

Primary Repair Verses Colostomy for Colonic Injuries

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Objective: The objectives of this study are to: evaluate the role of primary repair with or without defunctioning colostomy in the management of colonic injury. identify the factors contributing to the outcome in management of colonic injuries. **Study Design:** Prospective Observational **Setting:** Surgical Unit IV, DHQ Hospital PMC Faisalabad. **Duration:** November 2001 to November 2003. **Subjects and Methods:** The patients of colonic injury presenting at one emergency day were included in primary repair group (n=20) and patient of colonic injury at next emergency day were included in colostomy group (n=20). All patients were aggressively resuscitated and investigated. Colonic injury was suspected on clinical grounds and managed according to standard protocol (*vide infra*). Associated injuries were managed accordingly. Colostomy was closed after three months and all patients were followed for six months complete record was maintained on preformed proforma. **Results:** Most patients were males and average age in both groups was 28.5 years. Fire arm injury was the top most cause of colonic injury in both groups. In both groups left colon was injured in majority of cases. Maximum time interval between injury and treatment in both groups was within 24 hours. Majority of patients in both groups had associated injuries and commonest injured viscera was small gut. The average hospital stay in primary repair group was half of that in colostomy group. Two patients (10%) in primary repair group who developed complications had right colonic injuries with moderate fecal contamination. In colostomy group ten patients (50%) developed complications majority having left colonic injury with moderate contamination. In majority of the patients who developed complications in both groups the delay was more than 6 hours. There was no mortality in either of the groups. **Conclusion:** Primary repair of colonic injuries has less morbidity and is less expensive as compared to colostomy and is ideal method of management for colonic injury in patients aggressively resuscitated with no pre existing medical illness.

Key words: Colon, injury, primary repair, colostomy

Colonic injury is still widely recognized as one of the most serious intra-abdominal disasters in civilian practice because colon is commonly injured viscera in abdominal trauma with lethal consequences of peritoneal contamination. Colon maybe injured in several ways. In civilian practice dealing with abdominal injuries, the greatest number of the injuries to the colon is the result of penetrating wounds (95%) with gun shot wounds accounting for 69% and stab wounds accounting for 31% of cases. Blunt abdominal trauma resulting from external violence as in crushing injuries accounts for 5% of cases^{1,2}. According to Flint severity of colonic injuries is divided into three grades.

Grade 1: Isolated colonic injury with minimal contamination, no shock and minimal delay in presentation.

Grade 2: Through and through perforation / laceration with moderate contamination.

Grade 3: Severe tissue loss, devascularization of colon, heavy contamination and prolonged shock³.

The micro flora of colonic contents and feces consists of variety of microorganisms and anaerobic bacteria account for 99% of fecal flora. The microorganisms are present in the order of 10^9 to 10^{10} per gram of feces. Endogenous bacterial contamination is the most consistent risk factor in the development of sepsis following colonic injury with exogenous bacterial contamination contributing in penetrating abdominal wounds. Other factors like presence of bile or blood with synergism of bacteria in

peritoneal cavity are also important in the development of infection.

If colonic injury is not treated in time it may cause generalized peritonitis, septic shock and multiple organ failure. Though immediate mortality has only been 5% but morbidity rate is as high as 50%. There has been a great controversy in the treatment of colonic injuries. Colostomy, exteriorization of injured part of colon and primary repair all have been advocated^{5, 6}. There are a number of factors that are considered to be responsible for the postoperative complications. The factors include age of the patient, number of blood transfusions required, presence of shock or associated injury, method of repair, severity of colonic injury, delay between injury and intervention, degree of fecal contamination, anatomical location of injury, mechanism of injury peritoneal lavage and use of antibiotics⁷.

The survival rate in colonic injuries dramatically increased by exteriorization of injury as a colostomy during World War II. With increasing experience colostomy was accepted as standard method of management for colonic injuries⁸.

A colostomy creates medical and social problems. Colostomy is ill managed by the patients and inconvenience of having colostomy by itself makes patient isolate from the society and workplace for prolonged periods. Patient has to be admitted in hospital many times for management of colostomy related complications and colostomy closure. Colostomy is an open source of contamination being close to main wound. Colostomy

complications maybe prolapse, retraction, stenosis of orifice, parastomal herniation, internal herniation, necrosis of distal end, secondary hemorrhage from granulomas around the margins of colostomy and colostomy diarrhea⁹. In the past two decades, there has been a move toward primary repair of colonic injury without proximal defunctioning colostomy. This has provided the avoidance of the disadvantages of colostomy but with the specific selection of patients¹⁰.

In order to evaluate the role of primary repair with or without proximal defunctioning colostomy in management of colonic injuries and factors contributing to the outcome in the two procedures, we started a prospective observational study two years ago. This study has helped us to define case selection for primary repair without colostomy as a method of treatment for colonic injuries.

Material and methods:

This study was carried out in surgical unit IV DHQ Hospital Faisalabad, over a period of two years from November 2001 to November 2003. Patients presented to us with colonic injury on one emergency day under went primary repair whereas patients of colonic injury on another emergency day under went colostomy.

The intra venous volume deficit was corrected by aggressive administration of Ringers lactate solution and cross-matched blood. All patients were catheterized and nasogastric tube passed for stomach decompression. Blood pressure, pulse and urine output were regularly monitored and output maintained between 30 to 50 ml per hour. All patients had Hb, TLC, DLC, Blood Urea-sugar, Serum electrolytes, Chest X-ray and abdominal X-rays done. Diagnosis of intraperitoneal injury was made mostly on clinical ground. Abdominal ultra sonography was done for assessment and as an aid for diagnosis in cases of blunt trauma. The preoperative antibiotics (ceftazidime and metronidazole) started immediately and continued five days post operatively. After hemodynamic stability and achieving 50 cc urine output per hour patient was taken to theatre and laparotomy performed through midline incision. A search for massive hemorrhage was made first, which was controlled by standard methods. Resection or damaged part of colon and end to end anastomosis with 3/0 polyglactin by single layer extra mucosal interrupted technique was done. In colostomy group standard technique for formation of colostomy was used. Associated injuries were dealt accordingly. Peritoneal cavity was washed with copious amount of normal saline. Abdomen was closed with no 1 monofilament, polypropylene in enmass fashion. Skin wound washed with normal saline and closed with silk 2/0. The factors related to outcome and complications of two procedures were noted and data shifted to the specially prepared proforma. Patients were followed for six months for complications of primary closure with or without colostomy. Colostomy was closed after three months using

same technique as for primary closure and ensuring distal patency and mechanical plus chemical gut preparation preoperatively.

Results:

Forty cases of colonic injury due to penetrating and non-penetrating injury were studied. 20 patients under went primary repair without defunctioning colostomy. Rest of the patients have primary repair protected by defunctioning colostomy. Average age was 28 years and majority of patients were males. Site of injury with outcome in primary repair and colostomy group is shown in tables 1 and 2 respectively. The relationship between degree of fecal contamination and complications in two groups are detailed in tables 3 and 4. Complications in association with severity of injury in two groups are detailed in tables 5 and 6. Delay in presentation with outcome in two groups is summarized in tables 7 and 8. Mechanism of injury and outcome in two groups is shown in tables 9 and 10.

Table 1: Site of injury and outcome in primary repair group

No. of patients with complication	Site of injury	Complications	%age
1	Right colonic injury	Pancreatic abscess	5
1	Right colonic injury	Infected fire arm entry wound	5

Table 2 Site of injury and outcome in colostomy group

No. of Pts. with complication	Site of injury	Complications	%age
6	Left colonic injury	<ul style="list-style-type: none"> • Internal herniation • Colostomy retraction and diffuse peritonitis • Wound infection after colostomy closure • Faecal fistula • Wound infection and incisio-nal hernia • Wound infection 	60
4	Right colonic injury	<ul style="list-style-type: none"> • Wound infection + colostomy retraction • Intestinal obstruction due to impacted hard stool at stoma • Wound infection • Wound infection and colostomy retraction 	40

Table 3 Degree of Faecal contamination and complication in primary repair group

Degree of contamination	n=	No. of patients with complication	%age
Mild	12	0	0
Moderate	8	2	25

Table 4: Degree of Faecal contamination and complication in colostomy group

Degree of contamination	n=	No. of patients with complication	%age
Mild	10	4	40
Moderate	10	6	60

Table 5: Severity of injury and complication in primary repair group

Severity of injury	n=	Patient with complications	%age
Single perforation	12	0	-
Through and through injury	8	2	25

Table 6: Severity of injury and complication in colostomy group

Severity of injury	n=	Patient with complications	%age
Single perforation	17	5	29.4
Through and through injury	3	1	33

Table 7 Time interval and outcome in primary repair group

Time interval	n=	Infective complications	%age
Less than 6 hours	1	-	-
6-12 hours	16	1	6.6
12-24 hours	3	1	33

Table 8: Time interval and outcome in colostomy group

Time interval	n=	Pts with infective complications	%age
Less than 6 hours	4	1	25
6-12 hours	12	4	33
12-24 hours	4	1	25

Table 9: Mechanism of injury and outcome in primary repair group

Mechanism of injury	n=	Pt. with complications	%age
Fire arm	12	2	16.6
Stab	8	0	0

Table 10: Mechanism of injury and outcome in colostomy group

Mechanism of injury	n=	Pts. with complications	%age
Fire arm	11	6	82
Stab	1	1	100
Iatrogenic perforation	6	3	50
Blunt abdominal injury	2	0	0

Discussion:

During the past century, the principles were continuously changing upto early 1970's the colostomy was the method of choice. But in the last two decades civilian trauma surgeons have started doing primary repair of colonic injuries because the morbidity associated with colostomy is formidable. The complications related to colostomy stoma account for the morbidity of the procedure and the social, psychological and economical burden of colostomy management is substantial. Colostomy closure is also associated with complication rate of 10-50 % and mortality rate of 4%. Many other series have shown higher incidence of complications for colostomy patients than for patients treated without it¹¹.

At our hospital patients with colonic injuries were routinely managed by colostomy. By consideration of morbidity of colostomy related complications and its cost effectiveness, we wanted to find out the safe and cheap method of treatment for colonic injuries. Different studies done by different authors recommended the primary repair of colonic injuries under strict criteria¹⁰.

In our study comparison of primary repair and colostomy was done with respect to different aspects. The average hospital stay in primary repair group is 11.3 days and that in colostomy group is 24.5 days (time of colostomy formation + time of colostomy closure). It is

comparable to hospital stay of different series. This period is less than half of the period required for treatment of patients managed by colostomy¹².

It shows that patient with colonic injury maybe manage safely with primary repair and less indoor stay, less consumption of drugs and in cost effective manner. Out of 20 patients in primary repair group no patient developed leak of suture line. No patient died due to fecal peritonitis. Two patients (10%) developed complications. One had pancreatic abscess and other developed local infection of fire arm entry wound. In colostomy group 10 patients (50%) developed complications. Four patients developed more than one complication. Morbidity in colostomy group is five times greater than that in primary repair group^{8,9}.

The intra-abdominal infection rate in our study is 5% in primary repair group and 15% in colostomy group. In both groups it is less than that in other series⁴. No patient in primary repair group had main wound infection whereas five patients (25%) in colostomy group had this complication. Different study have recorded wound infection rate of 20 to 50%. The high occurrence of main wound infection may be due to stoma close to laparotomy wound¹³.

It was a common thinking that right colonic injuries give good results if treated by primary repair and left colonic injuries should be managed by colostomy¹². In our study in primary repair group 8 patients had right colonic injury and 12 patients had left colonic injury. No patient either with right or left colonic injury developed leakage of repair.

In primary repair group, 2 patients who had complications presented with fire arm injury. In colostomy group 6 patients had colonic injury due to fire arm wounds and all developed complication. It is evident from results of both groups that colonic injury due to fire arm wound has more tendency to develop complications. It is consistent with result of other series.

Degree of fecal contamination is considered an important factor in defining the choice of procedure for managing colonic injuries⁴. In our study 2 out of 8 patients with moderate contamination developed infective complications. In colostomy group 1 patient with moderate fecal contamination developed diffuse peritonitis and 4 patients with same degree of contamination developed infection of main laparotomy wound. So it apparent that increased severity of fecal contamination increases the rate of infective complications. The safe time interval between injury and definitive procedure is 6-8 hours⁶. In our study in primary repair group, 1 patient who developed intra abdominal abscess had 12 to 24 hours delay between injury and intervention. One patient who developed infection of fire arm entry wound had 10 hours delay. In colostomy group two patients who developed main wound infection and diffuse peritonitis respectively had 12 to 24 hours delay in presentation. Three patients who developed

main wound infection had 6 to 12 hours time interval between injury and definitive procedure. A prolonged time duration permits significant inflammation induced by colonic organisms and peritonitis sets in leading to infective complications⁴.

It is clear from the results that all patients in colostomy group had to admit in hospital twice for colostomy formation and colostomy closure. Patients with primary repair had less morbidity. This method of treatment is cheaper than colostomy and more economically suitable for our poor society.

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