A Comparative Study of Single Layer Versus Double layer Intestinal Anastomosis

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ABSTRACT:

Objective:

To determine the efficacy of single layer intestinal anastomosis to double layer technique in terms of anastomotic healing.

Materials and Methods:

Fifty patients who underwent intestinal anastomosis in the Department of Surgery, Western Regional Hospital from June 2014 to May 2016 were taken for this comparative study and divided equally in two groups, 25 each (single layer and double layer).

Results:

Of the total fifty cases, twenty-five cases included in each group, there was no leakage in single layer group while 1 patient had leakage in double layer group which was statistically insignificant.

Conclusion:

Single layer interrupted intestinal anastomosis is simple to carry out and is as efficacious as double layer anastomosis in terms of postoperative anastomotic leak.

Keywords: Anastamosis, leakage, technique

INTRODUCTION:

Intestinal resection and anastomosis is one of the commonest procedure performed in surgery all over the world. 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. Failure of anastomosis with leakage of intestinal contents is still, regrettably, a common surgical complication and it has always been cause for concern in patients undergoing surgery with gastrointestinal anastomosis. Reported failure rate range from 1.5% to 2.2% , depending on what type of anastomosis was performed, where the operation was elective or an emergency procedure, general factors as age, nutritional status, comorbid conditions and local factors like vascularity, sepsis and suture technique [1-3].

A leaking anastomosis greatly increases the morbidity and mortality associated with the operation: it can double the length of hospital stay and increases the mortality as much as tenfold.[4] Dehiscence, when it occurs, has been associated with one-fifth to one third of all postoperative deaths in patients who underwent an intestinal anastomosis.[5]

Although many surgeons advocate one method over another, more approximation of two well vascularised, healthy limbs of bowel without tension in a normotensive, well nourished patient almost always results in a good outcome. One aspect that has always remained controversial is the use of either single or double layer of intestinal anastomosis. Historically, double layer anastomosis using an outer inverted seromuscular layer and a running transmural inner layer has been the standard for most of the situations. However, the double layer anastomosis produces mucosal inversion and serosal apposition. The inner layer is believed to be hemostatic but there are chances of strangulation of mucosa due to damage to submucosal vascular plexus[6]. Currently, the single layer intestinal anastomosis is popular as it probably causes less tissue necrosis or luminal narrowing and requires less time and cost without adding risk of leakage. [7, 8]

Our objective of this study was to reiterate the safety of single layer interrupted intestinal anastomosis.

MATERIALS AND METHODS

This is a randomized prospective study which was conducted at Western Regional Hospital from June 2014 to May 2016. Using non-probability convenience sampling methods about 25 patients each for single and double layer technique was selected.

Inclusion Criteria:

1. Patient's age> 12 yrs,
2. Those who gave consent to be included in the study,
3. Patients needing intestinal resection and anastomosis,
4. Patients with both elective and emergency resection.

Exclusion criteria:

1.Patients with other co morbid conditions like cardiac failure, hypertension, diabetes mellitus
2. Patients who has intestinal anastomosis with proximal defunctioning enterostomy
3.Patients requiring oesophageal, gastric, biliary, rectal and anal anastomosis.

All single layer intestinal anastomosis were done by vicryl 3-0 in interrupted fashion. All double layer intestinal anastomosis were done by inner transmural continuous with vicryl 3-0 and outer interrupted seromuscular with silk 3-0. Anastomotic failure was taken as, a fistula documented radiographically or by finding the bowel content draining from the wound, externally or a visible disruption of the suture line during re-exploration.

All statistical analyses and graphics were performed with the IBM SPSS version 23.0 statistical package (International Business Machines Corp., New Orchard Road Armonk, New York 10,504 914–499-1900, USA) for Windows.

RESULT

There were altogether 50 patients. The patients were divided in two groups, 25 each. The Single layer group had patients ranging from 12 to 74 years, with the majority in the 61-70 years group whereas the double layer group had patients with age ranging from 16 to 79 years, with majority being in the 41-50 years group. However, the mean age in the single layer group was 48.8 years and in double layer, the mean age was 45.07 years (Table 1). There were 13 male and 12 female patients in single layer group and 15 male and 10 female in double layer group.

In the present study, most of the patients having resection anastomosis were due to Ischaemia of the intestine following trauma, infection or neoplasm which was identical in both the groups. The causes of ischaemia in both the groups were mostly due to strangulated hernia, volvulus and intestinal obstruction (Figure 2a and 2b).

During this study, the cases included in the study predominantly had diseases of the small bowel, so majority of the cases had to undergo enteroenterostomy in both the groups, 72% of the patients in single layer while 75 % in double layer group (Figure 3a and 3b).

The first group included the patients who underwent single layer anastomosis and the second group included those patients who underwent double layer intestinal anastomosis. Elective and emergency surgeries were both included in the study and the outcome was assessed by the presence of anastomotic leakage during the postoperative period which was diagnosed both clinically and radiologically (Table.2).

Table 1. Distribution of different age group in the study

Age(years)	Single Layer (%)	Double Layer (%)
11-20	2	4
21-30	3	3
31-40	4	3
41-50	4	6
51-60	5	3
61-70	6	3
71-80	1	3
Mean age	48.87	45.07

Figure 1. Distribution according to procedure.

Figure 2a. Indication for surgery (single layer)

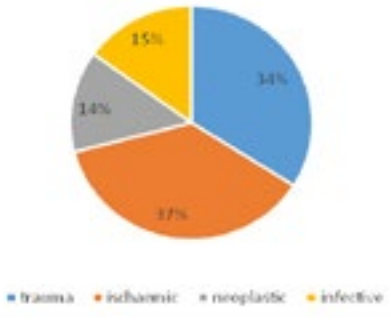

Figure 2b. Indications for surgery (Double layer)

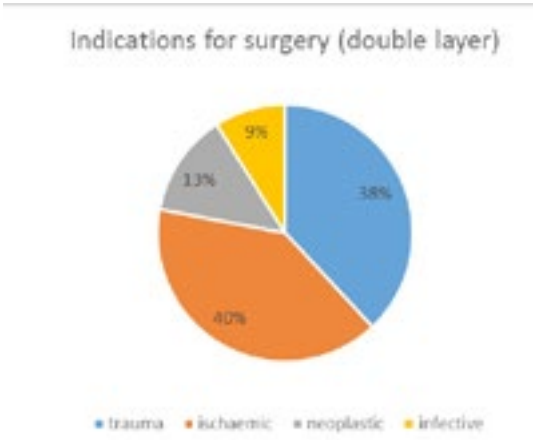

Figure 3a. Type of anastomosis (Single layer)

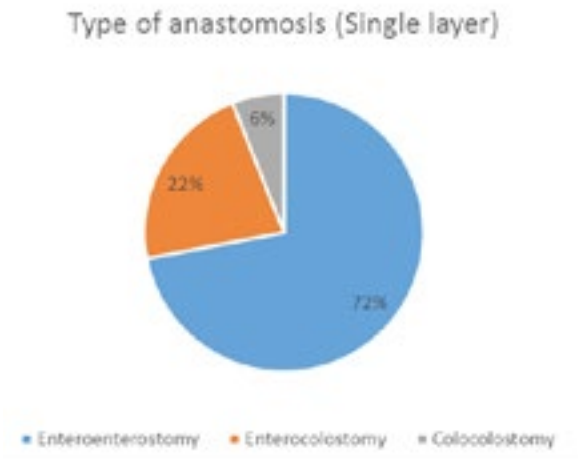

Figure 3b. Type of anastomosis (Double layer)

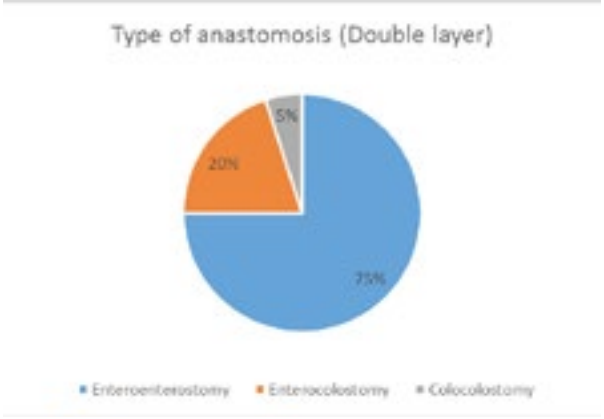

Table 2. Distribution according to outcome during post-operative period

Post-op period	Single layer	Double layer	p-value
Uneventful	25	24	>0.05
Leakage	0	1	

DISCUSSION

In single layer anastomosis group 38% were operated on elective basis while 62% were emergency cases and in double layer anastomosis group, 48% were elective cases 58% emergency cases (Figure 1). Samiullah et al also compared the type of procedure, emergency cases being predominant.[09]

There was 1(4%) patient with leakage in the double layer intestinal anastomosis group, the patient had undergone ileocolic anastomosis after right hemicolectomy for carcinoma colon (Table 2). A similar study comparing single layer versus double layer intestinal anastomosis done by Samiullah et al included 52 patients in single layer and 61 patients double layer, 2 patients (3.8%) in single layer while 8 patients (13.1%) leaked in double layer intestinal anastomosis.[9] Wayand W et al concluded in a study comparing the two techniques and single layer anastomosis was preferred for small and large bowel anastomosis.[10] Burch et al compared single layer (n= 59) and double layer (n= 66). There was 3 % leaking seen in single layer while 1.5 % in double layer, which was statistically insignificant.[11]

Similar study done by S. T. Irwin et al including a total of 466 single layer gastrointestinal anastomosis, 6 (1.3%) anastomotic leakage occurred concluding it to be simple and safe procedure [12]. In a study by N J Carty et al. out of 500 single layer interrupted intestinal anastomosis only 2.2% leaked concluding it to be a safe procedure. [2]

The objections against the traditional double layer anastomosis may be due to incorporation of large amount of ischaemic tissues in the suture line as more of the mesentery is cleared of the edge of the bowel rendering tissue ischaemia in the suture line. In addition it causes tension on the suture lines and increases the chance of leakage and luminal narrowing.[2]

In contrast single layer anastomosis causes less damage to submucosal vascular plexus and minimally disturb the gut lumen as it incorporates the strongest submucosal layer and allows accurate tissue apposition and layer to layer attachment, leading to better wound healing and early bowel activity.[13,14]

CONCLUSION

Single layer interrupted intestinal anastomosis is found to be a simple technique to carry out and has less postoperative anastomotic leakage than conventional double layer intestinal anastomosis and can be safely carried out in our surgical practice.

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