

Comparative Study of 40 Cases of Bowel Surgery to See Use Efficacy of Hand Sutures Versus Stapled Sutures

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Abstract: Indications for intestinal anastomosis can be broadly divided into two categories: restoration of bowel continuity following resection of diseased bowel and bypass of unresectable diseased bowel. This study compared hand suturing with stapler technique for bowel anastomosis. Stapler technique was superior in terms of low complication rate and early recovery.

Keywords: Intestinal anastomosis, Hand suturing, Stapler technique

1. Introduction

Anastomosis is defined as the re establishment of continuity of two tubular structures. It is required in order to short-circuit some obstructive or other lesion or to re establish continuity after resection has been carried out. There are two different anastomotic technique for reconstruction of the small or large bowel: sutured or stapled. Sutured anastomosis can be separated into two basic types single layered or double layered. Stapled anastomosis can be subdivided into end to end or side to side technique. There are many studies where stapled bowel surgery has been thoroughly compared with hand sewn bowel surgery in both experimental and clinical series. It has been shown that ultimately viability of any gut anastomosis depends on a number of factors including the nutritional status of the patient, the vascular integrity of the anastomosis and the tension under which the anastomosis is created. In present study we compared 20 cases of stapled bowel surgery with hand sewn bowel surgery. The cases were randomly allocated depending on the availability of instrument or procedure in which stapler can be used.

2. Material and Methods

The present study is carried out on 20 cases of stapled bowel surgery compared with same number of cases with hand sewn bowel surgeries in Department of surgery, Mahatma Gandhi Medical College, Jaipur. The study included patients suffering from various gut malignancies, obstructive gut pathology and follow up cases of ileostomy for ileostomy closure etc. which require resection or anastomosis either side to side or end to end.

A detailed history was taken to obtain information regarding present complains, details of previous diseases and operations. Thorough pre operative systemic and general examination was done to rule out anaemia, jaundice, lymphadenopathy, nutritional deficiency, diabetes, tuberculosis, uremia, respiratory problems etc. All the routine and specific investigation were carried out and the

details about operation were recorded like operation (routine/emergency), operating surgeon, type of instrument, name of procedure in which stapler used or hand sutured. Proper Post operative care and careful observation of different parameter like return of GI function, post op complication, post op hospital stay etc. During the follow up complication of anastomosis and recurrence of malignant lesions were looked for specifically. Criteria included for complications were wound infection, clinical leaks, tumour recurrence and Intra abdominal sepsis.

3. Observation and Results

Table 1: Age Distribution

| Age (Years) | Hand Sewn | | Stapled | | P-Value |
|-------------|-----------|-----|---------|-----|---------|
| | No | % | No | % | |
| <20 | 0 | 0 | 1 | 5 | P>0.05 |
| 20-59 | 15 | 75 | 14 | 70 | |
| 60-70 | 5 | 25 | 5 | 25 | |
| GRAND TOTAL | 20 | 100 | 20 | 100 | |

Table 2: Diagnosis of patient

| S. No | Diagnosis | Stapled | % of Patients | Hand Sewn | % of Patients |
|-------|-------------------------|---------|---------------|-----------|---------------|
| 1 | Malignancy | 11 | 55 | 11 | 55 |
| 2 | Obstruction | 3 | 15 | 3 | 15 |
| 3 | Perforation | 1 | 5 | 1 | 5 |
| 4 | Ileoacaecal Perforation | 3 | 15 | 3 | 15 |
| 5 | Sigmoid Volvulus | 1 | 5 | 1 | 5 |
| 6 | FAP | 1 | 5 | 1 | 5 |
| | Total No. Of Patients | 20 | | 20 | |

Table 3: Operative procedures

| S No | Operation | Stapled | Hand Sewn | % of Patients |
|------|---------------------|---------|-----------|---------------|
| 1 | Gastro-Jejunostomy | 3 | 3 | 15% |
| 2 | Entero-Entrostomies | 7 | 7 | 35% |
| 3 | Right Hemicolectomy | 7 | 7 | 35% |
| 4 | Total Colectomy | 1 | 1 | 5% |
| 5 | Sigmoid Cloectomy | 1 | 1 | 5% |
| 6 | Anterior Resection | 1 | 1 | 5% |
| | Total Patients | 20 | 20 | 100 |

Table 4: Return of GI function

| Operative Procedure | Return of GI Function(Days) | | |
|---------------------|-----------------------------|---------|---------|
| | Hand Sewn | Stapled | P Value |
| | Mean | Mean | |
| Gastro-Jejunostomy | 8 | 6 | 0.4069 |
| Entero-Entrostomies | 8 | 6 | 0.0528 |
| Right Hemicolectomy | 7 | 5.1 | 0.0126 |
| Total Colectomy | 8 | 5 | NA |
| Sigmoid Cloectomy | 8 | 6 | NA |
| Anterior Resection | 6.333 | 5 | NA |
| Total Patients | 7.55 | 5.6 | 0.0003 |

Table 5: Overall complications of hand sewn vs stapled bowel surgeries

| S. No | Type of Complication | Stapled | % of Patient | Hand Sewn | % Of Patients | P Value |
|-------|-----------------------------------|---------|--------------|-----------|---------------|---------|
| 1 | Wound Infection | 4 | 20 | 10 | 50 | 0.0386 |
| 2 | Clinical Leak | 3 | 15 | 3 | 15 | P>0.05 |
| 3 | Intraabdominal Sepsis | 1 | 5 | 1 | 5 | P>0.05 |
| 4 | Obstruction | | | | | |
| 5 | Anastomosis Stenosis or Stricture | 1 | 5 | 2 | 10 | P>0.05 |
| 6 | Tumour Recurrence | | | | | |
| 7 | Death | 1 | 5% | 2 | 10 | P>0.05 |
| | Total Complication | 10 | 50 | 18 | 90 | 0.0063 |
| | Total Patients | 20 | | | | 20 |

Table 6: Post operative complications of individual procedures

| S.No | Operation | | Total Patients | Type of Complication with no. of Patients Having that Complication | | | | | | |
|------|---------------------|-----------|----------------|--|---------------|------------------------|-------------|-----------------------------------|-------------------|-------|
| | | | | Wound Infection | Clinical Leak | Intra Abdominal Sepsis | Obstruction | Anastomosis Stenosis Or Stricture | Tumour Recurrence | Death |
| 1 | Gastro-Jejunostomy | Stapled | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Hand Sewn | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | Entero-Entrostomies | Stapled | 7 | 3 | 2 | 1 | 0 | 0 | 0 | 1 |
| | | Hand Sewn | 7 | 4 | 2 | 1 | 0 | 1 | 0 | 1 |
| 3 | Rt. Hemicolectomy | Stapled | 7 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| | | Hand Sewn | 7 | 2 | 1 | 0 | 0 | 1 | 0 | 1 |
| 4 | Total Colectomy | Stapled | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Hand Sewn | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | Sigmoid Cloectomy | Stapled | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Hand Sewn | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | Anterior Resection | Stapled | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Hand Sewn | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

4. Discussion

This study has been done on all the patients undergoing resection and anastomosis of bowel for various indications. Forty patients entered the study, twenty patients underwent a stapled resection and anastomosis and similar number a sutured one. They were comparable and evenly matched for known risk factors in our study and a detail analysis was presented for separate operative procedures- GASTRO-JEJUNOSTOMY 15%, ENTERO-ENTROSTOMIES 35%, RT. HEMICOLECTOMY 35%, TOTAL COLECTOMY 5%, SIGMOID CLOECTOMY 5%, ANTERIOR RESECTION 5%. Thus entero-enterostomies and right hemicolectomy has been the most frequent operative procedure done in our study.

In our study the variety of complication found were categorized into 7 groups those were-wound infection, clinical leak, intraabdominal abscess, obstruction, anastomosis stenosis or stricture, tumour recurrence and death.

The maximum number of complications were in the form of wound infection (Stapled(4)=20% & hand sewn(10)=50%) that makes the major difference in no. of complications.

The no. of deaths in stapled surgery were one and for hand sewn it was two, out of these 2 of deaths were due to non operative causes that were due to cardiac, respiratory or renal causes and one death was directly related to anastomosis failure in our study. There was difference in mortality 5% in stapled and 10% in hand sewn surgeries

When post operative complication were correlated with individual operative procedure than it was found that the overall complication rate in stapled bowel surgeries was 30% & in hand sewn surgeries -55%. So there was 25% reduction in complication rate when stapling instruments were used.

The maximum complication rate occurred in Hand Sewn Ant. Resection (100%) in our study out of 1 patient for hand sewn ant. resection.

The minimum complication rate occurred in stapled Total colectomy and anterior resection.

The maximum difference of complication rate between stapled & Hand sewn bowel procedures occurred in Total Colectomy (i.e 0% Vs 100%) & Ant. Resection (0% vs 100%) and the minimum difference of complication rate occurred in Right Hemicolectomy (i.e 28% Vs 42 %) and entero-enterostomy (42 % Vs 57%).

| | Complication Rate | | Difference |
|--------------------|-------------------|-----------|------------|
| | Stapled | Hand sewn | |
| Upper GI Surgeries | 33 | 66 | 33% |
| Lower GI surgeries | 14 | 60 | 46% |

Richard B Reiling et al (1979) found the complications as follows [1]

| | Complication Rate Stapled | Hand sewn |
|---------------------------------|---------------------------|-----------|
| In colon Surgery | 20% | 41% |
| Gastric Surgery | 42% | 37% |
| Technique Related complications | 18% | 16% |

Weil & Scherz et al (1981) [2] found that in patients with Billroth II gastrectomies who had the duodenal stump handled by conventional methods, 4.7% leaked, compared with 2.5% leaks who had the duodenal stump stapled & in hand sutured anastomosis, there were 12 complications (Leaks, Haemorrhage, or Obstruction) whereas there were no complications in stapled anastomosis.

Similarly **IMR Lowden et al (1982)** [3] study on upper G.I surgery found that the complication rate was 21% for operation using conventional suturing technique & 16% for operation in which the stapling instruments were employed. This difference was statistically significant & is principally due to the difference in the leak rate after duodenal stump closure & oesophageal anastomosis. **Wolmark et al 1986** [4] explored 41 months follow up study of colorectal cancer of NSABP. They showed local recurrence of 12% in stapled and 19% in hand sewn group.

James G. Docherty et al (1995) [5] study on colorectal surgery found that there was a significant increase in radiologic leakage in sutured group (14.4% Vs 5.2%) but there was no difference in clinical anastomosis leak rates, morbidity or post operative mortality. Tumour recurrence and cancer specific mortality were higher in the sutured patients (7.5% and 6.7%) and in patients with anastomotic leaks.

Fingerhut et al (1995) [6] study on colorectal anastomosis found that there was no statistically significant change or difference in the rate of early complications including anastomotic leakage (5% vs 7%) in the hand sewn and stapled anastomosis.

N Damesha et al (2007) [7] found 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 out of the 12 cases had leakage (16%) with external fistula in the group of Right hemicolectomy with suture technique as compared to the stapler technique which was one case. In the group of anterior resection with colorectal anastomosis, there were 7 out of 25 cases which 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 significant statistical difference was found ($p > 0.05$).

Meta-analysis by **Lustosa et al 2007** [8] and review of Cochrane 17 showed clinical leak of 7.1% and 6.33% in stapled and hand sewn group respectively,

Hassanen A et al (2008) [9], **P.B Nichkaode et al 2013** [10] studied that for colorectal anastomosis a significantly high anastomotic leak rate was found in the hand sewn group.

Terry T.W. Leung et al 2008 [11] Comparing stapled versus hand-sewn closures, there were no statistically significant differences in wound infection (RR 0.91, 95% CI 0.53 to 1.97) or anastomotic complication rates (RR 1.01, 95% CI 0.99 to 1.03).

5. Summary

We undertook this comparative study of 20 cases of stapled bowel surgery versus same no. of cases with hand sewn bowel surgeries in the department of surgery in Mahatma Gandhi Hospital, Jaipur between June 2013 and June 2015.

- 1) Three fourth or 72.5% of the patients of bowel surgery for resection & anastomosis (stapled and hand sewn) were of middle age group i.e. 21-60 years, with male predominance (57.5%). The male female ratio 1.35:1.
- 2) Most of the patients had the diagnosis of malignancy (55%) followed by follow-up case of Intestinal obstruction (15%) & ileocaecal TB (15%).
- 3) The complication rate was 30% for stapled bowel surgery as compared to 55% for hand sewn bowel surgery. So there was 25% reduction of complication rate occur when stapling instruments were used.

The Maximum complication rate was in hand sewn Ant. Resection and Total colectomy (100%) and minimum complication rate was in stapled Ant resection and Total colectomy.

The Maximum no. of complications were in the form of wound infection (stapled 20% & Hand sewn 50%) that made the major difference in complication rate.

6. Conclusion

We conclude that stapled surgery helps to reduce the complication rate as well as post operative hospital stay.

Our reasons for favouring stapled bowel surgery are:

- It can be easily learned & is probably safer in the hands of a less experienced surgeon than hand sutured methods.
- It is associated with using a single loading unit in place of numerous sutures especially in anterior resection surgery. It is associated with relatively less complications, hence plays an effective part in reducing extra burden on patients & hospital staff, as well as attendants.
- It is particularly appropriate in ileostomy in which earlier return of GI functions, min. complication rate as well as less chances of obstruction because of larger stomas, less oedema & less inflammation with the stapled anastomosis.
- It enables the surgeon not only to extend the range of Ant. Resection to lower tumours but also to extend the level of resection below the tumor as well as reduce the rate of APR, especially in men with a narrow pelvis.

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