

**Solid Organ Injury-Major Factor Deciding Mortality Rate in Blunt Abdominal Trauma**Nilesh J Patel<sup>1</sup>, Harshiv B. Desai<sup>2</sup>, Deep P. Mehta<sup>3</sup>, Devesh C. Prajapati<sup>4</sup><sup>1</sup>Associate Professor, Department of General Surgery, Smt. N.H.L Municipal Medical College, Ahmedabad, Gujarat, India<sup>2</sup>Senior Resident, Department of General Surgery, Smt. N.H.L Municipal Medical College, Ahmedabad, Gujarat, India<sup>3,4</sup>Resident, Department of General Surgery, Smt. N.H.L Municipal Medical College, Ahmedabad, Gujarat, India

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Corresponding author: Dr. Harshiv B. Desai

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**Abstract:**

**Background:** Injury, or trauma, is defined as cellular disruption brought on by external energy that exceeds the body's capacity for recovery, which is exacerbated by cell death from ischemic reperfusion. [1] Trauma is still a major cause of death, especially for people between the ages of 1 and 44 (it accounts for 8% of all deaths in India). [2] 15–25% of trauma-related deaths are related to abdominal trauma. This type of trauma frequently results in hemoperitoneum, making prompt diagnosis difficult due to comorbidities. With the support of sophisticated imaging, non-operative therapy has emerged as the recommended strategy for patients who are hemodynamically stable. The development of trauma centers with modern facilities is intended to reduce morbidity and mortality, signifying a change in focus towards proactive healthcare. [3–5]

**Methods:** 50 randomly selected cases of blunt abdominal injuries that presented at a tertiary care teaching hospital were examined in this prospective observational study. Patients with proven single or multiple abdominal solid organ injuries, with or without concomitant injuries, who were 12 years of age or older met the inclusion criteria. Patients received primary resuscitation, investigations, and trauma center management in according to Advanced Traumatic Life Support (ATLS) standards. In order to collect data, a proforma was used to record the history, examination, and investigations. In the outpatient department, patients visited once a week for the first month following their discharge and once a month for the next five months.

**Results:** According to the study, blunt abdominal trauma from Road Traffic Accidents (RTAs) is most common in males between the ages of 20 and 40. Within six hours of the injury, 54% of patients were admitted to tertiary care hospitals. The most frequent damage were to the the spleen (62%) followed by liver and kidney. In 21 cases, surgical intervention was necessary, mostly for higher grade injuries; the most frequent surgery was a splenectomy. When it came to low-grade and single solid organ injuries, conservative therapy fared better. The most frequent postoperative consequence was surgical site infection, which led to an average hospital stay of 9.28 days for operated patients as opposed to 6.27 days for conservatively managed patients. Mortality occurred in 10% of individuals throughout treatment.

**Conclusions:** Blunt abdominal injuries, primarily caused by vehicle collisions, require greater observance of traffic laws in order to lessen the increasing burden. Treatment is still complex and requires a CT scan for a quick diagnosis, although FAST helps patients who are hemodynamically unstable. For stable patients (Grades 1-3), conservative approach has good results; however, ideal protocol to be followed in unstable or higher grade injuries (Grade 4-5) is surgical management. In order to improve results, medical teams must work together, with a focus on early presentation to tertiary care institutions for the best management during the "Golden hour."

**Keywords:** Blunt Abdominal Trauma, Conservative Management, Road Traffic Accidents, Solid Organ Injury, And Laparotomy.

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**Introduction**

Trauma occurs when external force disrupts cellular integrity beyond the body's ability to heal, further aggravated by cell death resulting from ischaemic reperfusion. [1] Trauma stands as the

primary cause of death for individuals aged 1 to 44, and ranks third across all age groups, marking a significant loss of productive years. In India, it contributes to 8% of all fatalities, with around

140,000 deaths annually due to accidents, leaving double that number disabled. [2] Abdominal trauma, leading to haemoperitoneum, poses a critical challenge in diagnosis, often concealed by concurrent injuries such as head, chest, or skeletal trauma. This underscores trauma's status as a pressing public health issue. [6]

Accounting for 15% to 20% of trauma deaths, abdominal trauma commonly affects solid organs like the liver, spleen, and kidneys, primarily due to haemorrhage, with some fatalities resulting from sepsis complications. Recent years have witnessed a shift from surgical to non-operative management globally, reflecting a paradigm change in managing these cases. Given the broad spectrum of injuries and the unreliability of clinical examinations, a systematic approach to early assessment and management is crucial. Abdominal injuries frequently coincide with other severe traumas, necessitating prioritization in assessment. Swift diagnosis of serious injuries is paramount to minimize morbidity and mortality. [7] Urgent laparotomy is warranted in cases of haemodynamic deterioration or concerning abdominal examination findings, irrespective of initial diagnostic impressions. [8]

#### Methods

This study consists of an analysis of randomly selected 50 cases with blunt abdominal trauma admitted at tertiary care teaching hospital. It is a prospective observational study.

#### Inclusion Criteria

- Cases of blunt abdominal trauma with age 12 or more than 12 years
- Having definite single or multiple abdominal solid organ injury confirmed on clinical and radiological basis
- With or without associated other injuries (chest, head, peripheral extremity injuries)

#### Exclusion Criteria

- All patients less than 12 years of age.
- Patients with blunt trauma abdomen without solid organ involvement.

All patients were managed in trauma centres as per ATLS guidelines and underwent appropriate primary resuscitation and investigations as per ATLS protocols for management of abdominal trauma and underwent exploration when required. For the purpose of study enrolled each patient was evaluated taking into consideration his/her history, general examination, abdominal examination, investigations and analysed according to data collected on a planned proforma.

In our study patients were divided according to the number of solid organs injured, that was whether patients had only single or multiple abdominal solid organ involvement and how the managed was planned until the patient was discharged or died.

The patient will be followed in OPD after discharge, every weekly for first month followed by monthly for next 5 months.

#### Results

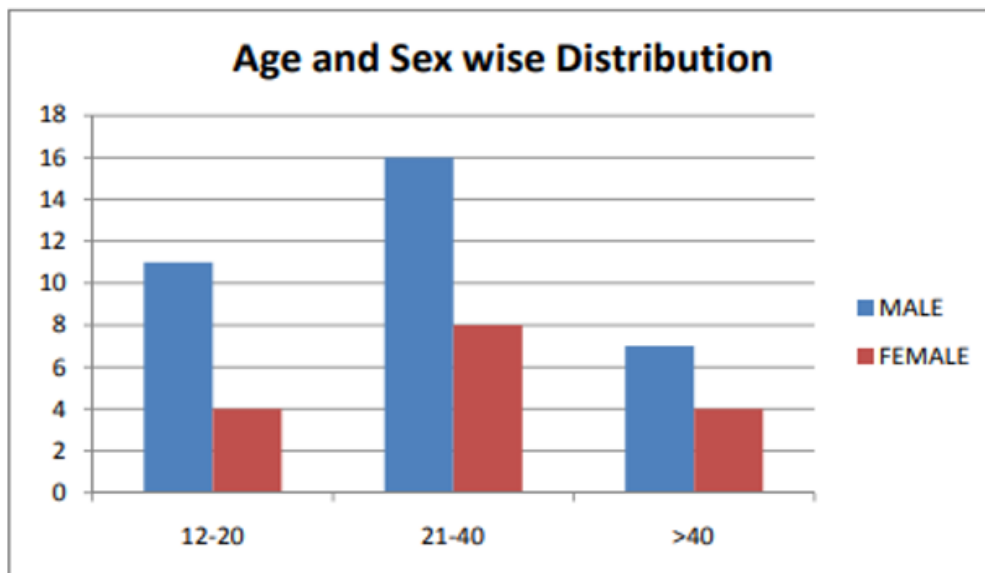


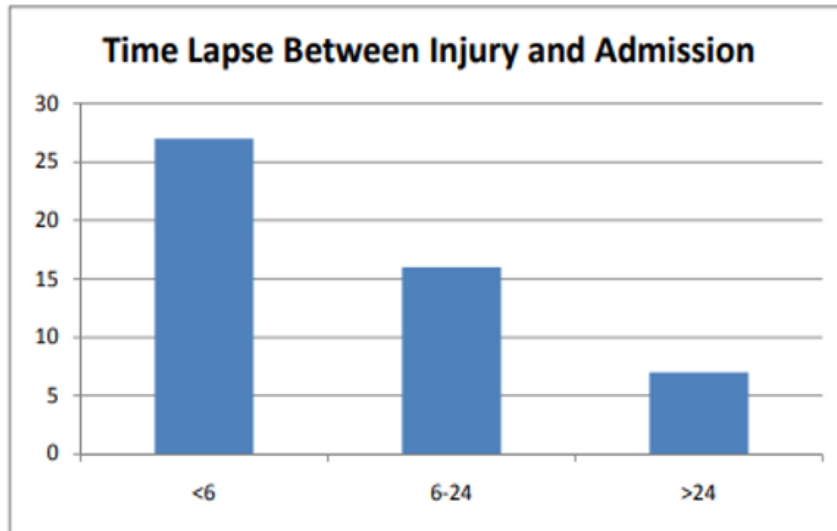
Figure 1: Age and Sex Distribution

In our study most patients were between the age group of 21-40 years and 68% were male patients. Male to female ratio was 2.12:1

**Table 1: Distribution According To Age Wise Mode of Injury**

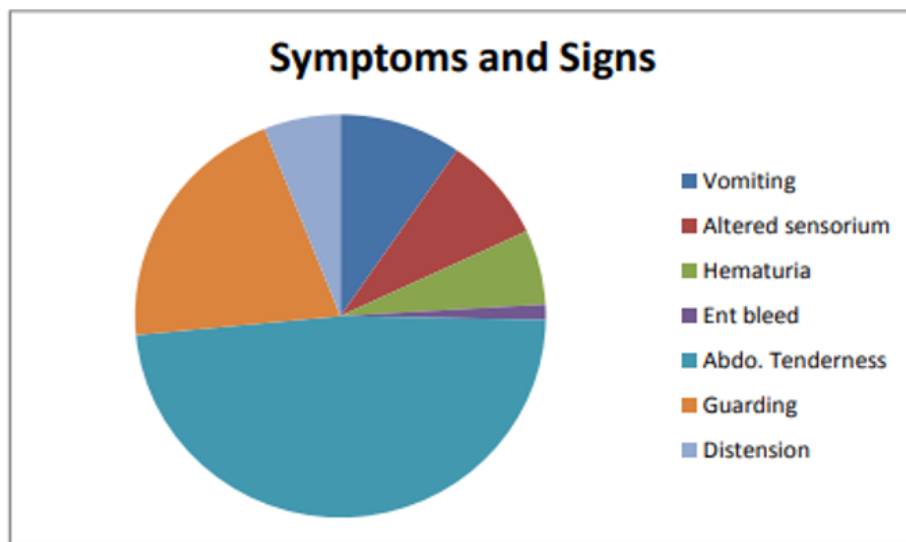
Age (Years)	RTA	Fall Down	Assault	Other	Total
12-20	8	6	1	0	15
20-40	17	4	3	0	24
>40	8	1	1	1	11
<b>Total</b>	<b>33</b>	<b>11</b>	<b>5</b>	<b>1</b>	<b>50</b>

In our study most common mode of injury was Road traffic accident (66%) followed by fall down (22%), assault (10%) and trauma by an animal (other) (2%).



**Figure 2: Time between Injury and Admission**

In our study it was observed that majority (54%) of patients were able to reach within 6 hours of injury.



**Figure 3: Presenting Complaint**

In our study abdominal pain is present in all patients and most common symptom associated with abdominal pain was vomiting (16%). Altered sensorium (14%), Hematuria (10%) and Ear, nose or oral bleed (2%) rest of symptoms. Most common sign was abdominal tenderness (80%). Guarding was seen in 34 % of patients and abdominal

distension in 10% of patients. In our study peripheral extremity injuries were seen in 32% patients. Chest injuries (rib fracture, pneumothorax, and lung contusion) were seen in 28% of patients. Head injury (skull fracture, pneumocranium, hemorrhage) was seen in 20% of patients. Isolated abdominal injury was found in 14 patients

**Table 2: Distribution According To USG/ CT Findings**

USG/ CT Findings	Number of Occurrences
Free fluid	50
Liver injury	27
Splenic injury	31
Renal injury	8

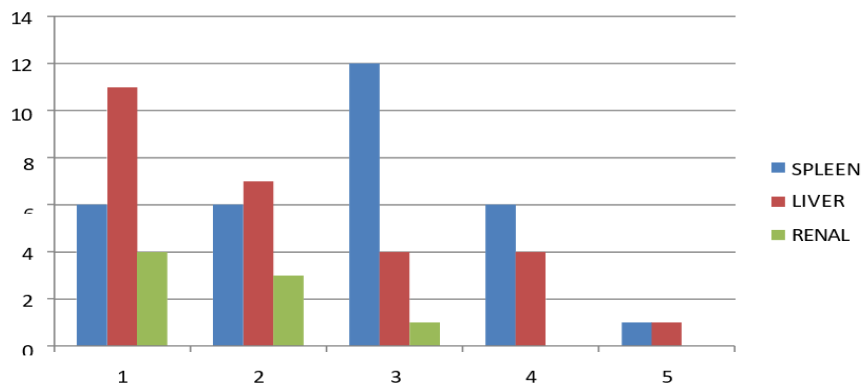
In our study most common finding was free fluid (100%). Most common solid organ injury was splenic injury (62%) followed by Liver injury (54%), Renal injury (16%). In this study USG FAST was the commonest tool used to diagnose patients with abdominal injuries.

**Table 3: Multiple Solid Organ Injury**

Solid Organs Injured	Number Of Patients
Spleen + Liver	8
Spleen + Kidney	3
Liver + Kidney	5
Spleen + Liver + Kidney	0

It was observed that most commonly in case of multiple solid organs injured, Spleen and Liver concurrently occurred most number of times although in our study single solid organ injury was more commonly seen (68%) compared to multiple solid organ injuries (32%).

### Grading of Organ Injury

**Figure 4: Grading Of Organ Injury**

In our study patients with splenic injury most common (50%) was grade 3, while in liver injury most common grade was 1 and in renal injury it was grade 1. It is to be of note that isolated renal injury was not observed in our study.

**Table 4: Mode of Management**

Management	Total
Conservative	29
Operative	21

In our study with solid organ injury 29(58%) patients were managed conservatively while 21(42%) patients were operated.

**Table 5: Operative Management in Blunt Abdominal Trauma**

Operative Management	Total
Splenorrhaphy	1
Splenectomy	12
Liver packing	6
Laceration repair (Liver or Spleen)	8

Splenectomy was the most common procedure performed (12 patients). Other procedures performed are splenorrhaphy, liver packing, lacerations repair of spleen and liver the distribution of which is mentioned in table 5.

**Table 6: Complications**

Complications	Total
Septicemia	1
SSI	5
RC	2
ARF/AKI	4
DIC	1
<b>Total</b>	<b>13</b>

(SSI- Surgical site infection, RC- Respiratory complications, ARF/AKI- Acute renal failure/acute kidney injury DIC- Disseminated intravascular coagulation)

In our study SSI was the most common complication (5 patients), followed by ARF/AKI (4 patients), respiratory complications (2 patients), septicemia and DIC (1 patient each).

In this study complications were more common in operated patients and only 1 patient who is

managed conservatively had developed AKI. In this study there were 5 patients who developed surgical site wound infections.

All of them had associated other organs injuries and sepsis could be due to contamination of the wounds.

**Table 7: Mortality Associated In Blunt Abdominal Injury**

Management	Total	Death	Complications	TLBIAA	Other Organs Injury
Conservative	29	2	1)No 2)No	1)10 Hour 2)11 Hour	1)Yes 2)Yes
Operative	21	3	1)Yes (SSI) 2)Yes(AKI) 3)Yes(AKI +RC)	1)7 Hour 2)8 Hour 3)4 Hour	1)Yes 2)Yes 3)Yes
Total	50	5			

In our study of 50 patients, 29 were managed conservatively, of whom 2 died. Both fatalities occurred in patients who presented more than 6 hours after the injury, with one patient also experiencing associated organ injury. Among the 21 patients managed surgically, 3 died, all of whom suffered complications and additional organ injuries. Two of these patients arrived more than 6 hours post-injury, while one presented within the critical 6-hour window. These findings underscore the impact of the time lapse between injury and admission, along with associated complications and additional organ injuries, on the mortality rate of blunt abdominal trauma

In our study an average hospital stay of operated patients (9.28 days) was longer than the hospital stays of conservatively managed patients (6.27 days).

#### Discussion:

The study underscores the rising incidence of blunt abdominal trauma attributed to increased motor vehicle usage, particularly road traffic accidents (RTAs). Heightened awareness of traffic regulations could mitigate this trend. Managing blunt abdominal trauma remains a formidable challenge in general surgery due to its varied clinical presentations, from subtle signs to shock progression, posing diagnostic and therapeutic dilemmas for surgeons. While Focused Assessment with Sonography in Trauma (FAST) aids in

assessing haemodynamically unstable patients, abdominal CT scans remain paramount for grading organ injuries and guiding management, given their ability to diagnose specific organ injuries effectively and widespread availability.

Clinical assessment, coupled with a high suspicion for organ injuries, holds greater significance than laboratory and radiological investigations for optimal patient outcomes. Conservative management is suitable for haemodynamically stable patients with grade 1 to 3 solid organ injuries, whereas urgent laparotomy is considered ideal approach for unstable grade 4 and 5 patients. Collaborative teamwork among resident doctors, surgeons, and radiologists is imperative to mitigate mortality and morbidity associated with blunt abdominal trauma. Timely presentation at tertiary care centres during the "Golden hour" is pivotal for favorable prognosis and efficient management.

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who has contributed, no matter how tiny, to the completion of this study.

#### List of Abbreviations:

AKI	Acute Kidney Injury
ARF	Acute Renal Failure
ATLS	Advanced Traumatic Life Support
CT	Computed Tomography
DIC	Disseminated Intravascular Coagulation
FAST	Focussed Assessment with Sonography in Trauma
OPD	Outdoor Patient Department
RC	Respiratory Complications
RTA	Road Traffic Accident
SSI	Surgical Site Infection
TLBIAA	Time lapse between injury and admission

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