

ANASTOMOTIC LEAK IN PREPARED VERSUS UNPREPARED BOWEL

Muhammad Uzair Ilyas Tahirkheli¹, Irfan Shukr², Raja Azhar Iqbal³

¹Combined Military Hospital, D.I.Khan, ²Army Medical College, Rawalpindi and ³Children Hospital, Lahore, Pakistan

ABSTRACT

Background: Patients undergoing bowel surgery for any reason are prone to develop peritonitis as a result of anastomotic leak. It is controversial whether bowel preparation before surgery can prevent this complication. The aim of this study was to measure the frequency of anastomotic leak in prepared compared to un-prepared bowel.

Material & Methods: This quasi experimental Trial was conducted at Department of Surgery, C.M.H Rawalpindi, from Jan to Jul 2009. Ninety six patients were randomly allocated in two equal groups, A and B by lottery method. Patients of Group A were prepared with NGT irrigation of bowel with saline on the evening before surgery. Patients of Group B were not prepared. Patients were observed for anastomotic leak post operatively. Frequency and percentage were determined for Gender, TLC, peri anastomotic fluid, peri-anastomotic abscess and fistula. All the values were assessed using Chi-square to determine significance at $p < 0.05$.

Results: Mean age of sample was 41.46 ± 8.15 . There were 52 (54.2%) males and 44 (45.8%) females. Anastomotic leak was seen in 14/96 (14.6%) patients. Frequency of anastomotic leak in groups A & B was 8 (16.7%) & 6 (12.5%) respectively $p = 0.56$. Difference in the raised TLC ($p = 1.0$), peri-anastomotic free fluid ($p = 0.50$), peri-anastomotic abscess formation ($p = 0.23$), and peri-anastomotic fistula formation ($p = 0.55$), was 27.1% ($n = 13$), 12.5% ($n = 6$), 10.4% ($n = 5$), 4.2% ($n = 2$) respectively in group A and 27.1% ($n = 13$), 8.3% ($n = 4$), 4.2% ($n = 2$), 2.1% ($n = 1$) in group B.

Conclusion: There is no difference in frequency of leakage of bowel anastomosis whether it is performed in prepared or un-prepared bowel.

KEY WORD: Bowel anastomosis, Bowel preparation, Anastomotic leak.

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INTRODUCTION

Patients undergoing bowel surgery for any reason are prone to develop peritonitis as a result of anastomotic leak. The leakage of anastomosis and its sequel in the form of peritonitis results in the significant mortality and morbidity and prolonged hospital stay with protracted follow up in rest of their lives.¹ One of the anticipated causes of anastomotic leak is anastomosis in unprepared bowel when there is local fecal contamination along with presence of normal gut flora at the site of anastomosis.² Anastomotic dehiscence is a significant setback to the patient and the surgeon moreover a high index of suspicion is required for its diagnosis. The incidence of anastomotic leak varies widely because of the

divergences in what constitute a leak. If a leak is defined on the basis of only those requiring surgery, the cited rate is 1.9% but may be as high as 15.9% for radiologically sought leaks.³ In recent years number of studies, local^{4,5} and international,⁶ conducted on the subject of bowel preparation and anastomosis, claim superiority of anastomosis in the unprepared bowel. Bowel preparation is stressful for the patient and can result in significant fluid and electrolyte abnormalities particularly in the elderly,⁷ so there is a constant complaint of non compliance of patients to the fluids used for bowel cleansing. Studies to determine the best solution for bowel irrigation were also conducted but no single solution was able to show its superiority over the other.⁸⁻¹⁰ This study intended to find out if there was any difference in the rate of leak after bowel anastomosis in prepared versus unprepared bowel. The significance of determination of the effect on anastomosis could avoid gut preparation.

The aim of this study was to measure the fre-

Corresponding author:

Dr M Uzair Ilyas Tahirkheli,
General Surgeon,
Combined Military Hospital, D I Khan, Pakistan
e-mail: doc.uzair@gmail.com

quency of anastomotic leak in prepared compared to un-prepared bowel.

MATERIAL AND METHODS

This Randomized Controlled Trial was carried out at Department of Surgery Combined Military Hospital Rawalpindi, over a period of 6 months from January 2009 to July 2009. Males and females of age 15-50 years, with abdominal conditions requiring bowel resection and primary anastomosis, were included. Patients with primary/secondary/tertiary peritonitis, with history of previous intestinal surgery, on oral or injectable anti-coagulants or corticosteroid, or immuno-compromised patients were excluded. Subjects developing complications other than leakage like hemorrhage, stenosis and diverticular formation were also excluded from the study. After acquiring permission from the Ethical Committee 96 patients, were randomly allocated into groups A and B by lottery method. Group A consisted 48 patients who underwent intestinal anastomosis after gut preparation while the remaining 48 (Group B) underwent anastomosis without preparation. Following written and informed consent patients of (Group A) were used to be admitted three days before the day of surgery for bowel preparation under supervision. Patients were started on fluid diet 3 days before surgery and shifting to clear fluids 48 hours before surgery followed by naso-gastric tube irrigation of whole bowel with normal saline on the evening before surgery in combination of oral ciprofloxacin in three divided doses before surgery. Patients of Group B were not subjected to this preparatory procedure.

All patients were administered same pre and postoperative antibiotics. Same suture material was used in all the patients and it was ensured that anastomosis is tension free and the site of anastomosis has good blood supply. Patients were observed for anastomotic leak in the postoperative period till the time of their discharge, observing four common presentations of anastomotic leak including raised total leucocyte count, perianastomotic free fluid collection, abscess and fistula. Clinical signs of anastomotic leak were confirmed with Blood total leucocyte count and detection of free fluid, abscess or fistula on ultrasound examination.

Data was analyzed in Statistical Package for Social Sciences (SPSS) Version 13.0. Mean and standard deviation for the age while frequency and percentages were presented for Gender, Total Leucocyte Count, Free fluid in peritoneal cavity, Perianastomotic abscess and fistula. All the values were assessed using Chi-square test to determine statistical implication; $p < 0.05$ was considered as significant.

RESULTS

The mean age of total patient sample was 41.46 ± 8.15 SD. Mean age for patients with bowel preparation (Group A) was 41.54 ± 7.76 and for Group B 41.37 ± 8.60 years. The frequency of males and females in the study population was 52 (54.2%) and 44 (45.8%) respectively. Their frequency in the study groups was 28 (53.85%) males and 20 (45.45%) females in Group A while 24 (46.15%) males and 24 (54.55%) females in Group B.

In the total sample anastomotic leak was seen in 14 (14.6%) patients. The frequency of anastomotic leak in the individual groups A and B was 8 (16.7%) & 6 (12.5%) respectively ($p=0.56$).

The frequency and percentage of raised Total Leucocyte Count was 26 (27.1%) in study population, while it was 13 (27.1%) in either group.

The frequency of collection of free fluid around anastomosis was 10 (10.4%) in study population, 6 (12.5%) in Group A and in Group B was 4 (8.3%) with p at 0.504. The frequency of abscess was 7 (7.3%) in study population. In Group A it was 5 (10.4%) and in Group B it was 2 (4.2%) with p at 0.239. The frequency of peri-anastomotic fistula formation was 3 (3.1%). Its frequency in Groups A was 2 (4.2%), while in Groups B it was 1 (2.1%) with p at 0.55.

DISCUSSION

The centuries old tradition of bowel preparation is an integral part of the current practice besides local and international studies contradict. Physicians favor preparations with best compliance while patients favor preparations that are low in volume, palatable, have easy to complete regimens. Anastomotic disruption is the most dreaded complication after intestinal surgery.¹¹ Some leaks presents in a dramatic fashion early in the postoperative period, while many others present in a far more subtle fashion and often relatively late in the postoperative period.¹²

This study comprised relatively younger population which although decreases the incidence of co-morbid illnesses but doesn't represent the whole population. The frequency of males was 54.2% while females were 45.8% reflecting the increased incidence of gastro-intestinal malignancy among the male population. Another gender related observation was higher leak rate (15.95%) in females than males 1(3.5%) reflecting nutritional deficiencies of female gender.¹³ Also the most frequent age group in which the anastomosis leaked in the postoperative period was 41-50.

Fourteen patients of the sample population developed anastomotic leak. Among these 8 (16.7%)

Table 1: Comparison of our study results with other similar studies.

Study	Publication Year	Study Design	Number	Bowel Prep		Leak Rate (%)			Infectious Complications (%)		
				Yes	No	Prep	No Prep	p-value	Prep	No Prep	p-value
Present study		RCT	96	48	48	16.7	12.5	0.563	10.4	4.2	0.23
Arns-pinger et al ³	1988	Rev	70	50	20	<	>	0.02	<	>	0.04
Bucher et al ⁶	2005	RCT	153	78	75	6.4	1.3	0.210	13	4	0.07
Zamora et al ¹⁶	2006	RCT	249	120	129	3.2	2.3	NS	12.5	13.2	NS
Pe-na-Soria et al ²⁰	2007	RCT	97	48	49	8.3	4.1	0.44	12.5	12.2	0.97
Ali M ⁵	2007	RCT	211	109	101	5.5	1.0	-	18	9	-
Guena-ga et al ²²	2009	S Rev	4777	2390	2387	4.2	3.4	-	9.6	8.3	-
Scab-ini et al ²⁴	2010	RCT	244	120	124	5.8	4.0	0.52	5.0	2.4	0.36

belonged to Group A while 6 (12.5%) belonged to Group B. Although statistically not significant (p=1.0), these results follow the trend of rest of the studies expressed in table 1. The same is evident in a multicenter, randomized study conducted by Fa-Si-Oen et al,¹⁴ of 250 patients undergoing elective open colon surgery when randomized between receiving mechanical bowel preparation with polyethylene glycol (125 patients) and having a normal meal preoperatively (125 patients).

The percentage of raised Total Leucocyte Count was 27.1% in the sample population (p=0.56), although percentage of leaks was only 14.6%, making raised leucocyte count alone a non-specific perimeter however it was observed that in patients who developed peri-anastomotic abscess post-operatively raised total leucocyte count was a consistent finding. Similarly when infectious complications were noticed in study by Ram et al¹⁵ they came out to be 9.8% in the prepared group and 6.1% in the unprepared group. A very high infectious rate was also reported by Zmora et al,¹⁶ 12.5% in the prep group (leak rate 4.2%) and 13.2% (leak rate 2.3%), in the non-prep group. Case selection of left sided colonic resection can be attributed to this high infectious rate as Iqbal et al¹⁷ showed anastomotic leak of 17.8% and a mortality of 10.7% in rectal anastomosis while the overall anastomotic leak rate found to be 6.09%.

Collection of free fluid around anastomosis, (10.4%, p=0.504), was also not consistent with the anastomotic leaks. However significance of the peri-anastomotic fluid collection is that it can easily be picked up with ultrasound in expert hands and hence can be useful for bedside diagnosis.

The frequency of development of peri-anastomotic abscess was 7 in total study population which was 7.3%. The percentage of abscess formation in Group A (prep) was 10.4% while in Group B (un-prep) it was 4.2%. These results are in accordance with the study by Bucher et al (Table 1), but in study conducted by Zmora (Table 1) they were contradicting due to a very obvious reason, that these studies mainly concentrated on the left colon and colorectal surgeries, which literature shows to have high infectious complications rate.

In this study 3.1% of patients developed peri-anastomotic fistula. This rate was 4.2% in Group A while 2.1% in the non-prepared group. Although international and local literature have nothing to say about this component of anastomotic leak but it comprises of an important variable as few of the leaks do not present as peri-anastomotic abscess or fluids but directly communicate to the skin.

Structural damage to intestinal mucosa due to bowel preparation was studied by Croucher et

al¹⁸ and Bucher et al¹⁹ and reported significant observations in the loss of superficial mucous ($p < 0.001$), loss of epithelial cells ($p < 0.01$), edema of the lamina propria ($p < 0.01$), lymphocyte infiltration ($p < 0.02$) and polymorphonuclear cell infiltration ($p < 0.02$) in patients who received bowel preparation.

Pena-Soria et al²⁰ in 2007 studied the effect of oral polyethylene glycol (Group A) or no preparation (Group B) in 97 patients in two groups. Anastomotic failure occurred in four patients in group A (8.3%) while two patients in group B (4.1%) developed anastomotic leakage.

Ali M⁵ showed a high percentage of anastomotic leaks in the prepared group that was 5.5% in comparison to 1% in the unprepared group in an RCT involving 211 patients with infectious complications of 18% and 9% in the preparation and non-preparation group respectively. Nasir et al²¹ was successful in uncomplicated bowel anastomosis in 63 patients without bowel preparation.

Systematic review by Guenega et al²² proved that efficacy of bowel preparation was based on observational data and expert opinions only. Two groups of 2390 and 2387 in prep and non prep groups respectively showed increased rate of anastomotic dehiscence (4.2%) and infectious complications (9.6%) in the prep group. The same idea was strengthened by a systemic review presented by Slim et al²³ who found no statistical difference between the groups for anastomotic leakage ($p = 0.46$) and pelvic or abdominal abscess ($p = 0.75$). It was also determined that use of different regimes for bowel preparation did not influence outcomes of the bowel anastomosis.

Arnsperger et al⁴ in 1988 studied anastomosis on unprepared right colon and found more complications ($p = 0.04$), and anastomotic disruption ($p = 0.02$) in the unprepared group but his study was contravened by Scabini et al²⁴ in 2010 in a randomized trial which failed to find any difference in the rate of surgical infectious complications between the two groups as well as the anastomotic leak rate.

In this study the pre-operative antibiotics, were kept constant rendering it an area needed further research. Ultrasound was used to detect the free fluid and abscess however CT scan is more specific and sensitive. The result of this study and current literature is suggestive to abandon bowel preparation keeping the interest of patients above all. However particular situations, like rectum resection with total meso-rectal excision and pelvic anastomosis may benefit from bowel preparation.²⁵

CONCLUSION

This research offers no evidence to support

the claim that bowel preparation can improve anastomotic patency or infectious complications.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
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None declared.