

Single-Layer Continuous Versus Single-Layer Interrupted Extra Mucosal Techniques in Small Intestine Anastomosis

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ABSTRACT

Background: Intestinal anastomosis is a commonly performed surgical procedure both in emergency and elective settings in surgical practice therefore its leak and disruption is a common cause of post operative mortality and morbidity and economical burden. Gut anastomosis heals by same mechanism like that of wound healing. The submucosa, is the strongest layer of gut wall therefore ideal anastomotic technique is the one which includes apposition and approximation of this layer.

Aim: To find out the outcome of a single-layer continuous extra mucosal technique as compared to interrupted for the anastomosis of small bowel to be created.

Methods: This was a prospective study based on randomization and was carried out in Surgical B unit, Lady Reading Hospital Peshawar from 1st May 2012 to 31st December 2012. Total Fifty patients were included in study requiring small intestine anastomosis and were divided in two groups based on randomization. Group I included those patients in which the anastomosis performed by single layer continuous extra mucosal technique and Group II patients underwent single layer interrupted extramucosal technique for creation of anastomosis, Group I included 24 patients (n=24) and Group II 26 patients (n=26). The demographic features, time taken to create anastomosis, postoperative complications, number of deaths if any and hospital stay in days were recorded on a printed proforma and data analysis was done through computer soft ware SPSS 16.

Results: Group I and II were similar as for as the demographic features, postoperative complications and duration of hospital stay are concerned. 4.2% patients of Group I and 7.7% of Group II developed anastomotic dehiscence with non significant *p* value. Mean time taken for creation of anastomosis was 10.04 minutes in continuous extra mucosal anastomosis group (Group I) and 19.2 minutes in interrupted extra mucosal anastomosis [Group II] (*p*=0.0001) Overall hospital mortality was 2%.

Conclusion: Single layer continuous extra mucosal technique is as safe as interrupted extra mucosal anastomosis technique but can be performed in shorter time and can be a cost effective alternative for construction of bowel anastomosis.

Keywords: Small intestine, Single layer continuous extramucosal technique, Anastomosis

INTRODUCTION

The gut anastomosis heals by same mechanism like that of wound healing¹. The submucosa, is the strongest layer of gut wall² therefore ideal anastomotic technique is the one which includes apposition and approximation of submucosa of gut wall³. As intestinal anastomosis is a commonly performed surgical procedure both in emergency and elective settings in surgical practice therefore its leak and disruption is a common cause of post operative mortality and morbidity and economical burden. The basic principles of gut anastomosis were established more than a century ago and have gone through the process of evolution⁴.

There are different techniques for intestinal anastomosis. Conventional methods, which range

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from sutured (single layer interrupted or continuous, double layer) to stapling techniques. Unconventional methods include compression rings, tissue glue and laser welding.⁵ Healing of the anastomosis depends upon several factors, like tension at the suture line, an adequate blood supply at the two ends of the intestine, clean gut at the time of operation and meticulous surgical technique.^{6,7} keeping in view all these and working on apposition of submucosal layer to produce better results. Norman Matheson of Aberdeen introduced the single layer extramucosal anastomosis.⁸ Single layer technique has been proven superior to two-layer method with respect to luminal reduction tissue strangulation and strength of anastomosis.^{9,10} The single layer continuous anastomosis was first described by Hautefeuille as an innovative technique. This is now an established fact that extra mucosal single layer anastomosis can

be done by two methods either continuous or interrupted techniques now which one of these techniques is better than the other is yet to be determined^{11,12}. This current study was planned to evaluate and compare these two methods of creating single layer extra mucosal anastomosis for small intestine.

We hypothesized that both methods of small bowel single layer extra mucosal anastomosis are same as for as anastomotic dehiscence is concerned but single layer continuous extra mucosal technique of anastomosis is cost effective and comparatively less time consuming.

PATIENTS AND METHODS

This was a prospective study based on randomization and was carried out in Surgical B unit, Lady Reading Hospital Peshawar from 1st May 2012 to 31st December 2012. Fifty patients of either gender and age above 14 years requiring small intestine anastomosis were included in the study. Patients were placed in either Group 1 (single layer continuous extra mucosal anastomosis group) or Group 2 (single layer interrupted extra mucosal anastomosis group) after simple randomization. Informed consent was taken from all the patients before including them in the study. All the patients were admitted from either emergency or opd. Patients included were above fourteen years of age, underwent small gut (jejunum and ileum) anastomosis. Patients with other hollow organ injuries (like large gut stomach and duodenum), those with extensive contamination of peritoneal cavity, and those with diabetes mellitus, uremia, malignancies and on steroids were excluded from the study. After taking history and doing clinical examination baseline/ routine laboratory investigation performed for all patients other specific tests to find out co morbidities were done where required. Preoperative prophylactic antibiotics were given to every patient.

All the patients were operated by a qualified surgical specialist. Different procedures were primary end to end anastomosis, ileostomy closures, ileo-ileal and Jejunal anastomosis. In most emergency cases laparotomy by midline incision was performed, while in elective cases in cases of ileostomy closure the procedure was done through peristomal elliptical incision. All the anastomosis were done by a single layer extra-mucosal technique either continuous or interrupted method applied, using vicryl 3/0 75mm, stitches were placed equidistant 5mm apart. The time was measured from the start of first stitch of anastomosis till the completion of last stitch of anastomosis. The cost estimation was based on the

actual price of the vicryl 3/0. One full length of 3/0 Vicryl suture used for continuous method and two were required for interrupted extra mucosal technique. Patients were not allowed to take orally till 5th day after surgery. Anastomotic dehiscence or leak was diagnosed on clinical grounds as for example leakage of gastrointestinal contents from the wound or through the drain and purulent discharge with or without systemic signs and symptoms was called wound infection. Postoperative hospital stay was defined as the number of days from the day of operation to discharge. The data was collected and recorded on a printed proforma including patients demographics, operative findings, anastomotic time, anastomotic leak, wound infection etc. Data analysis was done through computer soft ware SPSS 16. Statistical tests of significance were applied wherever required. A *p*-value of less than 0.05 was considered as significant.

RESULTS

This was a comparative study based on randomization and was carried out in Surgical B unit, Lady Reading Hospital Peshawar. It comprised 50 cases requiring small intestine anastomosis. Twenty-four patients were included in Group A and 26 patients in Group B. The demographic features of the two groups were similar as for example age and gender distribution as shown in Table.1.

Table 1: Demographic characteristics of the patients

Demographic features	Group A (n=24)	Group B (n=26)	P value
Age (in years)	29.29±8.92	28.96±8.89	NS
Gender			
Male	15 (62.5%)	14 (53.8%)	NS
Female	10 (41.6%)	12 (46.1%)	NS
Area of anostamosis			
Jejunum	10 (41.6%)	11 (42.3%)	NS
Ileum	14 (58.3%)	15 (57.6%)	NS
Reason for anastomosis			
Ileostomy closure	15 (62.5%)	16 (61.5%)	NS
Traumatic jejunam & ileum	9 (37.5%)	10 (38.4%)	NS

Mean time taken for creation of anastomosis was 10.04 minutes in continuous extra mucosal anastomosis group (Group A) and 19.2 minutes in interrupted extra mucosal anastomosis (Group B) *p*-value was 0.0001 and was significant (Table 2). Common post procedural complications studied were leakage of anastomosis, wound infection and mortality. Among the group A patients one patient showed anastomotic dehiscence while 2 case in

Group B showed leak with non significant p value. The rate of anastomotic leak was about 6%. These cases were managed by re exploration abdominal wash and ileostomy formation. Overall superficial wound infection occurred in 10% (Table 3). One (3.8%) patient died secondary to leaked anastomosis in group B in which jejunal anastomosis leak occurred and the patient was having multiple injuries due to fire arm, he was received in shock and there was delay in his presentation to ER.

Table 2: Comparison of anastomosis time and hospital stay between two groups

Parameters	Group A (n=24)	Group B (n=26)	p-value
Anastomosis time (minutes)	10.04±1.37	19.2±1.93	0.0001
Duration of postoperative hospital stay (days)	5.87±2.22	6±2.025	NS

Table 3: Postoperative complications

Complications	Group A (n=24)	Group B (n=26)	p-value
Dehiscence of anastomosis	1 (4.2%)	2 (7.7%)	NS
Infection of surgical wound	2 (8.3%)	3 (11.5%)	NS
Mortality	0	1 (3.8%)	NS

NS = Not significant

DISCUSSION

Extramucosal technique is the procedure of choice for anastomosis involving small and large bowel¹³ because there are less chances of delayed revascularization, intramural abscesses and stenotic intraluminal roll building associated with other methods of creating anastomosis.¹⁴ Extra-mucosal technique of anastomosis can be done by two ways interrupted and continuous but there is scarcity of studies in literature regarding the comparison of these two techniques. An important aspect of this study is that a comparison of the two methods of extramucosal anastomosis was made in terms of anastomotic dehiscence, time taken to create anastomosis, post operative mortality, overall cost and hospital stay. In this study among the group A patients one patient showed anastomotic dehiscence while 2 case in Group B showed leak with non significant p value .This is similar to that reported by Ahmad et al² and other studies^{3,9,15}. Overall anastomotic leak rate that is 6% in our study is a bit high because emergency and polytrauma cases were also included. The cases of anastomotic dehiscence were managed by re-exploration peritoneal wash and creation of stoma. The frequency of infected surgical wounds in our study is 8.3% in group A and 11.5% in

group B with p-value is non significant this falls within the range mentioned in literature^{13,16,17}.

The most common disadvantage of single layer interrupted extra mucosal technique is that it takes comparatively more time for the anastomosis to be constructed by this method. Our study has also shown that mean time taken for creation of anastomosis was 10.04 minutes in continuous extra mucosal anastomosis group (Group A) and 19.2 minutes in interrupted extra mucosal anastomosis (Group B) p-value was 0.0001 and was found significant. A study by Ahmad et al² also showed that single layer continuous extramucosal technique for construction of anastomosis is less time consuming. Mean hospital stay was 5.87 days in Group A and 6 days Group B with p value non significant. The overall mortality rate was 2% with 0% in group A and 1 patient that is 3.8% in group B with p value non significant this falls within the range mentioned in a study by Carty et al¹⁰.

The cause of death was septicemic shock and DIC in a patient of fire arm injury abdomen where jejunal anastomosis had leaked. This happened probably due to delayed presentation, polytrauma, haemodynamic instability and considerable contamination of peritoneal cavity. The overall cost of single layer continuous extramucosal technique was found to be less then interrupted technique because one full length vicryl 3/0 suture was required for continuous method while 2 were consumed in interrupted extra mucosal technique.

CONCLUSION

Single layer continuous extra mucosal technique is as safe as interrupted extra mucosal anastomosis technique and but can be performed in shorter time and can be acost effective alternative for construction of bowel anastomosis.

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