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Single vs Double Layered Intestinal Anastomosis: A Comparative Study

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BACKGROUND

Perforation peritonitis is a common surgical emergency in the Indian Sub-continent and tropical countries. Perforationcan be treated by resection anastomosis or by creating a temporary stoma and again creating anastomosis on a later date to maintain continuity of the bowel. Anastomosis can be done by various methods including staples and hand sewn methods. Hand sewn methods include single layered gastro-intestinal suturing (SGIA) and double layered gastro-intestinal (DGIA) suturing. The principles of intestinal suture was establishes more than a century ago by Travers, Lambert and Halsted. Single layer intestinal suture was a more contemporary innovation first described by Hautefeuille in 1976. This comparative study will help us to establish the criteria for instituting the management modality and outcome of these two procedures.

OBJECTIVE

To compare the effectiveness of SGIA and DGIA in both emergency and elective cases of intestinal resection and anastomosis in terms of operative and post-operative outcome, time taken for surgery, stricture of anastomotic site, anastomotic leak, intraabdominal infection, septicemia and cost factor.

A total of 60 patients were studied in our institute, R.L.Jallappa hospital, Kolar, who presented to our outpatient department and our emergency department. The following were the inclusion and exclusion criteria.

INCLUSIONS

1. Adults of the age group 18-65 years
2. Patients who are given ceftriaxone single dose Before surgery
3. Both elective and emergency patients were included.

EXCLUSIONS

1. Patients with co-morbid conditions like Diabetes mellitus, hypertension
2. Serum albmunin: <3 gm/dl
3. Hb <10 gm/dl
4. Pregnant women were not included in this study

METHODS

This comparative study was conducted over a period of 18 months. 60 patients with perforation in

GI tract were taken up for the study. These patients were divided into two groups, Group A and Group B, each group consisting of 30 patients. The intestinal closure was done in single layer in Group A (n=30) and double layer in Group B (n=30). Same aseptic precautions taken in both the groups, same antibiotics were used. In SGIA, anastomosis was carried out in an interrupted method with seromuscular non-absorbable silk 3-0 suture. In DGIA, closure was carried out by inner layer of continuous absorbable 3-0 polyglactin suture and external layer with interrupted non-absorbable silk 3-0 suture.

The entire study was randomized. The operative and post-operative outcome, time taken for surgery, stricture of anastomotic site, anastomotic leak, intraabdominal infection, septicemia and cost factor were evaluated in both the groups. Both groups were treated pre-operatively with a single dose of Ceftriaxone and post-operatively with 3 doses of Ceftriaxone and Metronidazole each.

Sl. No.	Surgery	Group A	Group B	Total
1.	RTA	8	9	17
2.	Perforated viscous	6	7	13
3.	Ischemia due to band	5	5	10
4.	Gall stone ileus	5	4	9
5.	Bull gore injury	3	3	6
6.	Stab wound	2	2	4
7.	Cancer GIT	1	0	1
Total		**30**	**30**	**60**

	Group A	Group B	Total
Wound infection	6 (10%)	7 (11.67%)	13 (21.67%)
Intra-abdominal abscess	3 (5%)	2 (3.33%)	5 (8.33%)
Septicaemia	1 (1.67%)	1 (1.67%)	2 (3.44%)
Enter-cutaneous fistula	1 (1.67%)	1 (1.67%)	2 (3.44%)
Total	11 (17.34%)	11 (17.34%)	

RESULTS

In this prospective study of 60 adults who underwent resection and anastomosis, intestinal closure was done in the above stated 2 methods, i.e., SGIA and DGIA.

In single layer group, wound infection was the most common complication, 6 patients had wound infection (10%), 3 patients had intra-abdominal abscess (5%), 1 patient had septicaemia (1.67%), 1 patient developed entero-cutaneous fistula (1.67%).

In double layer group, wound infection was the most common complication, 7 patients had wound infection (11.67%), 2 patients had intra-abdominal abscess (3.33%), 1 patient had septicaemia (1.67%), 1 patient developed entero-cutaneous fistula (1.67%).

This explains that there is no significant difference between SGIA and DGIA.

The average time taken by a surgeon to finish SGIA was 20.8 mins (10.6 mins to 31 mins) and that required for DGIA was 26.8 mins (21 mins to 32.6 mins). There is a significant difference between the two showing SGIA is less time consuming.

Also, the point against DGIA is that it ignores the basic principle to accurately opposethe clean cut edged leaving large amount of ischaemic tissue within the suture line, causing more chances of anastomotic leak. Contrary to this, in SGIA, incorporating the strongest layer of the gut which is the submucosa, causes minimal damage to the vascular plexus.

	Group A	Group B
Complication rate	17.34%	17.34%
Anastomotic leak	1 (1.67%)	2 (3.33%)
Time required to suture	20.8 mins	26.8 mins
Suture material (quantity and quality)	Silk 3.0	Polyglactin 3.0 Silk 3.0
Length of hospital stay	13.2 (average)	12.8 (average)

DISCUSSION

The present study assessed the efficacy and safety of single- and two-layer anastomosis after intestinal resection. The main finding of the study was that there is no evidence of a difference in terms of risk of leak but that there is insufficient evidence to rule out a modest but potentially important difference. Sensitivity analysis excluding the study by Goligher et al. suggested it as the source of heterogeneity. In their trial, techniques of vertical mattress sutures in the posterior two-thirds of the circumferences and Lembert sutures of horizontal mattress type in the anterior third of the bowel circumference were performed in single-layer group and reported the highest risk of leaks (45%). One possible explanation of this high rate of leaks may be their inclusion criteria, high and low colorectal anastomosis. On this subject, they described "We are quite unable to explain the difference between Everett's results and ours" in their report [11]. This suture technique is not common in intestinal anastomosis in the present day. Although various endpoints can be used to assess efficacy and safety of intestinal anastomosis, risk of leak after operation occupies the greatest attention among surgeons. Because there is no difference in the main out- come between two techniques, choices in clinical practice should be made after taking into account the results of other outcomes such as mortality, duration of anastomosis procedure, duration of TPN, length of hospital stay, risk of wound infection, and cost of sutures. Arithmetical means of these endpoints suggests that the single-layer method offers almost the same or better results than the two-layer method.

Post operative complication of anastomotic leak was higher in double layer group (20%) as compared to single layer group (8%) with significant statistical difference. It was observed that though the two layer method adds protective layer, it induces more inflammation due to extra suture material and ischaemia of the inverted layer. The inflammatory reaction results into a weaker anastomosis due to excess breaking down of collagen. High incidence of fistulation in double layer group can be explained due to impairment of blood flow to the anastomotic suture line as proved by Raphel Chung et al in 1987 [11]. Double layer technique, causes considerable thickness of intestinal wall which projects into the lumen creating an obstacle to the passage of feces. This may increase the tension over the sutures and lead to their separation4. Satoru Shikata et al in 2006 clarified that two layer anastomosis offers no definitive advantage over single layer in terms of post operative leak.[12]. In a study by Maurya SD et al in 1984, incidence of anastomotic leakage was lower in the single layer group[8].

None of the studies except Ordorica et al. met the require- ments for appropriateness of double-blinding. In the study by Ordorica et al., neither the physician performing the assessments nor the pediatric patient knew the type of anastomosis. However, assessing outcomes under blind- ing is virtually impossible in surgical trials. We therefore regarded studies with a Jadad score of 3 as high-quality studies.

CONCLUSION

Though a large number of patients need to be studied to do a dogmatic conclusion, based on the observations and results obtained in the present study following conclusions can be drawn

In our institute where large number of emergency procedures perform and most of patients are poor with economic problems, single layer anastomosis method is beneficial as it reduces operative time, time of anesthesia and less suture material required so economical and equally safe.

This study thus proves that SGIA not only has comparatively similar rate of complications as that of DGIA (which is insignificant) but also requires less suture material and saves the quality time of a surgeon. As shown above, SGIA is better than DGIA.

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