Single Layer Versus Double Layer Anastomosis of Small Intestine – A Comparative Study from Karnataka, India

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ABSTRACT

BACKGROUND

Intestinal anastomosis is an operative procedure that is of importance in the practice of surgery. It is a very commonly performed technique in today's surgical era. We wanted to study the postoperative complications like anastomotic leak and abscess formation and duration of hospital stay in single layer and double layer anastomosis and compare the same.

METHODS

In our prospective observational study, 80 patients were reviewed and were divided into 2 groups. Cases were allotted to either group based on the odd even method requiring single- and double-layer anastomosis, odd being single layer and even being double layer anastomosis. Intestinal anastomosis was carried out in single layer technique with delayed absorbable suture material and double layer technique with inner transmural layer with delayed absorbable suture material and seromuscular layer with non-absorbable suture material.

RESULTS

Each group had 40 patients, there was significant difference noted between the groups. Mean duration of hospital stay in single layer group was 17.85 ± 7.62 days and in double layer group was 26.20 ± 16.12 days ($P = 0.043$ *). In single group, mean time taken for anastomosis was 18.50 ± 1.73 and in double group was 29.05 ± 2.19 . There was significant difference in time taken between two groups ($P < 0.001$). In single group, majority of subjects had no anastomotic Leak (95 %) and 5 % had leak. In double group 70 % had no leak and 30 % had leak. P value was statistically significant ($P = 0.037$).

CONCLUSIONS

Single layer anastomosis was better in terms of duration of hospital stay, post-operative anastomotic leaks and time taken for anastomosis.

KEY WORDS

Single Layer, Double Layer, Small Bowel, Duration of Hospital Stay, Anastomotic Leaks

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BACKGROUND

Intestinal anastomosis is an operative procedure that is of importance in the practice of surgery.¹ Intestinal anastomosis is a very commonly performed technique in today's surgical era. Gastrointestinal anastomosis was the most interesting surgical procedure to be performed by a budding surgeon in our surgical practice. The aim of anastomosis is to make a good approximation of bowel edges so that the contents pass through it easily and as early as possible.² End to end anastomoses, side to end or side to side, are the various methods of intestinal anastomoses used depending on the surgery, and the operating surgeon³. Different methods of anastomoses such as, single layer anastomosis, double layer anastomosis, staplers, glues, and laser welding have been tried. Various techniques were devised at different times, yet there is no single technique which has been accepted internationally.

For over 150 years, a wide range of techniques and suture materials have been used to perform intestinal anastomosis. In today's cost-conscious environment, the use of staples for intestinal anastomosis does not suit common man as these staples are very expensive and should be used with caution. But hand sewn anastomosis can be done, in an appropriate time and can be performed at a lesser cost to suit the economy of a common man.³ Hand sewn suturing technique remains the main stay for bowel anastomosis in developing countries like India and has been proven successful in most bowel surgeries. The method that has withstood the test of time in most situations, and in the hands of most surgeons has been the double-layered anastomosis, using non-absorbable sutures for, an outer seromuscular layer and absorbable sutures for inner layer.⁴

METHODS

Data was collected from patients who came to the Department of General Surgery at R.L. Jalappa Hospital, Tamaka, Kolar. Ethical clearance was obtained from the institutional ethical committee. No. SDUMC/KLR/IEC/16/2017-18, Dated: 29-11-2017. A pretested proforma was used to collect relevant information (patient data, clinical findings, lab investigations, follow up events etc.,) from all the selected patients. The study was a prospective comparative type conducted from November 2017 to June 2019 with a sample size of 80.

Patients selected for this study were admitted with small bowel gangrene, strangulated hernia with bowel loop as content, small tumours, intestinal ischemia requiring resection and anastomosis of bowel. Detailed history, thorough examination, preoperative examination, and radiological examinations were done. Cases were allotted to either group based on odd even method requiring single layer anastomosis and double layer anastomosis, odd being single layer and even being double layer anastomosis. In single layer technique anastomosis was carried out with delayed absorbable suture material and double layer technique with inner transmural layer with delayed absorbable suture material and seromuscular layer with non-absorbable suture

material. All cases were followed up to a period of 2 weeks post discharge. Each case was analysed with respect to, post-operative complications, anastomotic leak, abscess formation and duration of hospital stay.

Inclusion Criteria

- Age criteria 19 - 60 years.
- Surgical procedure for clinical conditions like small bowel gangrene, strangulated hernia with bowel loop as content, small bowel tumours, intestinal ischemia, requiring resection and anastomosis of small bowel.

Exclusion Criteria

- Patients requiring multiple anastomosis.
- Post chemotherapy and radiotherapy.
- Patients with diseases like sepsis, known cardiovascular disease.

Statistical Analysis

Data was entered into Microsoft excel data sheet and was analysed using SPSS 22 version software (IBM SPSS Statistics, Somers NY, USA). Categorical data was represented in the form of frequencies and proportions. MS Excel and MS word were used to obtain various types of graphs such as bar diagram. P value (Probability that the result is true) of < 0.05 was considered as statistically significant after assuming all the rules of statistical tests.

RESULTS

Figure 1. Bar Diagram Showing Anastomotic Leak Distribution between Type of Anastomosis Done

In single group, majority of subjects had no anastomotic leak (95%) and 5 % had leak. In double group 70 % had no leak and 30 % had leak. P value was statistically significant (P = 0.037). Mean duration of hospital stay - single group was 17.85 ± 7.62 days and in double group was 26.20 ± 16.12 days. The duration of stay between two groups was statistically significant. (P = 0.043 *). In single group, mean time taken was 18.50 ± 1.73 and in double group was $29.05 \pm$

2.19. There was significant difference in time taken between two groups. ($P < 0.001$).

Figure 2. Comparison of Duration of Stay between Types of Anastomoses Done

Figure 3. Comparison of Time Taken between Types of Anastomoses Done

Figure 4. Anastomotic Site Distribution between Types of Anastomoses Done

In single group, site of anastomosis was Ileoileal in 50 %, Jejunoileal in 25 % and Jejunojejunal in 25 % and in double group, site of anastomosis was Ileoileal in 60 %, Jejunoileal in 0 % and Jejunojejunal in 40 %. There was no significant difference in anastomotic site between two groups.

In single group, 0 % had relaparotomy and in double group, 15 % required relaparotomy. There was no significant difference in relaparotomy between two groups. ($P = 0.071$).

In single group, 5 % had mortality and in double group, 15 % had mortality. There was no significant difference in mortality between two groups. ($P = 0.292$).

Figure 5. Relaparotomy Distribution between Types of Anastomoses Done

Figure 6. Mortality Distribution between Types of Anastomoses Done

DISCUSSION

This study was conducted in R.L. Jalappa hospital and research centre. This study assessed the efficacy and safety of the single layer anastomosis in comparison with double layer anastomosis in small intestine and included 2 groups, single layer and double layer. Efficacy of both the groups were compared in terms of duration required to perform intestinal anastomosis - single and double layer, postoperative complications and the duration of hospital stay in either of them.

Comparison of Anastomotic Leak

Anastomotic leaks are generally seen during the post-op day 5 - 7. This is the time when the collagen synthesis is the weakest and hence leads to dehiscence. Study conducted by Akthar Mehboob⁵ et al. showed, anastomotic leaks were seen in double layer anastomosis i.e. 4 cases and 2 cases - anastomotic leak was seen in single layer. Study conducted by Kanagale⁶ et al. showed, single layer interrupted anastomosis had leaks compared to single layer continuous anastomosis. Nemma⁷ et al. had higher number of leaks in double layer

anastomosis (5 cases) than the single layer. Similar results were seen in studies conducted by Hussain⁸ et al. and Tawar⁹ et al. where leaks were more in the double layer anastomosis. In the above study conducted, single layer group showed that majority of subjects had no anastomotic leak (95 %) and 5 % had leak. In double group 70 % had no leak and 30 % had leak. P value was statistically significant.

Comparison of Duration of Hospital Stay

Study conducted by Akthar Mehboob⁵ showed that duration of hospital stay was almost comparable in both the single- and double-layer anastomosis i.e. 6.40 ± 1.32 and 6.36 ± 0.66 in single and double layer. This was also seen in study that was conducted by Nemma⁷ et al. which showed 9.1 and 9.6 days - single- and double-layer anastomosis respectively. The duration of hospital stay was comparable in studies that were conducted by Hussain⁸ et al. (5.87 ± 2.22 , 6.2 ± 0.25), Burch¹⁰ et al. (7.9, 9.9), Dandi¹ et al. (8.24, 8.48). In Saboo et al. the duration of hospital stay was similar (16.9 ± 4.41 and 16 ± 3.45) in single and double layer and was also seen in study conducted by Tawar⁹ et al. (11.48 ± 2.10 , 13.45 ± 4.90). In the above study - Mean duration of hospital stay - single group was 17.85 ± 7.62 days and in double group was 26.20 ± 16.12 days. There was significant difference in duration of stay between 2 groups.

Comparison of Time Taken for Anastomosis

The time taken for anastomosis was 12.15 ± 1.4 in single layer and 20.98 ± 1.38 in double layer anastomosis in a study that was conducted by Akthar Mehboob⁵ et al. In a study by Hussain⁸ et al. the time was longer in double layer anastomosis i.e., 19.2 ± 1.93 and single layer was 10.04 ± 1.37 . Study conducted by Burch¹⁰ et al. and Dandi¹ et al. showed time taken for single layer 20.8 and 19.6 and 30.7 and 29.5 minutes respectively. Patak¹¹ et al. showed that for single layer anastomosis time was 17.59 ± 1.16 and double layer was 30.16 ± 1.28 . All these studies had significant P value in terms of time taken for anastomosis. In our study, time taken for single layer anastomosis was comparatively lesser than double layer anastomosis. The P value was significant.

Comparison of Site of Anastomosis

In the study by Akthar Mehboob⁵ et al. most common site of anastomosis was the ileum (48 of 60). This was seen in the study by Hussain⁸ et al. and Tawar⁹ et al. in which ileal anastomosis was the most common. In the present study, in single layer group, site of anastomosis was ileoileal in 50 %, Jejunoileal in 25 % and Jejunojejunal in 25 % and in double layer group, site of anastomosis was ileoileal in 60 %, Jejunoileal in 0 % and Jejunojejunal 40 %. There was no significant difference in anastomotic site between 2 groups

Comparison of Re-Interventions

The reintervention rates in the form of re-laparotomies were more in double layer anastomosis in this study, while it was lesser in the double layer anastomosis as seen in the study conducted by Saboo et al.

Comparison of Mortality

Study conducted by Nemma⁷ et al. had 2 mortalities and this was seen in double layer group. Same was seen in the study by Hussain⁸ et al. where mortality was more in the double layer group (2 cases) than in single layer (1 case). Saboo et al. and Patak¹¹ et al. showed higher leaks in single layer than double layer anastomosis. In the above study, in single group, 5 % had mortality and in double group, 15 % had mortality. There was no significant difference in mortality between two groups.

CONCLUSIONS

In the above prospective study that was conducted in the Department of General Surgery at R.L. Jalappa hospital, 80 cases which underwent single layer and double layer anastomosis were divided as 2 groups. Various aspects were recorded and compared between 2 groups i.e., duration of hospital stay, post-operative complications like anastomotic leaks. The above study showed that single layer anastomosis in small bowel was better than double layer anastomosis in terms of duration of hospital stay and anastomotic leaks, single layer having lesser leaks and duration of hospital.

Data sharing statement provided by the authors is available with the full text of this article at jemds.com.

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