

Solid and Hollow Organ Injuries in Blunt Trauma Abdomen Following Road Side Accidents and Fall from Height

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Abstract

Background: Fall from height are the second most common cause of injury-associated mortality after road side traffic accidents. They comprise a significant percentage of blunt trauma abdomen cases. Blunt abdominal trauma can result in complications such as hemoperitoneum due to injuries to solid organs such as spleen, liver, kidney and may even cause a retroperitoneal haematoma. It can also cause various modalities of injuries to hollow viscus such as stomach, small and large intestines.

Objectives: In view of increasing number of vehicles and consequently road traffic accidents, present study was aim to investigate the cases of blunt trauma abdomen to know about the different kinds of intra-abdominal organs injured from road side accidents and fall from height.

Methodology: Total 102 cases of blunt abdominal injuries who attended the casualty and out-patient department were include in this study. Demographic and clinical parameters of the patients were recorded on a prestructured proforma.

Results: The mean age of the patients was 31.55 ± 12.82 years with 85 (83.3%) patients were males and rest of 17 (16.7%) patients were females. Mode of injury was road side accident in 92 (90.2%) patients whereas injury due to fall from height was observed in 10 (9.8%) patients. Solid organ injury was encountered in 77 (75.5%) patients whereas hollow organ injury was found in 25 (24.5%) patients.

Conclusion: In present study, a high prevalence of road accidents was found which highlight the requirement of strengthen the traffic rule in the area. High rate of solid and hollow organ injuries also denoted the requirement to established high end medical diagnostic and operative facilities.

Keywords: Injury, Accident, Surgery, Road safety, Abdomen.

Introduction

The increasing fascination of people with speed travel has made accidental death the leading cause of mortality among young people today. Abdominal trauma is one of the most common injuries caused mainly due to road traffic accidents. Major vehicle accidents account for 75% to 80 % of blunt trauma abdomen. Blunt injury of abdomen can also be a result of fall from height, assault with blunt objects, sports injuries, industrial mishaps, bomb blasts (1, 2).

Abdomen is the third most common organ injured following extremities and head injury. Most preventable deaths are those occurring in abdomen. The clinical presentation of these injuries also varies considerably. Blunt abdominal trauma can result in complications such as hemoperitoneum due to injuries to solid organs such as spleen, liver, kidney and may even cause a retroperitoneal haematoma. It can also cause various modalities of injuries to hollow viscus such as stomach, small and large intestines (3).

Due to the tough hilly terrain of Himachal Pradesh, most of the cases are fatal. The knowledge in the management of blunt abdominal trauma is progressively increasing due to the in-patient data gathered from different parts of the world. In spite of the best techniques and advances in diagnostic and supportive care, the morbidity and mortality remain at large, the reason for this could be due to the interval between trauma and hospitalization, delay in diagnosis, inadequate and lack of appropriate surgical treatment, post operative complications and associated trauma especially to spine, head, thorax and extremities (3, 4).

However, with the increase of road connectivity and number of vehicles plying on the roads in the State of Himachal Pradesh, the number of road accidents and loss of precious human lives is increasing day by day. In 2021, around 893 people lost their lives in road accidents across the Indian state of Himachal Pradesh (5). The maximum accidents in the state are attributed to over speeding, followed by dangerous and negligent driving, wrong overtaking, bad road conditions, drug and alcohol abuse and other reasons including adverse weather conditions and mechanical faults (6). Bad roads and negligence of drivers result in death and disability which need to be ruled out by taking special initiatives like providing training to the drivers and the vehicle's road worthiness must be maintained to prevent mishaps. Roads safety infrastructure like crash barriers and parapets along with proper signage should be ensured (6).

Fall from height are the second most common cause of injury-associated mortality after road side traffic accidents. They comprise a significant percentage of blunt trauma abdomen cases. A fall is defined as an injury to a person that occurs after landing on the ground after falling from a higher place, such as a ladder, scaffold, building, roof, or other elevated place or work area. Falls mostly affect males, and disproportionately affect the very young or very old. They cause more deaths in old people than in children. Many factors affect the mortality and morbidity of falls, such as patient age, fall height, cause of fall, type of ground on which the patient fell, and body parts injured (5).

In view of increasing number of vehicles and consequently road traffic accidents, the subject for this dissertation has been chosen to study the cases of blunt trauma abdomen to know about the different kinds of intra-abdominal organs injured from road side accidents and fall from height and the overall outcome in blunt abdominal injuries. in patients presenting at IGMC hospital, Shimla H.P.

Methodology

Study design: Present study was a prospective, observational, single centric, descriptive, hospital-based study. Total 102 cases of blunt abdominal injuries who attended the casualty and out-patient department were include in this study. Cases of abdominal injury of very minor nature that did not require hospitalisation, patients who were treated at any other hospital prior to admission and patients with penetrating injuries were excluded from the study.

Demographic data: After initial resuscitation of the trauma victims, a careful history was taken to document any associated medical problem. Documentation of patients, which included identification, history, clinical findings, diagnostic test, operative findings, operative procedures, complications during the stay in the hospital and during subsequent follow-up period, were all recorded on a proforma specially prepared. Demographic data collected included the age, sex, occupation and nature and time of accident

leading to the injury. Routine blood and urine tests, radiological investigations were carried out in all the patients.

Clinical data: After initial resuscitation and achieving hemodynamic stability, all patients were subjected to careful examination, depending on the clinical findings; decision was taken for further investigations such as ultrasound, x ray abdomen diagnostic peritoneal lavage, and four-quadrant aspiration.

Surgical procedure: The decision for operative or non-operative management depended on the outcome of the clinical examination and results of diagnostic tests. Patients selected for non-operative or conservative management were placed on strict bed rest, were subjected to serial clinical examination which included hourly monitoring and repeated examination of abdomen and other systems. Appropriate diagnostic tests especially ultrasound of abdomen was repeated as and when required. Depending on indications, surgical management was employed and post-operative follow up was done to look for complications.

Results

The mean age of the patients was 31.55 ± 12.82 years with 85 (83.3%) patients were males and rest of 17 (16.7%) patients were females. The mode of injury was road side accident in 92 (90.2%) patients whereas injury due to fall from height was observed in 10 (9.8%) patients. Solid organ injury was encountered in 77 (75.5%) patients whereas hollow organ injury was found in 25 (24.5%) patients. The mean time taken to reach the hospital was 3.62 ± 4.42 hours. Abdominal examination revealed tenderness in 88 (86.3%) patients, guarding in 13 (12.7%) patients and rigidity in 8 (7.8%) patients. Associated injuries was present in 52 (51%) patients (Table 1).

Variable	Subdomain	Value
Mean age		31.55 ± 12.82 years
Gender	Male	85 (83.3%)
	Female	17 (16.7%)
Mode of injury	Road Side Accident	92 (90.2%)
	Fall From Height	10 (9.8%)
Type of injury	Solid organ injury	77
	Visceral organ injury	25
Time to reach hospital		3.62 ± 4.42 hours
Abdominal Examination	Tenderness	88 (86.3%)
	Guarding	13 (12.7%)
	Rigidity	8 (7.8%)
Associated injuries		52 (51%)

Table 1: Sociodemographic and clinical determinants of the patients.

Among 10 patients who fall from the height, organ injured was liver in 2 (20%) patients, spleen in 2 (20%) patients, pancreases in 1 (10%) patient, large bowel in 1 (10%) patient and was mesenteric tear in 1 (10%) patient.

Among 92 patients who has road side accident, organ injured was liver in 36 (38%) patients, spleen in 26 (27.2%) patients, kidney in 11 (12%) patients, urinary bladder in 7 (7.6%) patients, pancreases in 4 (4.3%) patients, large bowl in 4 (4.3%) patients, small bowel in 4 (3.3%) patients, mesenteric tear in 2 (1.10%)

patient and was urethra in 2 (2.20%) patients. Among all patients the most common injured organ was liver and spleen in 38 (37.33%) patients and in 28 (27.5%) patients respectively (Table 2).

Type of Injury	Organ involved	Fall From Height (n=10)	Road Side Accident (n=92)	Total (n=102)
Solid organ injury	Liver	2 (20%)	36 (39%)	38 (37.3%)
	Spleen	2 (20%)	26 (28.2%)	28 (27.5%)
	Kidney	0	11 (12%)	11 (10.8%)
	Pancreas	1 (10%)	4 (4.30%)	5 (4.90%)
	Mesenteric tear	1 (10%)	2 (2.17%)	3 (2.90%)
	Total	6 (60%)	79 (85.67%)	85 (83.33%)
Hollow organ injury	Urinary Bladder	1 (10%)	7 (7.60%)	8 (7.84%)
	Urethra	0	2 (2.20%)	2 (1.96%)
	Large bowel	1 (10%)	2 (2.30%)	3 (2.94%)
	Small bowel	2 (20%)	2 (2.20%)	4 (3.92%)
	Total	4 (40%)	13 (14.20%)	17 (16.67%)
Grand Total		10 (100%)	92 (100%)	102 (100%)

Table 2: Solid and hollow organ injuries among patients with fall from height and road accidents.

USG diagnosis revealed normal study in 67 (65.7%) patients, echogenic area in 15 (14.7%) patients, free fluid in 8 (7.8%) patients, hypoechoic area in 8 (7.8%) patients, splenic contusion with hemoperitoneum in 2 (2%) patients, tear in 1 (1%) patient, and wall defect in 1 (1%) patient (Table 3).

Variable	N (%)
Normal	67 (65.7%)
Echogenic area	15 (14.7%)
Free fluid	8 (7.8%)
Hypoechoic area	8 (7.8%)
Splenic contusion with hemoperitoneum	2 (2%)
Tear	1 (1%)
Wall defect	1 (1%)
Total	102 (100%)

Table 3: USG diagnosis.

CT scan was done in 44 patients and revealed normal study 18 (17.6%) patients. other ct finding include liver contusion 6 (5.9%) patients, liver laceration in 5 (4.9%) patients, splenic laceration in 3 (2.9%) patients, urinary bladder injury in 3 (2.9%) patients, extraperitoneal urinary bladder rupture in 2 (2%) patients, free fluid in 2 (2%) patients, splenic contusion in 2 (2%) patients, grade 2 liver injury in 1 (1%) patient, mesenteric tear in 1 (1%) patient, and pancreatic injury in 1 (1%) patient (Table 4).

Variable	N (%)
Normal	18 (17.6%)
Liver contusion	6 (5.9%)
Liver laceration	5 (4.9%)
Splenic laceration	3 (2.9%)
Urinary bladder injury	3 (2.9%)
Extraperitoneal urinary bladder rupture	2 (2%)
Free fluid	2 (2%)
Splenic contusion	2 (2%)
Grade 2 Liver Injury	1 (1%)
Mesenteric tear	1 (1%)
Pancreatic injury	1 (1%)
Not done	58 (56.9%)
Total	102 (100%)

Table 4: CT diagnosis.

There were no complications occurred in 95 (93.1%) patients whereas pneumonia occurred in 3 (2.9%) patients, wound infection occurred in 2 (2.0%) patients, pseudocyst occurred in 1 (1.0%) patient and urinary tract infection occurred in 1 (1.0%) patient (Table 5).

Variable	N (%)
Pneumonia	3 (2.9%)
Wound infection	2 (2%)
Pseudocyst	1 (1%)
Urinary tract Infection	1 (1%)
Nil	95 (93.1%)
Total	102 (100%)

Table 5: Complications.

Discussion

Because our institute is a tertiary care facility in the Shimla region of the Himachal Pradesh and the majority of patients who visit the hospital come from local regions. The prevalence of abdominal injuries in our locations has been attributed to a lack of knowledge about traffic safety precautions, broken roads, subpar lighting, illiteracy, and contour geographic profile.

In this study most common mode of injury was RTA (90.2%) followed by fall from height (9.8%) which is consistent with the findings in similar study by Umare et al., who also reported that RTA were the most common mode of injury (52%) followed by fall from height (28%) and assault (20%). According to Balamurugan et al., 68% injuries were due to RTA (7). Similar findings were made by Khanna et al, who discovered that road traffic accidents were the most frequent cause of injury in BAT cases (57%) (8). Chalya et al., also reported that 69.5% injuries were due to RTA (9). Kulkarni et al., reported RTA responsible for injuries in 75% cases (10). Distribution according to type of injury consisted of maximum cases, 84 (84%) of road traffic accidents, 11% cases were of fall from height in the study by Shram and

Bhargav (11). Easy access to automobiles, rising vehicle and population numbers, a lack of familiarity with traffic, poor traffic sense, and disregard for safety measures that results in increasing congestion on the roads can all be directly linked to a rise in traffic accidents. Because of the rising population and number of cars, which increased traffic and congested the roads, the majority of traffic accidents happened in metropolitan areas. This also involves a lack of understanding of traffic laws and a population shift into metropolitan areas in search of employment (12). A higher number of road accidents could be due to the booming economy, rising purchasing power of the average person, and the ability of people of all socioeconomic statuses to purchase a two-wheeler, which has led to an increase in the number of two-wheelers on the road.

Falling from the height was observed in 9.8% cases in our study after road accidents. This is in line with a study by South Indian researchers Balamurugan et al., where the second most prevalent factor was falling from a height (17%) (7). According to a study by Kulkarni et al. from India, assault was the second-leading cause of injury at 26% (10). Chalya et al., reported that 17.2% case were of fall from height and 5.1% cases represent the assault (9).

Latent period is the interval between the time of injury to the time of surgery. In our study, the mean time to reach the hospital from the time of injury is 3.62 ± 4.42 hours. Time taken to reach hospital was ≤ 4 hours in 79.4% patients and was >4 hours in 20.6% patients. In the study by Kondreddy and Nittala, 30% of patients were taken for surgery between 11-15 hours and 16% of patients between 6-10 hours of injury (13). In the study by Sujatha and Venkanna, about 30% of patients were taken for surgery between 11 and 15 h and 16% of patients between 6 and 10 h of injury (14). To save the patient life before they die from their injuries, it is essential to provide medical care to trauma patients as quickly as possible. This delay is brought on by the fact that accident scenes are frequently remote and that getting them to the hospital takes time. The morbidity and mortality of the patient can be reduced if they are transported to the hospital as soon as possible (during the "golden hours") after suffering trauma. The idea of an air ambulance was created by Baron Laireg, the chief surgeon under Napoleon, to speed up the process of giving injured people decisive care (15).

The most prevalent complaint in our research was abdominal pain (90.2%). This is in line with research by Umer et al., in which abdominal pain accounted for 88 percent of patients and was the most prevalent presenting complaint. In 72% of patients, abdominal guarding and stiffness were the most prevalent symptoms (16). Salem et al., from Egypt reported abdomen pain in 87.5% cases (17). Panchal et al., from India showed that abdomen pain was in present in 98% patients (18). Balamurugan et al., in their study also showed similar results (7). This seems to be because patients neglect BAT and present themselves to health care facility only in case of pain. This seems to be the reason why PAT is diagnosed early, and BAT is missed and diagnosed late.

Abdomen tenderness (86.3%) were the commonest finding in our study and were comparable to similar studies in the past. Abdominal distension may be due to ruptured hollow viscous, paralytic ileus or due to bleeding in the peritoneal cavity. Results of present study is consistent with a study by Kulkarni et al. who reported abdominal distension in 26% cases (10). Panchal et al. and Maske et al., have also documented a higher incidence of abdomen distension (18, 19). Hence patients who are having abdominal tenderness and distention have to be monitored carefully and investigated for blunt injuries of abdomen.

In our investigation, solid organ damage was shown to be more prevalent in 77 (75.5%) patients. Similar findings have also been found in studies by Panchal et al. and Balamurugan et al. (7, 18). According to a research by Maske et al., SOI and HWI were each present in 50% of patients (19). Spleen injuries were

the most prevalent organ in our analysis, accounting for 31 (33.7%) cases. Lima et al and Panchal et al have shown that liver is the commonest organ injured (18, 20). Additionally, studies have revealed that in individuals with abdominal trauma, the small bowel suffers the most hollow viscous injuries (18). Pneumonia was the most common complications in this research. The findings of the study by Maske et al. are congruent with ours (19). According to studies by Jain et al. and Dodia et al., respiratory problems occur in 11% and 16% of patients, respectively (21, 22). According to Ramya et al., respiratory complications are seen in 28% of individuals (23). Lung problems, such as pneumonia and acute respiratory distress syndrome, were observed in 22% of individuals in a study by Bala et al. (24).

Conclusion

Present study was a prospective, single centric, observational, and hospital-based study conducted at the department of surgery at IGMC Shimla to determine the pattern of solid organ injuries and visceral injuries in blunt trauma abdomen following road side accidents vs fall from height in isolated Himalayan population of Himachal Pradesh. Total 102 patients were recruited in the study among which majority of patients were injured due to road accident whereas a small proportion represent the patients who were injured due to fall from the height. A high prevalence of road accidents was found which highlight the requirement of strengthen the traffic rule in the area. Among all patients the most common injured organ was liver and spleen. High rate of solid and hollow organ injuries also denoted the requirement to established high end medical diagnostic and operative facilities. Conservative treatment was adopted for all patients and all patients were successfully discharged with no mortality.

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