- Highly inflamed bowel and friable bowel.

Relative Contra Indication

- Peritoneal sepsis.
- Hemodynamically precarious patient.
- Extensive Crohn's disease.

Materials and Method

This study was conducted in the Department of General Surgery, Shri M.P. Shah Govt. medical college and Guru Gobind Singh Government Hospital, Jamnagar. The study was conducted from 2017 to 2019 between hand sewn and stapler anastomosis in emergency gastro intestinal surgeries.

This study included 50 patients. Out of them, 24 underwent hand sewn anastomosis, in which 11 were male patients and 13 were female patients (mean age group 64 years). 26 out of the 50 patients underwent stapler technique. Out of 26 patients, there were 18 male patients and 8 female patients (mean age group years).

All patients were carefully monitored with the following parameters:

- Operating time,
- Return of bowel sounds
- Oral feeding starting day,
- Hospital stay,
- Anastomotic complications like leak
- Other complications like fever, tachycardia, abdominal distension, burst abdomen, septicemia
- Outcome

The study was conducted considering following criteria:

Inclusion criteria

- Patients of emergency gastro-intestinal surgeries who underwent pure and only bowel anastomosis.

Exclusion criteria

- Gastro-intestinal anastomosis done in elective setting.
 - Patients where bowel anastomosis were done as a part of some other procedure.
 - Patients refusing to join the study or left the hospital before final evaluation.
 - Patients with prior chemo-radiation and Patients unfit for anaesthesia were excluded from the study.
- A well designed proforma was prepared

Observation and Result

We have studied and observed total 50 patients who underwent intestinal anastomosis in emergency settings during years 2017 to 2019 in Shri M. P. Shah Government Medical College and GGG Hospital Jamnagar.

Table 1: Types Of Anastomosis.

Groups	Frequency	Percent
Handsewn	24	48.0
Stapler	26	52.0
Total	50	100.0

A comparative study between hand sewn and stappled intestinal anastomosis in emergency surgeries was done in 50 patients and results were analysed. 24 patients (48%) underwent hand-sewn anastomosis and 26 patients(52%) underwent stapler anastomosis.

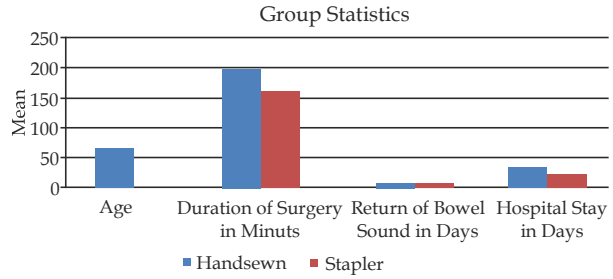


Chart 1: Comparison Between Two Groups.

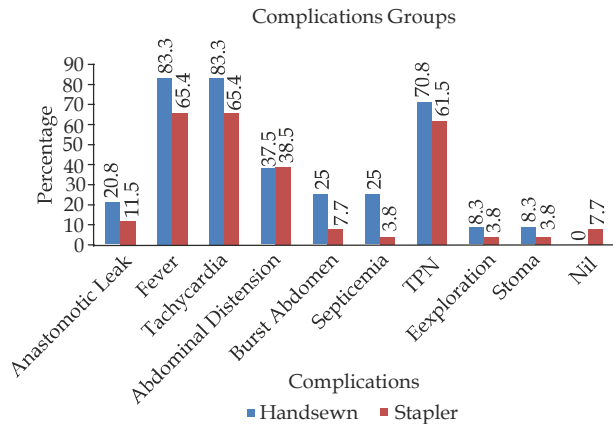


Chart 2: Comparison of Complications Between Two Groups.

Table 2: Outcome.

	Handsewn	Stapler	Total	Chi square/ Fisher exact
Count	21	23	45	1
Discharged	% within Groups	87.5%	88.5%	90%
Count	3	3	5	1
Expired	% within Groups	12.5%	11.5%	10%

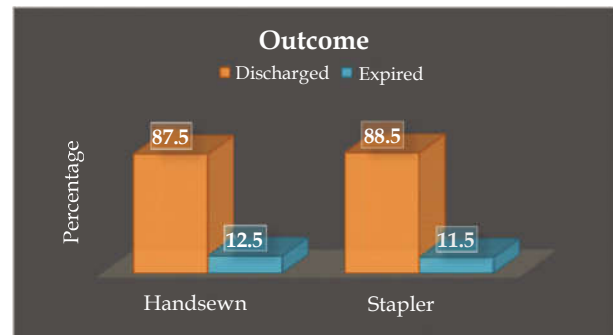


Chart 3: Comparison of outcome between two groups.

In terms of mortality, 3 patients (12.5%) of handsewn anastomosis were expired and 3 patients (11.5%) of stapler anastomosis were expired. Rest all were discharged.

Comparison with various studies

Table 3: Duration of procedure (in minutes).

	Handsewn	Stapler
Bain 1996	37	35
Hull 1996	57	55
Hasegawa 2000	42	38
Horisbergr 2010	101.4 (Duration of complete procedure)	83.6 (Duration of complete procedure)
Our Study	198.75 (Duration of complete procedure)	162.69 (Duration of complete procedure)

Above mentioned comparison shows that stapler anastomosis requires less time and this was evident in different studies. This can be attributed to the facts that unlike in handsewn anastomosis where surgeon has to take each bite of suture separately, in stapler anastomosis, a complete row of staples is applied at a time

Table 4: Hospital stay (in days).

	Handsewn	Stapler
Bain 1996	8	7
Hasegawa 2000	10	8
Wong 2005	4	3
Horisbergr 2010	8.2	7
Balik 2011	8.58	6.6
Our study	31.63	21.08

The post operative hospital stay was significantly less in stapler group compared to handsewn group in our study while in other studies it was quite similar. In our study, as in Balik study, the postoperative complications were more in handsewn group than stapler group as the postoperative complications are directly proportional to hospital stay, we can see that the number of days of hospital stay increases accordingly.

Table 5: Anastomotic leak (%).

	Handsewn	Stapler
Hasegawa 2000	2.9	0
Wong 2005	1.7	0.9
Balik 2011	3.9	2.1
Doucherty et. al. 1992	4.3	4.7
Cuberafond et al 1995	7.2	6
Monero et. al. 1994	5.8	5
Our study	20.8	11.5

Hasegawa in his study in 2000 did not found any anastomotic leak in Stapler group while in other studies also there were less rates of leakage in stapler group. In our study also, there were relatively less incidence of anastomotic leakage in stapler group.

It is difficult to judge the clear cut superiority of stapler as far as anastomotic dehiscence is concerned. But it would not be wrong to comment that the use of stapler has slight edge over the conventional handsewn method.

Table 6: Return of bowel sound (in days).

	Handsewn	Stapler
Bain 1996	6.1	5.5
Hasegawa 2000	5.9	4.3
Balik 2011	4.6	3.4
Our study	6.4	5.9

It is clear that there was no significant difference in both the groups. However, marginal upper edge in stapler group can be attributed to relatively lesser bowel handling.

Table 7: Re-exploration (%).

	Handsewn	Stapler
Bain 1996	4.3	4.1
Hull 1996	2.1	1.8
Hasegawa 2000	5.7	4.2
Wong 2005	1.8	1.3
Our study	8.3	6.0

In our study 2 patients of hand sewn anastomosis needed reexploration while only 1 patient of stapler anastomosis needed reexploration.

One patient of ileal perforation of hand sewn ileoileal anastomosis had anastomotic leakage underwent reexploration. Later on, she had burst abdomen due to distension and died due to electrolyte imbalance and septicaemia.

The incidence of re-exploration also goes in favour of stapler anastomosis. Meticulousness, mechanical ease, avoidance of suture related variables and lesser time required for the procedure are the probable reasons behind this.

Comparing to other studies it is also clear that there are relatively less incidence of re-exploration rates in stapler group.

Discussion

24 patients (48%) underwent hand-sewn anastomosis and 26 patients (52%) underwent stapler anastomosis. There were 21 female patients (42%) and 29 male patients (58%), out of which 13 female patients (54.2%) and 11 male patients (45.8%) underwent hand sewn anastomosis. In stapled anastomosis, there were 18 (69.2%) male patients and 8 (30.8%) female patients.

Majority of patients in hand sewn group were in the age group of 51 years and above. There was no patients below 30 years of age in hand sewn group. Majority of patients in stapler group were in the age group of 41 to 50 years. Mean age in hand sewn group was 64.33 years and mean age in stapled group was 49.54 years.

Average total duration of hand sewn anastomosis was 198.75 minutes and average total duration of stapled anastomosis was 162.69 minutes. As can be noted, there was difference of 36.06 minutes between both the groups. The difference mainly due to less consumption of time with use of stapler.

Appearance of bowel sounds and starting of oral feeds was almost similar in both the groups and its mean value in stapler group was 5.96 days and in hand sewn, it was 6.42 days.

Mean time for hospital stay in hand sewn group was 31.63 days while mean time for hospital stay in stapler group was 21.08 days. Thus the patients with stapler group required less hospital stay as compared to hand sewn group.

In our study, total 8 patients (16%) had anastomotic leakage. amongst 26 stapled anastomosis 3 patients(11.5%) had anastomotic leakage and 5 patients(20%) of 24 hand sewn anastomosis had anastomotic leakage. Out of these patients 1 patient (3.8%) of stapler anastomosis required reexploration and 2 patients (8.3%) of hand sewn anastomosis needed reexploration. 1 patient of hand sewn ileal anastomosis required reexploration and expired due to septicemia due to burst abdomen.

Amongst 50 patients, 37 patients(74%) developed fever and tachycardia, the most common complications in both the groups. Fever and tachycardia were noted in 20 patients(83.3%) of hand sewn anastomosis and 17 patients (65.4%) of stapler anastomosis with no significant difference between the two groups. 9 patients(37.5%) of hand sewn anastomosis developed abdominal distension while 10 patients(38.5%) of stapler anastomosis developed abdominal distension.

6 patients (25%) from hand sewn anastomosis and 2 patients (7.7%) from stapler anastomosis had burst abdomen. Septicemia was observed in 6 patients (25%) of hand sewn anastomosis and only in 1 patient (3.8%) of stapler anastomosis.

33 patients(66%) required total parenteral nutrition, 17 patients (70.8%) of hand sewn anastomosis and 16 patients(61.5%) of stapler anastomosis required total parenteral nutrition.

Conclusion

From our study done to compare the hand sewn intestinal anastomosis and stapler intestinal anastomosis in emergency surgeries, we concluded that stapler technique is quicker to perform. So

duration of surgery is less than that in the handsewn technique. Hence stapler can be used in patients with poor general condition and in emergency surgeries. Low complication rate and lesser hospital stay makes the stapler patient friendly. Here against mechanics rule over the personal variable. Hence, now if available a stapler can be always a preferred choice, even by a junior surgeon as learning curve is less, so one has to be master of the art of using stapler gun along with using needle holder and suture.

However, the only limiting factor for stapler is its cost. Availability of cheaper stapler with reusable gun will make stapler more patient friendly. A day may come when as far as bowel anastomosis is concerned, people may not remember or require the art of suturing!

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