



Primary Bowel Repair with Exteriorization of Anastomosis– A Hospital Based Study

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Abstract

Background: A defunctioning stoma is used primarily to protect the anastomosis and prevent sepsis. However, temporary stoma is a morbid condition in itself affecting quality of life. Exteriorized anastomosis is an alternative in high-risk situations as it avoids intraperitoneal anastomotic leak and the risks of a second procedure.

Aim: 1.To see the feasibility of exteriorized bowel repair as an alternative to stomas i.e.ileostomy and colostomy.2.To evaluate morbidity in terms of duration of hospital stay and complication rate in patients with exteriorized bowel repair as well as mortality, if any.

Design and Place: This is a prospective observational study which was carried out in 30(thirty) patients admitted in Post Graduate Department of Surgery Government Medical College, Jammu over a period of one year w.e.f. November 2012 to October 2013.

Method: 30 patients were subjected to primary bowel repair with exteriorization of anastomosis. 'Drop-back' of exteriorized anastomotic segment is done under local or mask anaesthesia if there is no leak from anastomosis. Immediate complications are noted and dealt accordingly.

Result: Of the 30 patients included in our study, there was no need of stoma in 10 patients. In 20 patients due to anastomotic leak, the exteriorized segment functioned as stoma with no intra-abdominal collection.

Conclusion: Exteriorization of primary repair with subsequent delayed return of the repaired bowel to its intra-abdominal location represents an intermediate between primary repair and stoma formation. The procedure lacks the severity of intraperitoneal suture dehiscence and other complications of stoma.

Keywords: Ileostomy, Colostomy, Exteriorization, Anastomosis, Drop-back.

Introduction

Intestinal anastomosis is a surgical procedure to establish communication between two formerly distant portions of the intestine. This procedure restores intestinal continuity after removal of a pathological condition affecting the bowel. A disastrous complication of intestinal anastomosis is

anastomotic leak, resulting in peritonitis. So, proper surgical technique and adherence to fundamental principles is imperative to ensure successful outcome after intestinal anastomosis.

Primary suture with intraperitoneal drainage has been advocated for patients with perforating colonic injuries. Some patients with colonic

injuries are particularly at risk regarding the development of intraperitoneal septic complications and possible disruption of the colonic suture line. A delay of 6 hours or more before laparotomy or frank faecal contamination of the peritoneal cavity has been defining criteria for these 'high-risk' patients. For patients falling into these categories, colostomy is strongly recommended either by exteriorization of the wound or by primary closure and proximal decompression of the repair. Colostomy is also considered advisable when there are surrounding areas of devitalized bowel with subserosal hematoma or severe associated visceral injuries with extensive hematoma formation.

Colon injuries are graded as per the severity of bowel involvement and the injury scale for the same is given below.

Colon Organ Injury Scale (Moore *et al.*, 1990)

GRADE INJURY	
I	Haematoma contusion or haematoma without devascularization. Laceration partial thickness, no perforation.
II	Laceration <50% of the circumference.
III	Laceration >50% of the circumference without transection.
IV	Laceration transection of the colon.
V	Laceration transection of the colon with segmental tissue loss. Vascular devascularised segment.

The literature suggests that there is greater morbidity in patients treated with colostomy than those treated with primary repair wherever feasible. Also, there is a greater chance of stoma complications and intra-abdominal abscess in patients treated with colostomy than in patients at equivalent risk treated with primary repair [28, 4].

Traumatic perforations of the small bowel have almost uniformly been repaired by primary closure or primary resection, while a colon wound in the same patient has been religiously exteriorized or its closure protected by a proximal colostomy. The degree of fecal contamination of the peritoneal cavity is identical if both occur in the same patient [28]. The greatest single factor in the improved results is the exteriorization of colon injuries.

There is reduced mortality after exteriorization or diversion of colon injuries as compared with the results after suture repair [20].

Although a colostomy is generally considered a more conservative approach, the associated complications and the occasional death make colostomy more than an entirely innocuous procedure [24]. Advocates of primary closure often emphasize the latter point. Many surgeons favour primary repair of colon injuries because the procedure can be performed in the majority of instances with a shorter hospital stay and without significant increase in morbidity rates [29, 9]. Exteriorization of repaired colon injuries combines the relative merits of both colostomy and primary closure [6-21, 11].

"Exteriorize colon injuries" and a "well prepared bowel is a pre-requisite for any colon repair", the time honoured dictum, was challenged by Mason JM (1945). He introduced the technique of primary suture of unprepared colon and exteriorizing the segment of bowel outside the peritoneal cavity.

The majority of reports concerning the primary repair and exteriorization of colon injuries have been favourable [16]. A literature review of 339 patients treated for colonic injuries by primary repair and exteriorization showed that colostomy was avoided in 63.3% of these patients. These patients were saved the stage procedure for colostomy closure and repeated hospital admission [18].

The surgeons worldwide have been working out different strategies to avoid colostomy and its associated problems. These included primary repair, exteriorization of the repaired segment with early drop-back and use of intra-colonic bypass tube after repair of left colon and rectum [26].

The technique of sutured exteriorization of the colonic wound was described by Beall AC, Bricker DL *et al.* (1971) and Middleton CJ and Wayne MA (1973) as an alternative to colostomy. This technique is indicated when the resection has been carried out in a mobile colon, which enables exteriorization. A good blood supply and absence of elbowing or compression must be assured. It can be used in all cases where primary anastomosis

carries a high risk and therefore a stoma would have been mandatory. Being a high-risk anastomosis, anastomotic dehiscence may still occur, but the complications lack the severity of an intraperitoneal suture dehiscence^[7].

Exteriorization of primary repair with subsequent delayed return of the repaired bowel to its intra-abdominal location represents an intermediate between primary repair and stoma formation. The procedure lacks the severity of intraperitoneal suture dehiscence and other complications of stoma^[10].

The timing of interiorization or “drop-back” of the exteriorized bowel segment ranges from 5-21 days, although early “drop-back” between 5th and 7th day after primary surgery has been advocated^[8].

Traditional surgical training dictates that a “clean” colon is a pre-requisite for a sound anastomosis. However, no association between anastomotic leaks and failure to achieve a “clean colon” has been found^[17, 3].

Exteriorized bowel anastomosis for unprepared bowel offers shorter hospital stay, no stoma, one stage surgery and one hospital admission to the patient and thereby decreases his/her physical and psychological discomfort. Thus in our study, feasibility of primary bowel repair with exteriorization of anastomosis was assessed in detail in terms of complications and length of hospital stay.

Aims and Objectives

1. To see the feasibility of exteriorized bowel repair as an alternative to stomas *i.e.*, ileostomy and colostomy.
2. To evaluate morbidity in terms of duration of hospital stay and complication rate in patients with exteriorized bowel repair as well as mortality, if any.

Materials and Method

This study was carried out in patients admitted in Post Graduate Department of Surgery Government Medical College, Jammu over a period of one year *w.e.f.* November 2012 to October 2013. Thirty (30)

patients admitted during this period comprised the sample size for this study.

Inclusion Criteria

All below mentioned cases whether elective or emergency, in which routine stoma was planned:

1. Traumatic bowel injuries.
2. Volvulus sigmoid colon.
3. Occlusive neoplasm.
4. Perforated diverticulitis.
5. Ischemic colitis.
6. Strangulated ventral hernias.
7. Other colonic lesions, *e.g.* colonic stricture.
8. Substitute to covering stoma.
9. Severe secondary peritonitis.

Exclusion Criteria

1. Coagulopathy or bleeding disorder.
2. Chronic or end-stage liver disease.
3. Contra-indication for anaesthesia.
4. Refusal of surgery.
5. Pathology below peritoneal reflection of rectum.

Methodology

A written informed consent was obtained from all the patients for participation in the study, as well as for the surgical procedure. All patients were put to detailed history taking and a complete clinical examination including digital rectal examination was done. Baseline investigations like Hb, TLC, DLC, BT, CT, serum electrolytes, RFTs, LFTs including serum protein, serum albumin, X-ray chest and abdomen, and ECG.

Technique

The technique involved opening of abdomen and thorough inspection of peritoneal cavity. Thorough peritoneal lavage was given. Bowel segment bearing pathology exteriorized via colostomy/ileostomy wound after proper bowel mobilization before or after dealing with the pathology. Second peritoneal wash followed by rechecking of bowel and closure of laparotomy wound. Exteriorized bowel ends anastomosed after resection of pathologic segment if not done intraperitoneally

and anastomosis supported over a Ryle's tube or soft rubber drain. Drain was passed through mesenteric border of anastomosis and brought out over skin or subcutaneously via small incisions 3-4 cm away from the stoma wound. Exteriorized anastomosis covered with stoma bag and kept moist with saline which was changed daily.

Post-Operative Care and Evaluation

Patient was kept nil per oral with intravenous fluid and antibiotics for 3-5 days with or without nasogastric suction. Daily inspection of anastomosis (atleast twice) for any visible leak, faecal odour, viability and edema. Orals were started when bowel activity in the form of bowel sounds and passage of flatus or stools was present.

'Drop-back' of exteriorized anastomotic segment if bowel is healthy with no leak, under local or mask anaesthesia. Immediate complications were noted and dealt accordingly. Patient was discharged after passing stools for a day or two in the hospital, with the advice of semisolid diet.

Results

In our study of primary bowel repair with exteriorization of anastomosis, 30 patients were selected on the basis of inclusion and exclusion criteria which comprised 19 males (63.33%) and 11 females (36.67%) in the age group of 14 to 80 year. Small bowel pathology was encountered in 22 patients and 8 were having large bowel pathology. Table 1&2 illustrates the etiology seen according to bowel involved.

Table 1: Distribution of patients according to etiology of large bowel (n=8)

Indication	Etiology	Number of patients	Percentage (%)
Trauma	Penetrating = 1 Blunt = 2	3	37.50
Intestinal obstruction	Adhesion=1 Others=2 (colonic stricture/Neoplasm)	3	37.50
Sigmoid volvulus	–	2	25.00
Total	–	8	100.00

Table 2: Distribution of patients according to etiology of small bowel (n=22)

Indication	Etiology	Number of patients	Percentage (%)
Perforation peritonitis	Tubercular = 7 Enteric = 5	12	54.55
Intestinal obstruction	Tubercular = 2 Adhesion obstruction = 2 Others=3 (Band/Intussusception/Neoplasm)	7	31.82
Strangulated ventral hernia	–	1	4.54
Trauma	Penetrating = 1 Blunt = 1	2	9.09
Total	–	22	100.00

Anastomotic leak in exteriorized segment was seen in 20 patients. In our study, anastomotic leak was seen mainly between 3rd to 5th postoperative days which collectively constituted 85% of total suture line breakdown (Table 3).

Table 3: Distribution of patients according to postoperative day of anastomotic leak (n=20)

Postoperative day	Number of patients	Percentage
3 rd	5	25%
4 th	5	25%
5 th	7	35%
6 th	1	5%
7 th	2	10%
Total	20	100%

Mean \pm standard deviation = 4.5 \pm 1.23 days; Range = 3-7 days

Successful drop-back of exteriorized anastomotic segment was done in 3 patients (37.50%) with large bowel pathology and 7 patients (31.82%) with small bowel pathology. It was observed that in 50% of patients (n=05) drop-back was successful by 8th postoperative day.

Table 4: Distribution of patients according to postoperative day of drop-back (n=10)

Postoperative day	Number of patients	Percentage
7 th	1	10%
8 th	5	50%
9 th	2	20%
10 th	1	10%
11 th	1	10%
Total	10	100%

Mean \pm standard deviation = 8.6 \pm 1.17 days; Range = 7-11 days

Mean duration of hospital stay in patients with anastomotic leak of exteriorized segment was 11.95 ± 1.82 days. Maximum duration of hospital stay in patients with successful drop-back of exteriorized anastomotic segment was 16 days seen in 1 patient (10%), who had wound infection of the laparotomy wound. Mean duration of hospital stay in these patients was 12.7 ± 1.63 days. Table 5 & 6 illustrates hospital stay in patients with suture line breakdown (leak) and successful return of sutured bowel in peritoneal cavity.

Table 5: Distribution of hospital stay in patients with anastomotic leak (n=20)

Hospital stay (days)	Number of patients	Percentage
10	4	20%
11	6	30%
12	4	20%
13	3	15%
14	1	5%
15	1	5%
17	1	5%
Total	20	100%

Mean \pm standard deviation = 11.95 ± 1.82 days; Range = 10-17 days

Table 6: Distribution of hospital stay in patients with drop-back (n=10)

Hospital stay (days)	Number of patients	Percentage
11	2	20%
12	4	40%
13	2	20%
15	1	10%
16	1	10%
Total	10	100%

Mean \pm standard deviation = 12.7 ± 1.67 days; Range = 11-16 days

Complications were divided into those related to exteriorization and those related to interiorization or drop-back. Those related to exteriorization were anastomotic leak seen in 20 patients (66.67%) and wound infection in 2 patients (6.67%). Those related to drop-back was seen in 1 patient (3.33%) who presented with wound infection. It was managed conservatively by good antibiotic cover, regular dressings and keeping skin open which was allowed to heal by secondary intention.

Table 7 Distribution of patients according to complications (n=30)

Complications	Number of patients	Percentage
Anastomotic leak	20	66.67%
Wound infection	3	10.00%
Intra-abdominal collection/abscess	0	0
Wound dehiscence	0	0

Patients who had anastomotic leak after exteriorization of large bowel anastomosis were having hypertension in 60% (n=3), IHD (n=1) and COPD in 40% (n=2). Those patients with exteriorization of small bowel anastomosis followed by leak were seen to be having TB in 53.33% (n=8), anemia in 20% (n=3), HTN in 13.33% (n=2) and COPD and DM each in 6.67% (n=1). From the above observations, it is seen that TB, HTN, Anemia, COPD, Diabetes mellitus and IHD were the various co-morbid conditions in patients who had anastomotic leak in exteriorized segment.

Table 8: Distribution of co-morbid conditions in patients with exteriorized anastomotic segment leak

Comorbid conditions	Patients with large bowel anastomotic leak No.	Patients with small bowel anastomotic leak No.
Hypertension (HTN)	2	2
IHD+ HTN	1	1
Diabetes mellitus (DM)	–	1
Tuberculosis (TB)	–	8
Anaemia (Hb <6 gm%)	–	3
Chronic obstructive pulmonary disease (COPD)	2	1
Total	5	15

Discussion

It is seen that various etiological conditions warrant formation of intestinal stoma by virtue of their low immediate mortality and ease of performance. Stoma formation necessitates staged procedures for closure with repeated hospital admissions and prolonged hospital stay. The reported complications rate following colostomy creation ranges from 21-70%, so much so that some surgeons considered them inevitable. Parks

and Hastings (1985) reported an overall 36% complication following colostomy closure, many of which required more than one operation. Colostomy/ileostomy and staged procedure for its closure is associated with high mortality and morbidity, and is financial burden because of repeated admission and prolonged hospital stay. Exteriorized anastomosis is simple, avoids the inconvenience of stoma and can be an alternative to stoma formation wherever feasible. The principle is to undertake primary bowel repair with exteriorization of anastomosis at the first instance followed by interiorization of anastomotic segment at appropriate time in the same hospital admission. Etiology of large bowel is more or less the same in our part of world with trauma and intestinal obstruction being the leading causes. However, when etiology of small bowel is seen, perforation peritonitis and intestinal obstructions are major causes followed by trauma. The reasons for this is that diseases like abdominal tuberculosis and enteric perforations are common in our part of world as compared to western countries because hygiene is not of that standard especially in rural areas.

Successful drop-back of exteriorized segment in our study was feasible in 10 patients. Most of the studies have shown success rate of 30% to 40%, though some have reported higher success rates. Miller C Jr et al (1975) in their study noted that 8 (66.6%) patients were spared the inconvenience of colostomy and a second admission for colostomy closure in patients with colonic perforations. Our study was carried mostly on patients admitted in emergency setting. Patients usually presented late, had poor nutritional status and general reserve and in addition had other co-morbid conditions like hypertension, severe anemia, tuberculosis, COPD and diabetes mellitus.

Anastomotic leak in the exteriorized segment usually occurs between 3rd to 5th postoperative days. Successful drop-back of exteriorized anastomotic segment was possible between 7th and 11th day post surgery in our study. Beall AC Jr et al. (1971) in their study returned the exteriorized segment to the abdominal cavity in 10-14 days, if

healing appeared satisfactory. Though early drop-back of sutured colon was also shown to be successful by Dang CV *et al.* (1982).

Duration of hospital stay in patients who underwent exteriorized bowel repair followed by drop-back or fashioning of stomas was more or less the same as compared to other studies. Patients with anastomotic leak had mean duration of hospital stay of 11.95 ± 1.82 days and those with successful drop-back of exteriorized anastomotic segment had hospital stay of 12.7 ± 1.63 days. Asfar SK, Al-Sayer HM and Juma TH (2007) reported mean hospital stay of 11.5 ± 2.6 (range, 8-20) days in patients who were saved from the staged procedure of colostomy closure.

Complications are divided into those related to exteriorization and those related to interiorization or drop-back. Those related to exteriorization are anastomotic leak, serositis and wound infection. Exteriorization of anastomosis prevents the complication of intra-peritoneal suture line breakdown and avoids second surgery in those where drop-back of sutured bowel is possible. Complications related to drop-back are less severe and include wound infection etc. However, complication rates in terms of anastomotic leak are seen more frequently in patients with co-morbid conditions (hypertension, tuberculosis, diabetes mellitus, severe anaemia), gross faecal contamination, sepsis, poor nutritional status with low general reserve, higher degree of bowel injury and delay in seeking medical advice.

Conclusion

It is hard to overrule or challenge an orthodox technique or surgical dictum of stoma formation in emergency management of bowel pathologies by virtue of their immediate low mortality and ease of performance. But due to high morbidity and mortality associated with stoma formation and its staged closure, exteriorized bowel anastomosis offers substantial saving in cost, one stage surgery and overall shorter hospital stay. Nasogastric suction is encouraged to give rest to anastomosis by preventing pent up of gastro-intestinal secretions. Disruption of sutured perforation

occurred at an average of 4.5 days after operation (range 3-7 days). Early drop back of exteriorized segment after 7 to 11 days post-operatively is feasible, if suture line is healthy and usually by this time septic complications due to contamination of wound and peritoneal cavity manifest and most patients would have passed at least one bowel motion. Leak in the exteriorized anastomotic segment due to suture line break does not add any morbidity to the patient and it will function like an ordinary stoma. Complications in the setting of exteriorized bowel anastomosis lack the severity of an intraperitoneal suture dehiscence. Most of the complications of exteriorized bowel anastomosis can be prevented by liberal mobilization of bowel for exteriorization with no undue tension; anastomosis being made between healthy bowel edges with adequate blood supply and supported over soft tube and maintaining a moist environment over anastomosis by covering it with colostomy bag and saline. Wound infection can be easily managed by proper antibiotic selection, regular dressings and improving nutritional status of the patient.

In conclusion, the two classical methods that have been applied to the surgical management of bowel pathologies are colostomy/ileostomy and primary repair. A compromised approach as advocated by our study consisting of exteriorization of anastomosis with delayed interiorization combines the merits of both procedures. This technique circumvented the need of stoma in ten of our patients. Exteriorized bowel anastomosis offers shorter hospital stay, no stoma, one stage surgery and one hospital admission to the patient and thereby decreases his/her physical and psychological discomfort.

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