

Study of different type of the management of patients in cases of traumatic colorectal injury in tertiary hospital in West Bengal



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Submission: 06-03-2022

Revision: 29-04-2022

Publication: 01-06-2022

ABSTRACT

Background: Although the treatment strategy for colorectal trauma has advanced during the last part of the 20th century and the result has improved and compared to other injuries and problems, such as high septic complication rates and mortality rates, still exist, so standard management for colorectal trauma is still a controversial issue. **Aims and Objectives:** This study aims to determine the factors that affect morbidity and mortality in colon and rectum injuries. **Materials and Methods:** This study was prospective cohort study. The study was conducted at Burdwan Medical College and Hospital, West Bengal from May 2019 to October 2020 including 80 patient of trauma over abdomen. Thorough history taking and clinical examination were done. Template was generated in MS Excel sheet and analysis was done on statistical package for the social sciences software. **Results:** Among 80 patients, the majority of the patients were in the age group of 21–30 years (45%). Majority 69 patients (86.25%) were males and 11 patients (13.75%) were females. Gunshot wounds were found in maximum 41 (51.3%) and stab wounds in 27 (33.7%). Colon was injured in 68 (85%) patients and the rectum in 12 (15%) patients. CIS Grade 1, 2, and 3 was observed in 69 (86.3%) patients. Primary repair was performed in 45.0% (36) patients. Resection and anastomosis management was given to 32 (40.0%) patients. **Conclusions:** If colorectal injuries are not treated appropriately, severe complications leading to death may be induced; nonetheless, controversy still exists concerning the standard treatment. In this regard, unnecessary proximal diversions should be avoided.

Key words: Colorectal trauma; Colon trauma; Rectal trauma; Colon injury; Rectal injury

Access this article online

Website:

<http://nepjol.info/index.php/AJMS>

DOI: 10.3126/ajms.v13i6.43659

E-ISSN: 2091-0576

P-ISSN: 2467-9100

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INTRODUCTION

Colorectal injuries are rare in blunt trauma patients and are associated with increased mortality. These injuries constitute 1% of all trauma patients.¹ Most colorectal injuries occur following penetrating trauma and injury from blunt trauma is uncommon.² The mortality associated with colonic trauma has decreased considerably over the past half century; from 40% to 1–3% during the World War II over the past several decades.³ Common post-operative complications include systemic complications such as pneumonia, sepsis, and complications specific to abdominal

surgery such as surgical site infection, intra-abdominal abscess, and abdominal sepsis.⁴

Colon injury is common and occurs in about a half of patients with penetrating hollow viscus injuries. Operative management of penetrating colon injury, there remains discussion regarding the appropriate treatment of destructive colon injuries, with a significant amount of segmental resection with primary anastomosis in most patients without comorbidities or large transfusion requirement. Although the literature is concerning the management of blunt colon injuries, some studies have

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shown operative decision based on an algorithm originally defined for penetrating wounds should be considered in blunt colon injuries. Damage control surgery is controversial in colorectal injury.

The diagnosis of colon injury is based on physical examination findings of abdominal tenderness or peritoneal signs and relies heavily on computed tomographic (CT) evaluation. The sensitivity and specificity of contrast CT scan are found to be 97 and 98%, respectively, in diagnosing intra-abdominal organ injuries requiring surgical intervention.⁵ The diagnosis of colon injury after blunt trauma can be challenging since physical examination is not accurate in detecting hollow viscus injury. Although contrast CT scan has played major role for diagnosis of blunt colon injury.

Staging of the severity of injury is necessary for the management of trauma and as well as a basic requirement for clinical trials.⁶ Trauma scoring systems try to translate the severity of injury into a number. The scores enable physicians to translate different type of severity of colorectal injuries into a common language.⁷ Quantitative characterizations of injury are essential for research and meaningful evaluation of patient outcome, quality improvement, and prevention programs.^{7,8} For this purpose, many anatomical and physiological scoring systems are created.⁹ There are around 50 scoring systems published for the classification of trauma patients.⁷ Some of these scoring systems are new injury severity score, AIS, ISS, GCS, RTS, and TRISS.¹⁰ The aims of the study were to determine the factors that affect morbidity and mortality in colon and rectum injuries related to trauma, to utilize trauma scoring systems for predicting mortality and morbidity.

Aims and objectives

By keeping in view, this study was designed to evaluate site and severity of injury, to evaluate various modes of investigation to detect colon and rectal injury and to determine rate of morbidity and mortality among conservative management, proximal fecal diversion, primary repair, and anastomosis.

MATERIALS AND METHODS

The prospective cohort study was conducted in Burdwan Medical College and Hospital, West Bengal. Eleven patient of trauma over abdomen with imaging proved admitted in outpatient and emergency Department of General Surgery, Burdwan Medical College and Hospital. The study was conducted from May 1, 2019 to October 1, 2020. Sample size was calculated 80.

Methods of collection of data

After admission of abdominal trauma patients in surgery Department of Burdwan Medical College and Hospital, data were collected by direct interview with patient or patient relatives accompanying the patient and obtaining a detailed history, through clinical examination and clinical sing and relevant investigation are performed over the patient.

Inclusion criteria

Patients presenting with history of trauma by sharp or blunt objects over abdomen and blunt trauma abdomen. Road traffic accident with abdominal injury, history of fall from height, injuries occurring by sharp instruments such as stab injury and bullet injury, pelvic injury, iatrogenic injury of colon and rectum, patients with solid organ and mesenteric injury associated with colon and rectum were included in the study.

Exclusion criteria

Age group: <12 years and more than 60 years and pregnancy were excluded from the study.

Study tools

Study tools used were OPD tickets, indoor bed head tickets, history and clinical examination notes of the study population.

Method of statistical analysis

Data were processed and analyzed statistically using computer program statistical package for the social sciences. Qualitative data were analyzed using percentage and the statistical significance was accepted if $P < 0.05$.

Data variables include mode of colonic trauma, site of colonic trauma, severity of injured colon using the Flint scale and the colon injury scale (CIS) of the American Association for the Surgery of Trauma (AAST) in 1990, the degree of fecal contamination, the presence of shock, the need for blood transfusion, time from trauma to surgery, surgical treatment done, and the outcome. Fecal contamination was defined as minimal if there was spillage confined to the immediate area around the injury, moderate when spillage was confined to one quadrant of the abdomen, and major if fecal contamination was found in more than one quadrant.

Ethical clearance

Ethical clearance and approval for conducting this study were obtained from the Ethical Committee of Burdwan Medical College and Hospital. Informed verbal consent was obtained from the patients participating in this study after full explanation of the study objectives.

RESULTS

This prospective cohort study was conducted in Burdwan Medical College and Hospital, West Bengal from May 2019

to October 2020. During the period, 80 patients presenting with history of trauma by sharp or blunt objects over abdomen and blunt trauma abdomen based were included in the study as per inclusion criteria.

The majority of the patients were in the age group of 21–30 years (45%), followed by 31–40 years (21.25%), 41–50 years (16.25%), and 12–20 years (11.25%). The least common age group was 51–60 years (6.25%). About 11 patients (13.75%) were females and 69 patients (86.25%) were males (Table 1).

Gunshot wounds were found in maximum 41 (51.3%) and stab wounds in 27 (33.7%). Road traffic accident was seen in 8 (10%) of the patients and 4 (5.0%) inflicted injuries of other causes. Regarding site of injury the colon was injured in 68 (85%) patients and the rectum in 12 (15%) patients (Table 2).

The majority of the patients with colorectal injuries had Flint Grade 1 and 2 injuries (86.3%). About 11 (13.7%) patients had Flint's Grade 3. CIS Grade 1, 2, and 3 was observed in 69 (86.3%) patients while Grade 4 and 5 is seen in 11 (13.7%) patients. About 61 (76.25%) patients had accompanying additional organ injuries. Primary repair was performed in 45.0% (36) patients. Resection and anastomosis management was given to 32 (40.0%) patients

Table 1: Distribution of study participants according to the age and gender

	Frequency	Percentage
Age (years)		
12–20	9	11.25
21–30	36	45.0
31–40	17	21.25
41–50	13	16.25
51–60	5	6.25
Total	80	100.0
Gender		
Male	69	86.25
Female	11	13.75
Total	80	100.0

Table 2: Distribution of study participants according to the mechanism of injury and site of injury

	Frequency	Percentage
Cause		
Gunshot wound	41	51.3
Stab wound	27	33.7
RTA	08	10.0
Others	04	5.0
Total	80	100.0
Site		
Colon	68	85.0
Rectum	12	15.0
Total	80	100.0

and 12 (15.0%) patients underwent proximal fecal diversion management (Table 3).

The total complication rate for patients with colonic injury requiring primary repair, resection and anastomosis, and proximal fecal diversion management was 67.5%, 21.3%, and 11.3%, respectively. Considering colorectal injury the patient who underwent primary repair, 86.1% of them were discharged in a good condition and the mortality rate was 1 (2.8%); and for the patients with resection and anastomosis and proximal fecal diversion management, the mortality rate was 21.9% and 8.3%, respectively. The highest prevalent of mortality rate was found in resection and anastomosis management. Chi-square value -8.7331 $P = 0.012$ (S), it was significant correlation between three groups (Table 4).

Uneventful, morbidity, and mortality with respect to type of management, we have found statistically significant difference in between two groups primary repair versus resection and anastomosis ($P < 0.05$) (Table 5).

DISCUSSION

The colon is the second most frequent organ injured in penetrating abdominal trauma after the small bowel.¹¹ Colorectal injuries remain a challenge associated with significant morbidity. Surgeons must be familiar with a variety of the treatment options as well as risk factors for complications. Hence, the present study was conducted on 80 patients of trauma over abdomen with imaging proved and admitted in outpatient and emergency Department of General Surgery, Burdwan Medical College and Hospital during the study period to determine rate of morbidity and mortality among various modes of investigation.

Table 3: Distribution of study participants according to flint grade, CIS grade, associated organ injuries, and mode of management

	Frequency	Percentage
Flint grade		
Grade 1 and 2	69	86.3
Grade 3	11	13.7
Total	80	100.0
CIS Grade		
Grade 1, 2, and 3	69	86.3
Grade 4 and 5	11	13.7
Total	80	100.0
Associated organ injuries		
Present	61	76.25
Absent	19	23.75
Total	80	100.0
Mode of management		
Primary repair	36	45.0
Resection and anastomosis	32	40.0
Proximal fecal diversion	12	15.0
Total	80	100.0

Table 4: Distribution of study participants according to the mortality and morbidity with respect to type of management

Outcome	Primary repair (36)	Resection and anastomosis (32)	Proximal fecal diversion (12)	Total
Uneventful	31 (86.1%)	14 (43.8%)	09 (75.0%)	54 (67.5%)
Morbidity	4 (11.1%)	11 (34.4%)	2 (16.7%)	17 (21.3%)
Mortality	1 (2.8%)	7 (21.9%)	1 (8.3%)	9 (11.3%)
Chi-square	Chi-square value – 8.7331 P – 0.012 (S)			

Table 5: Statistical analysis of different variables

P-value (statistical analysis by EpiCal 2000 software)			
Uneventful	Primary repair	31 (86.1%)	0.0003
	Versus	14 (43.8%)	
	Resection and anastomosis		
Morbidity	Primary repair	31 (86.1%)	0.327
	Versus	9 (75.0%)	
	Proximal fecal diversion		
Mortality	Resection and anastomosis	14 (43.8%)	0.065
	Versus	9 (75.0%)	
	Proximal fecal diversion		
Uneventful	Primary repair	4 (11.1%)	0.023
	Versus	11 (34.4%)	
	Resection and anastomosis		
Morbidity	Primary repair	4 (11.1%)	0.498
	Versus	2 (16.7%)	
	Proximal fecal diversion		
Mortality	Resection and anastomosis	11 (34.4%)	0.219
	Versus	2 (16.7%)	
	Proximal fecal diversion		
Uneventful	Primary repair	1 (2.8%)	0.019
	Versus	7 (21.9%)	
	Resection and anastomosis		
Morbidity	Primary repair	1 (2.8%)	0.496
	Versus	1 (8.3%)	
	Proximal fecal diversion		
Mortality	Resection and anastomosis	7 (21.9%)	0.273
	Versus	1 (8.3%)	
	Proximal fecal diversion		

The age of the patients with colonic injury was ranged from 12 to 60 years. The mean age was 28.4 years and 86.25% of patients were males, the mean age is slightly less than other studies.¹²

The most common cause of injury was gunshot wounds found in maximum 41 (51.3%) and stab wounds in 27 (33.7%). Road traffic accident was seen in 8 (10%) of the patients and 4 (5.0%) inflicted injuries of other causes, this in support to what had been reported by many authors.^{12,13} Georgoff et al., reported an incidence of 91.8%.¹⁴

In the study by Ng et al., that evaluated 1367 patients with blunt trauma, they found the incidence of colorectal injury to be 0.1%.¹⁵ Similarly, Carillo et al., found the incidence of colorectal injury to be 0.5% following blunt trauma.¹⁶

Many classification systems of colon injuries have been established to facilitate clinical research and have a uniform system of reference. The PATI was published in 1981 and

was designed to access the degree of injury to all abdominal organs and to predict the risk of post-operative complications. For all injuries, a score of 25 is the cutoff above which there is a dramatic increase in post-operative complications, especially septic complications. Flint et al.,¹⁷ in 1981 developed the Flint Grading Scale for colon trauma. Grade 1 injuries are isolated colon injuries with minimal contamination, minimal delay in operation, and minimal shock. These injuries are generally all managed with primary repair. Grade 2 injuries are through-and-through perforations or lacerations with moderate contamination and possible associated injuries. Grade 3 injuries have severe tissue loss, devascularization, heavy contamination, and can have profound shock. The management of Grade 2 and 3 injuries is more widely debated than for Grade 1.¹⁸

In our study, the majority of the patients with colorectal injuries had Flint Grade 1 and 2 injuries (86.3%). About 11 (13.7%) patients had Flint's Grade 3.

The AAST CIS was established in 1990 to develop objective criteria for the classification of the severity of the injury and to enable the reliable comparison of results.¹⁹ Injuries are classified as Grades 1–5 with Grade 1 injuries being partial thickness injuries without perforation or hematoma and Grade 5 being transection of the colon with segmental tissue loss or a vascularized segment of colon. Destructive and non-destructive colon injuries are terms used in the literature based on the two former classification schemes.²⁰ CIS Grade 1, 2, and 3 was observed in 69 (86.3%) patients while Grade 4 and 5 is seen in 11 (13.7%) patients.

The wide variations in the results of surgical treatment of colon injuries are probably due to the presence of other types of injuries that are not included in present classification systems, for example, Busic et al., mentioned the presence of multiple injuries in the colon and managed them on individual basis.²¹

Regarding mode of management in the present study, primary repair was performed in 45.0% (36) patients. Resection and anastomosis management was given to 32 (40.0%) patients and 12 (15.0%) patients underwent proximal fecal diversion management.

The total complication rate for patients with colonic injury requiring primary repair, resection and anastomosis, and

proximal fecal diversion management was 67.5%, 21.3%, and 11.3%, respectively. Considering colorectal injury the patient who underwent primary repair, 86.1% of them were discharged in a good condition and the mortality rate was 1 (2.8%); and for the patients with resection and anastomosis and proximal fecal diversion management, the mortality was 21.9% and 8.3%, respectively. The highest prevalent of mortality rate was found in resection and anastomosis management. Chi-square value – 8.7331 P – 0.012, it was significant correlation between three groups.

Uneventful, morbidity, and mortality with respect to type of management, we have found statistically significant difference in between two groups primary repair versus resection and anastomosis ($P < 0.05$).

In a multicenter prospective study conducted with 297 patients in the years after 2000 by Demetriades *et al.*, two-thirds of the destructive injuries requiring resection were treated with primary repair; colon-related mortality was found to be significantly lower in the primary repair group (0% and 4%, $P = 0.012$) and no difference was observed in terms of colon-related complications (22% and 27%, $P = 0.373$).⁴ In the study by Miller *et al.*, while 153 patients (73%) without destructive injuries had primary suturing performed, of the 56 patients with destructive injuries, 40 (19%) had resection and anastomosis, and 16 (7.6%) had stomas.²²

Limitations of the study

The limitation of our present study is that it was conducted in a single centre including 80 patient of trauma over abdomen. Therefore, further studies should be conducted with bigger sample sizes and hospitals in rural and urban area.

CONCLUSIONS

If colorectal injuries are not treated appropriately, severe complications leading to death may be induced; nonetheless, controversy still exists concerning the standard treatment. In this regard, unnecessary proximal diversions should be avoided.

The treatment method should be selected based on considerations of diverse risk factors, such as the injury mechanism, the severity of injury, the general condition of the patient, the interval from injury to surgery, whether or not vital signs are stable, whether or not excessive transfusion was needed, the level of fecal contamination, and associated organ injuries. In other words, the therapy for each colorectal injury should be individualized.

Patients whom were managed with resection and anastomosis were found to have higher morbidity and mortality than those whom were managed with primary repair, so colostomies did not reduce the morbidity and mortality. Primary repair is the main approach in colonic repair. In the absence of shock, associated injuries, or gross fecal soiling, primary repair may be considered.

ACKNOWLEDGMENTS

The authors would like to acknowledge the patients who participated in this research study.

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

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CB and SKS involved in the diagnosis and management of the cases. SH did the literature search. SH and KKP wrote the manuscript.

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Source of Support: Nil, **Conflict of Interest:** None declared.