

Research Article**A Comparative Study of Primary Repair Vs Stoma in Emergency Surgeries: An Institutional Experience****Prashant Raj Pipariya, Ajay Venugopal Menon, Himanshu Chandel**

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Abstract: Decision making regarding repair or stoma has been a controversial theme in emergency surgery. We therefore reviewed our institutional experience with regard to decision regarding surgery and morbidity. A prospective study was conducted on hundred patients taken up for emergency laparotomy for various indications, in JA group of hospitals, GRMC, Gwalior, from September 2013 -August 2014. Half the patients selected had undergone primary repair (PR) whereas the other half had stoma formation (SF). Patients were assessed for pertinent clinical information and individuals requiring either of the two surgeries were compared. Non- traumatic perforation constituted 61% of indication for PR and SF. An adverse set of preoperative and intraoperative parameters were found in patients who underwent SF compared to PR group. Wound infection was the most common complication (28%) in both the groups. Surgical outcome, with reference to complications, was 52% in PR group and 64% in SF. Overall mortality was 8%. Morbidity, in either groups, is significantly influenced by an advanced age, a low Hb, hypoalbuminemia, an advanced lag period (>72 hours) and poor hemodynamic stability at the time of operation. The mean duration of hospital stay following either PR or SF is 10±3 days. PR is a safe procedure in emergency surgeries as long as patient is stable preoperatively and peritoneal cavity is non- compromised. SF seems to be a better option in adverse patient conditions. Patient outcome is influenced by poor clinical parameters and patient demographic in either surgery.

Keywords: Emergency surgeries, Primary repair vs stoma, Complications

INTRODUCTION

In emergency surgery, management of an enterotomy, either spontaneous or following resection of a bowel segment can be by an approximation of the cut edges; referred to as primary repair or by exteriorisation of the involved segment; referred to as ostomy.

Indications for such an operation can be a perforated bowel segment (produced as a result of trauma or secondary to an inflammatory process of gut) or a devitalised/redundant segment of bowel requiring resection. In the Indian sub-continent the most common indication is intestinal perforation secondary to typhoid, tuberculosis or non-specific enteritis [1-3].

The decision regarding the type of surgery needs to balance the risk of an anastomotic dehiscence to the inconvenience of bowel exteriorisation. Although, numerous studies have concluded an advantage of primary repair over stoma formation in emergency trauma surgeries, [4-6] choice of surgery in a purulent peritonitis with delayed presentation is controversial.

We have reviewed our institutions experience with management of cases of severe peritonitis requiring exploratory laparotomy followed by primary repair/ resection anastomosis and compared it with a similar cohort who underwent stoma formation. We hypothesise that a combination of preoperative and intra-operative adverse patient condition necessitates bowel exteriorisation. Moreover, complications following either surgery are governed by the clinical profile of the patient.

MATERIAL AND METHODS

Ours was a prospective study on a total of 100 patients undergoing either primary repair of bowel or intestinal stoma formation, following emergency laparotomies in the department of surgery, Gajra Raja Medical College, Gwalior (Madhya Pradesh) during the study period of September 2013 to August 2014.

Data Collection

Patient data were collected retrospectively from medical records and operating room registries. Patient demographics and laboratory tests were recorded. Paediatric population, patients undergoing a primary repair along with diverting stomas and patients

in whom a follow up of at least 6 weeks would not be feasible were excluded from the study.

Patient Management

A clinical assessment of severe peritonitis along with radiological confirmation was done in all cases prior to making a decision to explore the patient. Patients were resuscitated with intravenous fluids or blood transfusions until an improvement, at least partial, of haemodynamic parameters (blood pressure, heart rate and diuresis) was obtained. Preoperative blood investigations of the patient were sent along with screening for HbSAg/HIV antigens. Nasogastric and vesical catheters were positioned in all cases. Proper preoperative antibiotic coverage, usually with a combination of cephalosporin (Ceftazidime 1g/ Cefotaxime 1g/Cefoperazone sulbactam 1.5g) and metronidazole (100 cc iv) was used.

In all cases, laparotomy was performed by midline incision, under general endotracheal anaesthesia. The lag period from onset of symptoms to operative intervention, nature and volume of peritoneal fluid, location of insult, nature of bowel wall, were considered and recorded. The operative procedure done was one of the following, stoma formation, which was done using a standard technique of circular skin opening, incision of anterior and posterior rectus sheath, muscle splitting, placing of supporting rod/feeding tube (if necessary), bowel exteriorisation and placing of sutures from bowel (full thickness) to the deep dermal layers of skin.

In case of intestinal resection, a primary anastomosis was created in a double layer; an inner all coats layer using vicryl (absorbable suture material) and an outer seromuscular layer using silk (non-absorbable suture material).

Regarding primary repair, the technique adopted consisted of an inner layer of full thickness sutures placed using vicryl 3-0 followed by an outer seromuscular layer of sutures placed using silk 3-0. Debridement of edges of perforation was done in all cases.

The peritoneal cavity was thoroughly washed with warm saline. Abdomen was closed after placement of pelvic drains.

Patients who underwent emergency laparotomies with intraoperative enterotomy/ primary

repair/anastomoses were randomly selected based on the records and grouped into two groups:

Table 1: Groups

Group R (n=50)	Patients who underwent primary repair/resection anastomosis
Group S (n=50)	Patients who underwent stoma formation

From the immediate post op period till discharge patient was monitored for any complications. An assessment of the monetary burden on the patient was calculated by adding the total amount of hospital expenses (cost of surgery and daily expenses) to the loss of income suffered by the patient per day. Following discharge from hospital, follow up of the patient was done for a period of 6 weeks to enquire about any delayed complications.

Statistical analysis

Statistical analysis was done using SPSS software version 17. Quantitative data was analysed using independent t test and a p value greater than 0.05 was taken as significant. Ordinal data was compared using chi square test. A Pearson χ^2 value less than 0.05 were considered significant.

RESULTS

Of the 100 patients included in the study 71% were males. The mean age of patients in Stoma (S) group was 40.7 ± 13.01 years and 39.46 ± 11.76 years in Repair (R) group with maximum patients presenting in their second to fourth decade of life. The age and gender distribution in two groups were found to be comparable with no statistically significant difference (p value 0.618).

Non-traumatic perforation was the most common indication for exploratory laparotomy (61%) in the study group, followed by sub-acute intestinal obstruction (19%), traumatic perforation (15%) and sigmoid volvulus (5%). Ileum, especially in its distal part, was the most common site of insult (73%).

In Group S, 45 patients underwent ileostomy (n=24 loop ileostomy; n=11 double barrel ileostomy; n=10 end ileostomy) and 5 patients underwent end colostomy. In Group R, primary repair was done in 30 patients and the rest 20 patients underwent resection anastomosis.

Table 1: Preoperative and intraoperative parameters in Group S and Group R

Group	Lag period >72 Hr (%)	Mean Hb g%	Mean S.Alb g%	Mean MAP mmHg	Ipf >1000ml (%)	Feculent Ipf (%)	Edematous bw (%)
S (n=50)	70	9.842±0.52	2.90±0.22	78.66±4.51	52	66	96
R (n=50)	48	10.36±0.42	3.190±0.246	91.39±6.42	2	20	6

S, stoma; R, repair; Hr, hour; Hb, hemoglobin; MAP, Mean Arterial Pressure; ipf, intraperitoneal fluid; bw, bowel wall.

The time period from onset of symptoms to operative intervention was taken as the lag period, which was >72 hours in 70% of cases in Group S and 48% of cases in group R. On comparison of preoperative investigations of both groups, it was seen that the mean hemoglobin, mean serum albumin and Mean MAP (Mean Arterial Pressure) were 9.842 ± 0.52 , 2.90 ± 0.22 , 78.66 ± 4.51 in Group S and 10.36 ± 0.42 , 3.190 ± 0.246 , 91.39 ± 6.42 in Group R respectively. The p values of these 3 parameters were <0.05 on comparison. Intraoperative parameters on comparison, revealed an intraperitoneal collection >1000ml in 52% cases in group S and 2% cases in group R. The nature of collection was feculent in 66% cases in group S and 20% cases in Group R. The bowel wall was edematous in 96% case in group S, whereas it was non-edematous in 94% of group R patients. These preoperative and intraoperative data are summarised in Table 1.

In the postoperative period, the most common general complication was wound infection (28% cases in both groups), followed by wound dehiscence (14%) and respiratory complications (13%).

Table 2: General post-op complications

General complications	Grp S (%)	Grp R (%)
Wound infection	28	28
Wound dehiscence	16	12
Chest infection	14	12
Cardiac complication	4	4
Reperforation	4	2

Table 3: Procedure specific complications

Group S	(%)	Group R	(%)
Skin excoriation	16	Obstruction	14
Stomal prolapse	14	Leak	8
Parastomal hernia	6	Fistula	8
Stomal necrosis	6		
Local abscess	6		
Obstruction	6		
Stoma retraction	4		

Stoma related complication; found most commonly was excoriation of parastomal skin (16%), followed by stomal prolapse (14%). The most common procedure related complication in repair group was obstruction (14%), followed by leak of repair (8%) and fecal fistula (8%). These postoperative and procedure specific complications have been shown in Table 2 and 3.

Pertaining to outcome, 64% of patients in Group S developed complications along the course of hospitalisation and the mortality among the group was 10%. In the repair group R, the overall percentage of complications was 48% and the mortality among the group 6%.

Comparison of preoperative and intraoperative factors in patients who developed postoperative complications (among both groups), revealed a statistically significant association of incidence of complication and certain factors. Patients with age >50 years, female gender, mean MAP ≤ 80 mm Hg, serum albumin $\leq 3g\%$, Hemoglobin $\leq 10g\%$, lag period of greater than 72 hours, volume of intraperitoneal fluid ≥ 1000 ml and feculent nature of intraperitoneal fluid were found to have a higher incidence of postoperative complications. The p value calculated being <0.05. Male gender was not found to have any significant correlation with incidence of postoperative complication, p value being 0.935. This data is depicted in table 4.

Table 4: Preoperative and intraoperative factors determining postoperative complications

Factors	Patients with complications	Patients without complications	p value
Age >50 years	25	2	0.000
Males	35	36	0.935
Females	23	6	0.006
Mean MAP ≤ 80 mm Hg	28	2	0.000
Albumin $\leq 3g\%$	48	2	0.000
Hemoglobin $\leq 10g\%$	45	0	0.000
Lag period ≥ 72 Hrs	48	11	0.000
Volume of IPF ≥ 1000 ml	23	4	0.000
Feculent nature of IPF	30	14	0.030

MAP, mean arterial pressure; hrs, hours; ipf, intraperitoneal fluid

Mean duration of starting Oral feed in Group S was 3.177 ± 0.441 days and in Group R was 4.42 ± 0.683 days, which was significantly more (p 0.000) as compared to Group S. The mean duration of Hospital Stay was 10.84 ± 2.97 and 10.44 ± 3.07 days respectively in Group S and Group R, the difference being statistically insignificant (p 0.510)

DISCUSSION

Advancement in the field of medical care has made it possible to salvage even such a sick cohort of patients, which previously constituted mortality. Types of surgical repair being described for management of an enterotomy include repair of perforation with proximal ileostomy or colostomy; primary ostomy; simple excision of the edges of the perforation and closure; wedge resection and closure; segmental resection with primary end-to-end anastomosis [6, 7]. Choosing the appropriate method, though justified by various factors, is ultimately a matter of surgical skill and experience.

In our study, of the 100 patients selected, majority were males (71%) between their second and fourth decades. Studies conducted by Mittal S *et al.* and other authors have come up with similar result [7, 1]. The most common indication for exploratory laparotomy in both the groups was non-traumatic perforation (64% in Group S and 58% in Group R). Perforation peritonitis is still a major indication of exploratory laparotomy in our country, the most common non traumatic cause being typhoid perforation followed by tuberculosis [7, 8]. Ileostomy was the most commonly performed stoma surgery (48%), which is concurrent with incidence of multiple ileal perforation in typhoid perforation peritonitis.

An advanced lag period of >72 hours is associated with deterioration of general condition of patient and increased peritoneal contamination. These two factors, besides others, warrant an exteriorisation of bowel, as primary repair in such conditions is unlikely to hold, as put forward by Rasslan S *et al.* [9]. In our study, 70% patients in Group S had a lag period of >72 hours, whereas the number was less in Group R (48%). These findings are similar to the findings of Stone H *et al.* [10] who concluded that lag period was more in the patients with stomas. The number of patients having a lag period >72 hours is high predominantly due to poor infrastructure and delay in referring patients from rural areas.

In our study, the mean Hb, mean S Alb. and Mean MAP of the stoma group were 9.842±0.52 g, 2.90±0.22 g and 78.66±4.51 mm of Hg respectively. These values in Group R were 10.36±0.42g, 3.190±0.246 g and 91.39±6.42mm Hg respectively, which were significantly higher ($p<0.05$) than the stoma group (Group S). These preoperative findings, along with an increased lag period of > 72 hours point towards a poor general condition of the patient at presentation and such patients have been shown to have better outcome with bowel exteriorisation [11].

High volume, feculent intraperitoneal collection and bowel wall oedema are unfavourable factors for holding sutures and such cases are better managed by exteriorisation. The results of our study are comparable to Gupta S *et al.* [12] who analysed numerous studies on perforation peritonitis in the subcontinent and reported that bowel oedema warranted exteriorisation. Other authors have advocated stoma surgery in patients having intraperitoneal collections more than 1000 ml [3, 9].

The most common general post-operative complication encountered in our study was wound infection 28%. Similar studies on cases of emergency laparotomies done by other authors, have yielded comparable results [3, 13]. Among procedure related complications, in Group S, the most common complication was excoriation of parastomal skin, seen

in 16 % cases. This may be due to the fact that ileostomy was the most commonly performed stoma procedure in this group.

Our findings are in accordance with Ahmad QA *et al.* and other authors [9, 14], who performed a study on the indications and complications of intestinal stoma and concluded that parastomal skin excoriation was the most common complication (25%).

Parastomal skin excoriation in our patients was managed by patient education, liberal use of skin protectants and changing from adhesive collecting systems to belt held pouches. Other complications like stomal prolapse, parastomal hernia, stomal retraction, and local abscess weren't severe enough to warrant repositioning of stoma and were managed conservatively. One case of stomal obstruction was due to a proximal stricture, found during re-exploration. Other two cases responded to liberal stoma lavage. Stomal necrosis was a dreaded complication in our study as all three patients who developed it expired. This was probably due to the fact that these patients were already in a poor general condition prior to surgery.

Group R had four instances of anastomotic leak (8%). The leak rates of our study are comparable to the results of Jain BK *et al.* (having leak rates of 11%) and Agaba AE *et al.* (who reported a leak rate of 6% following colorectal anastomosis) [3, 15]. As reported by these authors, mortality in leak patients was high with three of the four patients dying in spite of re-exploration. The one patient who survived was reexplored and exteriorisation of the leak segment was performed.

Incidence of complications in stoma group (64%) was more than in repair group (48%). This corresponds to findings of Atamanalp SS *et al.* [16] who retrospectively evaluated the records of 86 patients operated for typhoid intestinal perforations and found out that complications were more in the stoma group than the primary repair group.

Preoperative factors that have a bearing on post-operative complications have been studied using various scoring systems like Mannheim's scoring system, APACHE III and POSSUM score [17]. From these, some of the factors which could be reproduced in the context of our study were selected and compared between the cases which had complications and the remaining cases in both study groups S and R.

Factors like mean age, gender, mean hemoglobin, mean serum albumin, mean map, lag period, volume of intraperitoneal content and its nature were compared in both groups for their prognostic significance in predicting post-operative complications.

From the results it is clear that an advanced age (>50 yrs), females, a low serum albumin (<3 g %), a low hemoglobin (10 g %), a low MAP (<80 mm Hg), an increased lag period (>72 hrs), presence of high volume peritoneal contamination (>1000ml) and its feculent nature were associated with a higher incidence of complications. Such results have been obtained in studies conducted by various authors like, Bortolin M *et al.* [18] who concluded that hemodynamically stable patients have lesser complications following primary repair; Chatterjee H *et al.* [19] and Ahmad Z *et al.* [20] who postulated that a greater lag period influenced morbidity; Reilly HM *et al.* [21] who showed that preoperative low serum albumin is associated with increased postoperative complications; Van Raamscoort GH *et al.* [22] who concluded that mean age and mean Hb are predictive risk factors for complications; Murray JA *et al.* [11] who concluded that hypotension is associated with an increase of anastomotic leak in colon surgeries and Edino ST *et al.* [13] who described an increased incidence of post-operative complications in patients having high volume feculent peritoneal contamination.

CONCLUSION

Decision regarding the ideal surgery for managing an enterotomy in a patient, is best governed by a combination of pre-operative and intra-operative parameters. Choosing the best method is imperative in minimising short term complications and long term morbidities. Patients having improved preoperative parameters like early presentation, non-anaemic, non-hypoproteinemic and good hemodynamic stability along with non-compromising intraoperative findings, such as low volume, non feculent intraperitoneal collection and healthy, non edematous bowel wall are the ideal candidates for primary repair. Patients having an adverse set of preoperative and intraoperative parameters are best managed by bowel exteriorisation. Morbidity is significantly influenced by an advanced age, a low Hb, hypoalbuminemia, late presentation, high volume fecal peritonitis and poor hemodynamic stability at the time of operation, in both set of surgeries.

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