

A Retrospective Study on Intestinal Injury from Blunt Abdominal Trauma.

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Abstract

Introduction: Blunt abdominal trauma is the primary cause of morbidity and mortality. Suppose there are no indications of external trauma or changes in the patient's vital signs; blunt abdominal injuries might be complicated to identify at first. It is possible to lose a significant amount of blood without the abdomen appearing significantly different. A direct blow from blunt trauma can result in visceral damage and solid organ rupture, which can cause hemorrhage, peritonitis, and related pelvic injuries. The liver, small bowel, and spleen are the most frequently injured organs.

Objectives: To find out the etiology, manifestation, anatomical distribution, diagnostic method, management, and outcome of intestinal injuries from blunt abdominal trauma.

Material and Methods: About 59 individuals who had laparotomies during a 3-year period to treat intestine damage from traumatic abdominal trauma were included in the research. In a retrospective analysis, the patients' causes, presentations, anatomical distributions, diagnostic techniques, related injuries, courses of therapy, and deaths were all examined.

Results: About 59 individuals with 60 significant bowel and mesentery lesions from blunt abdominal trauma were conducted. The average age was 36.78 years, and the male-to-female ratio was 5.5: 1. About 60 people sustained severe injuries. Furthermore, there were 50 minor intestinal injuries, which included 48 perforations, 12 major seromuscular injuries, and seven mesenteric, eleven colonic, and one duodenal injury. Thirty-three individuals suffered injuries from automobile incidents. The most frequent damage was a perforation at the small bowel's antimesenteric boundary. For colonic perforations, treatment included protective colostomy after resection, anastomosis, and perforation repair. There were 2 (3.38%) documented fatalities, and 10 (16.9%) individuals experienced significant problems.

Conclusion: Due to its enormous infectious potential, early detection of intestinal injuries following severe abdominal trauma is crucial, even if it might be challenging. Severe injuries are frequently linked to intestinal perforations and are likely the deciding factors in survival.

Keywords: intestinal injury, abdominal trauma, external trauma

Introduction:

Among all age groups, blunt abdominal trauma is the primary cause of morbidity and mortality. Suppose there are no indications of external trauma or changes in the patient's vital signs; blunt abdominal injuries might be complicated to identify at first. It is possible to lose a significant amount of blood without the abdomen appearing significantly different. A direct blow from blunt trauma can result in visceral damage and solid organ rupture, which can cause hemorrhage, peritonitis, and related pelvic injuries. The liver, small bowel, and spleen are the most frequently injured organs. One type of crush injury that can have a recognizable seatbelt pattern of bruising is shearing damage brought on by incorrectly fastened seatbelts [1].

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Severe intraabdominal pathology can be challenging to identify. Several causes of blunt trauma can result in intestinal disruptions, but car accidents are the most frequent aetiologic agent.[2] In urban settings, penetrating abdominal injuries are more common than blunt ones, which are more common in rural regions. [4] Stabbing and gunshot wounds are two subtypes of penetrating abdominal trauma that need distinct treatment approaches. [5] Risk factors for death must be rigorously identified and investigated in order to reduce mortality in cases of abdominal trauma. Numerous risk variables, such as sex, the amount of time that passes between an abdominal injury and operation, shock at the time of admission, and brain damage, have been established in recent years by research [3].

This study identifies the experiences with blunt intestinal injuries in a teaching hospital in Puducherry, India.

Methodology:

This retrospective study was carried out in a private medical college in Puducherry. During the last 3(2020-2022) years, about 59 of the 284 patients who were admitted for blunt abdominal trauma had laparotomies to treat their intestinal and mesenteric injuries. We included all the patients who had blunt abdominal injuries. We excluded those who had mesenteric injuries without bowel ischemia or serosal tears that did not require resection. After obtaining ethical approval, the patient's age, sex, injury cause, presentation, location, related injuries, treatment, mortality, and morbidity were all examined in this retrospective study. Our study categorized the injury into two main types: major and minor. Significant injuries included: 1) bowel perforation or transection, 2) ischemic bowel caused by a mesenteric injury that necessitated resection, and 3) seromuscular bowel wall injuries that also required resection.

Results:

Over three years, 284 individuals with traumatic abdominal injuries were hospitalized; 78 of those patients needed laparotomies. Major intestinal and mesentery injuries were present in 59 individuals. The mean age was 36.78 years. Table 1 displays the distribution of study participants as per their age group. There were 50 men and 9 women, or a 5.5:1 male-to-female ratio.

Age (in Years)	Male	%	Female	%	Total	%
Below 20	4	6.78	0	-	4	6.78
20-30	11	18.64	1	1.69	12	20.34
30-40	23	38.98	6	10.17	29	49.15
40-50	9	15.25	0	-	9	15.25
50-60	2	3.39	2	3.39	4	6.78
60 Above	1	1.69	0	-	1	1.69
Total	50	84.75	9	15.25	59	100.00

Table 1. Age and Sex distribution of Patients with Intestinal Injury from Blunt Abdominal Trauma

Most of our study participants (about 33(56%) cases included motor incidents on the roads. Various accidents caused the remaining cases. (Fig-1)

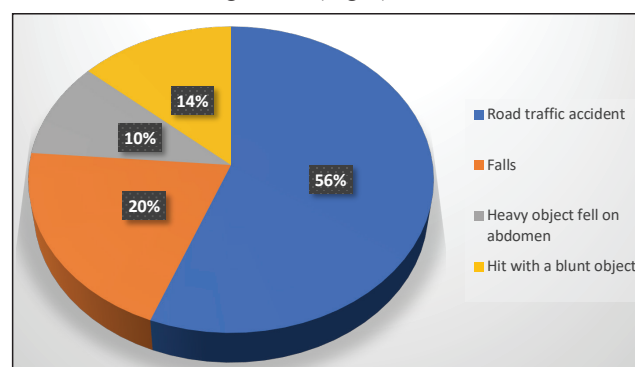


Figure 1 Mode of Injury

Plain abdomen and chest radiography revealed free peritoneal air in 22 of the 28 individuals with 36 intestine perforations. For five cases, ultrasonography was recommended. Based only on clinical findings, laparotomies were performed on the remaining patients. Pneumoperitoneum was only discovered in films taken 12 hours after the injury in 7 patients for whom the first film obtained within 6 hours after the injury was adverse. In ten cases, the laparotomy was postponed for more than twenty-four hours because the injuries were not seen at the first evaluation. 17.3 ± 21.5 hours was the mean time from admission to laparotomy. About 59 individuals suffered 60 significant injuries. In addition, there were 50 minor intestine injuries, comprising seven mesenteric, 11 colonic, and one duodenal injury, including 12 significant seromuscular injuries and 38 perforations. Table 2 displays the anatomic location of the injuries.

Site	Number				Total	%
	Perforation	%	Serosa injury	%		
Duodenum	2	4	0	0	2	4
Close to DJ junction	13	26	4	8	17	34
Close to jejunoileal junction	8	16	2	4	10	20
Close terminal ileum	12	24	3	6	15	30
Scattered	3	6	3	6	6	12
Total	38	76	12	24	50	100

Table 2 Anatomic Location of Small Intestinal Injuries

About 18 patients, or 30.5%, had associated injuries (Table 3). The liver was mainly injured by intra-abdominal trauma. In this study, patients who had acute abdominal trauma were more likely to have splenic injuries, whereas those who had intestinal injuries were more likely to have liver damage. The skeletal system accounted for the majority of extra-abdominal injuries.

Site	No. of patients
Intra-abdominal	8
Liver	6
Pancreas	2
Extra-abdominal	9
Skeletal	7
Facio maxillary	2
Intra + extra abdominal	1
Liver + skeletal	1

Table 3 Associated Injuries

There were three duodenal perforations among the 38 small intestine perforations. D4 was involved in a grade II injury. Gastrojejunostomy, feeding jejunostomy, and perforation repair were used to treat the duodenal perforation. Resection and anastomosis were necessary for the three isolated holes and the many perforations. Primary closure was used to treat the others. Resection and anastomosis were necessary to treat the significant seromuscular damage in the small intestine. The two holes in the colon had primary repair. Resection and anastomosis were necessary for the seromuscular injuries in the ascending colon, exteriorization and resection were done for the transverse colon, and resection and anastomosis with a protective colostomy were done for the sigmoid colon. The mesenteric damage necessitated anastomosis and resection.

About Ten individuals (16.9%) experienced significant problems (Table 4). The table does not include minor issues such as prolonged ileus, chest infection, and wound infection. Between the 59 patients, there were two fatalities. The percentage of deaths was 3.38%. In addition, both of the patients exhibited intra-abdominal organ damage. Two passed away right after the operation. The substantial blood loss brought on by the related organ damage was the reason for the immediate postoperative fatalities. After two weeks, the third patient, who also experienced anastomotic leaking, passed away.

Discussion:

There are two main ways that injuries to the intra-abdominal structures can be categorized: compression and deceleration forces.[6] Direct strikes or external compression against a fixed object (such as a lap belt or the spinal column) can cause compression or concussive forces. These pressures can rupture hollow organs by deforming them and momentarily raising intraluminal pressure. Deceleration forces cause stretching and linear shearing between relatively fixed and free objects. Bowel loops can cause thrombosis and mesenteric tears as they move from their mesenteric attachments, which can lead to splanchnic vessel injuries. Identifying these lesions early on can be challenging, regardless of the mechanism. Bowel injuries that go unnoticed can be hazardous due to their high potential for infection.

The first documented example of intestine rupture resulting from forceful trauma in America was documented by Annan in 1837 [7]. According to previous research, these injuries are typically encountered in younger age groups and are typically the result of automobile accidents [7, 8]. Similar findings were found in the current investigation. In this study, 20.7% of patients who had forceful abdominal trauma also had intestinal damage. The intestine is the third most often damaged abdominal organ in blunt trauma, with a rate of 5–15%, which is in line with other series' findings. [9, 10]. In this study, most patients had symptoms of distension, soreness, and discomfort in the abdomen. However, the characteristics were hazy during the first inspections and were unclear until many abdominal exams. Morbidity increases with delayed presentation or significant intestinal leaking into the peritoneal cavity. Other research has also reported on this [11].

The small intestine was the most frequently damaged organ in this investigation, as in previous ones [11, 12]. In this investigation, the proximal jejunum and distal ileum were shown to be more susceptible to perforation. This has also been noted in previous publications [13, 14]. However, some research has refuted this theory [15]. In research involving sixty patients, Dauterive et al. discovered that less than half of the perforations happened in these zones [7]. However, his research indicates that mesenteric injuries happen more frequently at these locations. The current study found similar outcomes. Minor intestine injuries were more common than colonic injuries. Other research has

Complications	No of patients	Procedure done	Outcome
Anastomotic leakage	3	Laparotomy + exteriorization	Survived
Anastomotic leakage + pelvic abscess	2	Laparotomy + abdominal drainage + exteriorization	Survived
Anastomotic leakage	1	-	Expired
Intra-abdominal abscess	1	Laparotomy + drainage	Survived
Burst abdomen + intra-abdominal abscess	3	Laparotomy + drainage + closure	Survived

Table 4 Major Complications

also reported this [7, 8, 9]. This is primarily because of its location and the absence of redundancy, which keeps closed loops from forming.

Patients with blunt abdominal trauma can be assessed using diagnostic testing. These consist of diagnostic laparoscopy (DL), computed tomography (CT), diagnostic peritoneal lavage (DPL), and ultrasonography (US). Ultrasonography is inexpensive, non-invasive, and handy. Evidence of free fluid or solid organ parenchymal damage is what is referred to as a positive test [16]. In the past, DPL was the preferred diagnostic technique for assessing blunt abdominal injuries, but CT imaging has recently taken its place often [17]. When intestinal damage is suspected, DPL is a crucial adjuvant [18]. The heightened incidence of non-therapeutic laparotomy linked with DPL has been criticized despite its sensitivity in detecting hemoperitoneum and related hollow viscus damage [19].

Extraluminal air and contrast extravasation on CT scans results in diagnostic results for intestinal damage. The presence of free fluid without solid organ damage and slight bowel thickening and dilatation are nondiagnostic but suggestive findings [20]. The presence of peritoneal fluid in the absence of apparent solid organ damage is a significant indicator of bowel damage, as several investigations have confirmed [21, 22]. Small intestinal perforation may be diagnosed with CT with a 92% sensitivity and 94% specificity [20].

Laparoscopy's primary function in blunt abdominal trauma cases is diagnostic. Reports regarding therapeutic laparoscopy and the healing of intestinal perforations have surfaced in recent years [23]. When a patient has acute abdominal trauma and is hemodynamically stable, laparoscopy is a safe and efficient way to identify intestinal damage. The best prognosis is provided by prompt surgical intervention and early identification of these lesions.[24]

In terms of treatment, saline lavage of the wound, drainage of septic peritoneal fluid, and exploratory laparotomy are crucial. Preventive antibiotics are necessary [25]. For a single small intestinal hole, simple closure is generally sufficient; however, resection and anastomosis are typically necessary for more significant injuries, such as numerous perforations and gangrene from mesenteric lesions. Large bowel injuries, especially in the left colon, could need stoma formation [11].

In this study, the death rate was 3.38%. The reported death toll from blunt intestinal damage is between 10 and 30 percent [7]. The reduced mortality in this research was most likely brought about by the lower incidence of related injuries compared to prior investigations. According to reports, the number of related injuries is correlated with an increase in mortality [11, 26].

Conclusion:

The study concluded that early detection and intervention are critical. The most common injury is a hole in the small intestine's antimesenteric border, occurring more often in the small intestine than in the colon. Associated injuries frequently determine one's chance of surviving.

COI Statement: This paper has yet to be submitted in parallel, presented fully or partially at a meeting, podium, or congress, published, or submitted for consideration beforehand.

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