

# A Clinical Study of Blunt Trauma Abdomen in a Tertiary Care Hospital of Uttarakhand

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## Abstract

**Background:** Blunt abdominal injuries are met more often nowadays due to increased industrialization and a greater number of vehicles, and is the third most common form of injury in road traffic accidents (RTAs) after orthopedic injuries and head injuries. Blunt injury to the abdomen can also occur as a result of fall from height, assault with blunt object and sports injuries, etc. Blunt trauma abdomen is seen in increasing number in the emergency department and therefore, the early diagnosis and treatment are very important and crucial for patients.

**Methods:** The study was carried out from January 2018 to December 2019. A total of 100 patients were studied. After detailed clinical history, physical examination various investigations such as complete blood count, X-rays, ultrasound of the abdomen, and computed tomography scan of the abdomen were done to complete the diagnosis. Then, data were statically analyzed.

**Results:** In our study, male patients were commonly affected (73%). The younger population between the age group of 18 and 40 years was predominantly affected (73%). The common mode of injury was RTAs (62%). The organ that was found to be most commonly injured in our study was the liver (27%) than spleen (22%). About 59% patients were managed conservatively while 41% were operated. The most common cause of death was cardiorespiratory failure followed by septicemia.

**Conclusions:** This research article shows that blunt injury abdomen is a major cause of morbidity and mortality in young age patients with RTA being the most common cause. Patients that are received in the emergency department should be given immediate attention and a quick and thorough evaluation of the patient must be done. Early diagnosis reduces the mortality rates and plays a major role in good outcome and lead to successful treatment in these patients.

**Key words:** Blunt trauma abdomen, Trauma, Liver, Spleen, Early diagnosis, Road traffic accidents

## INTRODUCTION

Abdominal trauma continues to account for a large number of trauma-related injuries and deaths. Abdominal trauma due to a blunt force is a common presentation in the emergency room and is the leading cause of mortality and morbidity in children and adults.<sup>[1]</sup> Blunt injury to the abdomen can also occur as a result of fall from height, sports injuries, assault with blunt objects, industrial mishaps, fall from riding bicycle, and bomb blasts.<sup>[2]</sup> World over injury

is the seventh cause of death rate and abdomen is the third most common injured organ and the injury can be either blunt or penetrating. Blunt abdominal trauma is one of the most common injuries among various injuries caused due to road traffic accidents (RTAs).<sup>[3]</sup> Rapid resuscitation is necessary to save the unstable but salvageable patient with abdominal trauma.<sup>[4]</sup> Due to the delay in diagnosis and inadequate treatment of the abdominal injuries, most of the cases are fatal. Hence, accurate diagnosis and avoidance of needless surgery are an important goal of evaluation.<sup>[5]</sup> Surgery is required in about 25% of the civilians who suffer abdominal injury.<sup>[6]</sup> Motor vehicle accidents account for 75% of cases of blunt abdominal trauma. Unrecognized intra-abdominal injury remains distressingly frequent cause for preventable death in a patient with blunt injury abdomen.<sup>[7]</sup> Blunt injuries are often missed as the clinical signs are less obvious. Blunt abdominal injuries can damage

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the liver, spleen, pancreas, bowel, and intestines and may result in bleeding or contusions. Some of the risk factors determining the mortality rates are sex, age, and the interval between the time of injury and management. In view of increasing number of vehicles and consequently RTAs, this research has been chosen to study the cases of blunt abdominal trauma with the aim, to evaluate the incidence of blunt injury abdomen, clinical presentation, morbidity, and mortality in tertiary care center in Uttarakhand.

## MATERIALS AND METHODS

This study was conducted in the Department of Surgery, Doon Government Medical College, Dehradun, Uttarakhand. The duration of this study was from January 2018 to December 2019. This study was conducted on the 100 subjects who sustained abdominal injury. Patients who sustained blunt abdominal trauma were admitted and managed in hospital. After physical examination, detailed clinical history, X-rays, and laboratory tests, ultrasonography was done to arrive at the diagnosis. Demographic data collected including the age, sex, occupation, and nature and time of accident leading to the injury.

### Inclusion Criteria

Patient age >18 years, admitted with the history of blunt abdominal trauma, RTA with suspected blunt abdominal injury, findings such as diagnostic peritoneal lavage or hemoperitoneum on Focussed Assessment with Sonography for Trauma (FAST), blunt trauma abdomen in sports injury, uncontrolled shock or hemorrhage, history of accidental fall from height, story of fall of the heavy object over the abdomen, undergoing surgical intervention, or treated by non-operative management were included in the study.

### Exclusion Criteria

Patients with penetrating, gunshot injuries, stab, and patients of the pediatric age group were excluded from the study.

### Statistical Analysis

The collected data were numerically coded and entered into Microsoft Excel 2010 and statistically analyzed. Socio-demographic pattern, mode of injury, and organs involved in patients who sustained blunt injury abdomen variables data were analyzed using descriptive statistics such as frequencies and percentages assessment.

## RESULTS

In the current study, the total number of patients who had blunt injuries to abdominal organs was 100. Our

study showed, maximum patients were male 73 (73%) and 27 (27%) were female. Male to female ratio was 3:1, and maximum of cases was in the 26–40 age group (54%), followed by 41–60 years group (23%), mean age was 39 years [Table 1].

From Table 2 in the study, author found the common cause of blunt trauma to the abdomen was RTA, i.e., 62 (62%) and the second common cause was fall from height (22%). Other causes were hit by blunt objects and assaults, i.e., 16 (16%).

The most common clinical presentation was pain abdomen (87%) followed by abdominal guarding and rigidity (80% cases) then distension (55%), shock (34%), and hematuria (4%) [Table 3].

Author found from Table 4, liver was the most common organ involved in 27 (27%) cases and spleen was the second most common organ injured in 22 (22%) cases. Small bowel and retro peritoneum were injured in 13%, 13% of cases. Injury to the kidney was in 10% cases, large bowel 6% cases, mesentery 4% cases, and diaphragm and bladder in each 2% cases, while pancreas was injured in 1% case only.

Out of 100 cases, 59 (59%) were managed conservatively and 41 (41%) were managed surgically [Table 5].

**Table 1: Sex- and age-wise distribution**

Sex	n=100	n %
Males	73	73
Females	27	27
Age group (years)		
18–25 years age group	19	19
26–40 years age group	54	54
41–60 years age group	23	23
>61 years age group	4	4

**Table 2: Causes of blunt trauma abdomen**

Causes	n=100	n %
Road traffic accidents	62	62
Fall from height	22	22
Assault/injury with blunt objects	16	16
Total	100	100

**Table 3: Clinical presentation**

Presentation	No. of cases	Percentage
Abdominal pain	87	87
Abdominal distension	55	55
Hematuria	4	4
Abdominal guarding and rigidity	80	80
Shock	34	34

In this study, cardiorespiratory failure was the most common cause of death (5 cases). Three died of septicemia and another two died of shock and one from renal failure [Table 6].

## DISCUSSION

Our study showed that maximum patients were male 73% in which the maximum number of cases was in the third and fourth decades of life (18–40 years). Most of the cases were in the first four decades of life. This indicates trauma is more common in young people. Maximum range was from 26 to 40 years. Average age was 34 years. Our study is comparable to study by Curie and Watne.<sup>[8]</sup> which showed maximum number of cases in the third decade (35%) ranging from 15 to 72 years with mean age of 39 years. Similar findings were made by Allen and Curry which showed 28% cases between 20 and 29 years of age.<sup>[9]</sup> In our study, male to female ratio was 3:1, was compared to other studies such as Tripathi *et al.*<sup>[10]</sup> reported a ratio of

4.4:1, the reason being the demographic profile of the Uttarakhand state.

The most common cause of blunt injury abdomen was RTAs (62%) which is comparable to most other studies. Mohapatra *et al.*<sup>[11]</sup> also reported that 62% cases of blunt abdominal injuries were due to RTA. Another study by Curie and Watne.<sup>[8]</sup> also reported that 58.6% cases of blunt trauma to abdomen were due to RTAs. As motor vehicle collisions and other RTAs are the common causes of abdominal trauma and can occur at any age.<sup>[6]</sup> Seat belts can reduce head and chest injuries but pose a threat to the internal organs such as pancreas and intestines. The second common cause was fall from height (22%) causing blunt trauma abdomen. Other causes were hit by blunt objects and assaults, i.e., 16 (16%) which comparable to most other studies by Mohapatra *et al.* and by Curie and Watne.<sup>[8,11]</sup> In present study, assault/injury with blunt object 11 cases (22.9%) and fall from height 1 cases (2.0%). Handle bar strikes while cycling or at play are another threat to children.<sup>[12]</sup> Sports injuries and fall from heights can injure the spleen and liver.

The location and severity of the blow and the position of the victim during injury, determine the combination of organs affected.<sup>[13]</sup> The reason why abdominal injuries are life-threatening, is that the organs in the retroperitoneal space can bleed profusely and some time resulting in hypovolemic shock before the patient got admission in the emergency department. The size and location of the liver make it more vulnerable and about 5% of the patients with abdominal trauma present with liver injury.<sup>[14]</sup> The risk of serious shock is more with the liver due to its profuse blood supply and capacity. Lacerations, contusions, and hematoma are common in the liver and it may even result in exsanguinations which necessitates an emergency surgery.<sup>[15]</sup> In the present study author found 34% cases of shock as clinical presentation in the patient reported to the emergency as case of blunt trauma abdomen. Author found in the study that liver was the most common organ involved in 27 (27%) cases and spleen was the second most common organ injured in 22 (22%) cases. Deaths are occurring every day, in many different settings, from injuries to the upper abdomen and lower rib cage that produce damage to the liver, spleen, and pancreas.<sup>[16]</sup> A study by Rutledge *et al.* found spleen to be most commonly injured than liver.<sup>[17,18]</sup> Small bowel and retro peritoneum were injured in 13%, 13% of cases in our study. In our study, injury to small intestine was less compared to a study done by Allen and Curry<sup>[9]</sup> which showed 35.3% cases.

The evaluation of any patient with trauma begins with A, B, and C (airway, breathing, and circulation).<sup>[19]</sup> If the patient is thermodynamically stable, then diagnostic investigations such as computed tomography (CT) scan

**Table 4: Organ involved in blunt trauma abdomen**

Organs involved	n=100	n %
Liver	27	27
Spleen	22	22
Small intestine	13	19
Retroperitoneum	13	13
Kidney	10	10
Large intestine	6	6
Mesentery	4	4
Diaphragm	2	2
Bladder	2	2
Pancreas	1	1
Total	100	100

**Table 5: Treatment opted**

Organ	Total cases	Surgery	Conservative
Liver	27	2	25
Spleen	22	12	10
Kidney	10	0	10
Hollow viscera	19	19	0
Retro peritoneum	13	0	13
Mesentery	4	4	0
Diaphragm	2	2	0
Urinary bladder	2	2	0
Pancreas	1	0	1
Total	100	41	59

**Table 6: Causes of mortality**

Mortality	Total cases
Shock	2
Septicemia	3
Renal failure	1
Cardio/respiratory failure	5

can be performed to assess abdominal and pelvic injuries. USG or extended FAST can be performed in unstable patients.<sup>[20]</sup> Once the primary survey (A, B, and C) is clear, hypovolemic patients require fluid resuscitation or blood transfusion. If the patient's clinical signs worsen immediate laparotomy is done. Out of 100 cases, 59% were managed conservatively, Davis *et al.* reported that 24.7% of cases had splenic injuries, out of which 10.7% were operated and 14% were managed conservatively.<sup>[21]</sup> In this study, liver injuries were present in 27% cases. In the contrary of this study, by Davis *et al.*, which showed 16.47% of liver injuries, of which 14% underwent laparotomy and suturing was done in all cases.<sup>[21]</sup> Another study by Curie and Watne. showed 20.6% of liver injuries.<sup>[8]</sup> The common surgeries performed in patients included splenectomy, primary closure of perforation and resection, and anastomosis. Similar surgeries were required in patients of blunt trauma abdomen as reported by Siddique *et al.*<sup>[22]</sup> and 41(41%) were managed surgically. Our study is comparable to study done by Davis *et al.* which reported 24.7% of cases had splenic injuries, out of which 10.7% were operated and 14% were managed conservatively.<sup>[5]</sup> Out of 100 cases in our study, 44% were managed surgically and 56% were managed conservatively. Our reports are comparable to Mohapatra *et al.*<sup>[11]</sup> who reported 39% laparotomy rates in their series. A study by Rutledge *et al.*<sup>[22]</sup> also reported that incidence of non-operative management in blunt abdominal trauma, who sustained both hepatic and splenic injuries was 48%. Conservative management depends on the extent of the injury and the hemodynamic stability of the patient. Hemorrhage control can be done by angiography assisted embolization and patients show a good prognosis.

If the abdominal injuries are not promptly treated on time or misdiagnosed, the prognosis can be worse. The associated complications can be sepsis, delayed splenic rupture, cardiorespiratory failure, shock, and death. In this study, cardiorespiratory failure was the most common cause of death. Three died of Sepsicimia and another two died of shock and one from renal failure, which is comparable to a study by Jolly *et al.*<sup>[23]</sup> which showed wound infection in 14% of the cases. Another study by Davis *et al.* showed wound infection as a complication in 15% of the cases.<sup>[5]</sup> These results are again comparable to another study by Jolly *et al.*<sup>[23]</sup> which showed 10% mortality in their study with septicemic shock the most common cause of death. Another study by Davis *et al.*<sup>[5]</sup> showed 15% mortality with septicemia the most common cause of death.

## CONCLUSION

Blunt injury abdomen forms significant load in our society. Increase in blunt trauma abdomen is due to excessive use

of motor vehicles, in which most common age group is 21–40 years. Predominantly males are affected in large proportions. Most common mode of injury is RTAs. In this study the liver was found to be the most common organ affected in blunt trauma abdomen. It poses a diagnostic and therapeutic confusion for the attending surgeon due to widespread range of the clinical manifestations ranging from no early physical findings to progression to shock. Early diagnosis of the extent of injury by appropriate imaging (X-ray, ultrasound, or CT abdomen) and appropriate interventions, blood transfusion, and operative interventions is crucial in treatment and management. Blunt injury abdomen is usually less obvious. Clinical presentation is varied, something confusing. Hence, the trauma surgeon should rely on his physical findings in association with the use of these modalities. However, solid organ injuries are sometimes difficult to diagnose due to restricted use of modern amenities such as CT scan in India. Prompt and early diagnosis is mandatory to control the morbidity and mortality rates. Hemodynamically stable patients with solid organ injury, conservative management can be tried, and non-operative management is associated with less complication. The outcome is affected by associated injuries such as head injury, thoracic injuries, and fractures. From our study, we conclude that use of appropriate investigation in early diagnosis and clinical examination forms the key in the management of blunt abdominal trauma and in hemodynamically stable patients with solid organ injury, non-operative management or conservative management can be tried and it is associated with less complication and morbidity.

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