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ORIGINAL RESEARCH

A study on the prevalence and pattern of abdominal organ injury in blunt trauma abdomen at a tertiary care centre

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ABSTRACT

Aim: Blunt trauma abdomen is a significant cause of morbidity and mortality worldwide. This study aims to evaluate the prevalence and pattern of abdominal organ injuries in patients with blunt trauma abdomen, assess the treatment strategies used, and analyze the outcomes at a tertiary care center.**Methodology:** A prospective study was conducted on 25 patients with blunt trauma abdomen admitted to SSIMS AND RC, Davangere, from January 2024 to January 2025. Patients above 18 years of age with blunt abdominal trauma were included, while those with penetrating injuries, deaths on arrival, and pregnant females were excluded. Clinical assessment, imaging modalities (FAST, USG, CT), and management strategies (conservative vs. surgical) were recorded. Data analysis included the distribution of organ injuries, clinical presentations, treatment methods, complications, and mortality rates.**Results:** The study population had a mean age of 34.72±10.52 years, with the highest incidence in the 18-30 years age group (36%). Road traffic accidents (RTA) were the predominant cause. Splenic injury was the most common (100%), followed by chest injury (80%), liver injury (36%), and kidney injury (32%). Conservative management was adopted in 60% of cases, while 40% underwent surgical intervention. Post-operative complications were observed in 4% of cases. The mortality rate was 16%, with no significant association between mortality and the chosen treatment modality.**Conclusion:** Blunt trauma abdomen due to RTAs remains a critical public health issue. While splenic injury was the most prevalent, a significant proportion of patients benefitted from conservative management, reducing unnecessary surgical interventions. Early assessment, imaging, and appropriate intervention are crucial in minimizing morbidity and mortality.

Key words: Blunt trauma abdomen, abdominal organ injury, splenic injury, liver injury, road traffic accidents, conservative management, surgical intervention

INTRODUCTION

Trauma is defined as bodily damage caused by environmental energy exceeding the body's resilience[1].Despite its prevalence, trauma remains a neglected disease in modern society and is the leading cause of death and disability in developing countries[2,3].

Globally, injury is the seventh leading cause of mortality, with 5.8 million deaths in 2006. In the U.S., injuries are the third leading cause of death across all ages and the primary cause among individuals aged 1-45 years[4,1].Abdominal trauma is a major contributor to morbidity and mortality, requiring prompt diagnosis and intervention[5].

The rise in blunt abdominal injuries is linked to increased urbanization, industrialization, and high-speed vehicle production[1].In India, abdominal trauma is escalating due to urbanization, civil violence, and crime[6].Unlike penetrating trauma, diagnosing blunt abdominal trauma is challenging due to unreliable

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clinical findings. Associated injuries may divert attention from life-threatening intra-abdominal pathology[7].

Imaging plays a key role in diagnosis. Focused abdominal sonography for trauma (FAST) helps assess intra-abdominal hemorrhage, especially in unstable patients, detecting ≥400ml of fluid. Computed tomography (CT) is the preferred method for diagnosing solid organ injuries. The spleen and liver are most commonly affected, followed by the kidney. Management depends on clinical evaluation, injury grade, and hemodynamic status[8].

This prospective study aims to stratify injury patterns of the liver, spleen and kidney and assess management strategies.

METHODS

This study was conducted on 25 patients with blunt abdominal trauma admitted to SSIMS AND RC, Davangere, from January 2024 to January 2025.

INCLUSION CRITERIA

- All patients with blunt abdominal trauma.
- Patients aged above 18 years.

EXCLUSION CRITERIA

- Penetrating abdominal injury.
- All deaths on arrival.
- Pregnant females.

DATA COLLECTION

- Patients were selected based on the above criteria, and the study was conducted following these parameters:
- Detailed clinical history, including age, sex, symptoms, mode of injury, and associated injuries.
- Thorough physical examination to assess hemodynamic stability, vitals, systemic examination, severity of injury, and other associated injuries.

INVESTIGATIONS

- Basic Investigations.
- Blood investigations.
- Chest X-ray.
- X-ray abdomen.

SPECIAL INVESTIGATIONS

- Focused Assessment with Sonography for Trauma (FAST).
- Extended FAST (E-FAST).
- Ultrasonography (USG) of the abdomen and pelvis.

POLYTRAUMA PROTOCOL IMAGING, INCLUDING

- CT Thorax, Abdomen, and Pelvis with Spine Screening.
- CT Brain.
- MRI Brai (if indicated).

Note: Imaging was performed based on the patient's hemodynamic stability.

MANAGEMENT OF PATIENTS

- Patients were assessed and resuscitated according to Advanced Trauma Life Support (ATLS) guidelines.
- Intravenous (IV) fluids and blood transfusions were administered based on pulse volume, blood pressure, and urine output.
- Continuous monitoring of vitals, urine output, and abdominal girth was performed.
- Patients were managed either conservatively or surgically based on hemodynamic stability.
- Preparation for emergency exploratory laparotomy was done based on hemodynamic stability, nature of injury, USG/CT findings, and other investigations.

SURGICAL MANAGEMENT

- Surgical procedures were performed according to intraoperative findings.

KEY INTRAOPERATIVE ASSESSMENTS INCLUDED

- Total blood loss.
- Presence of fecal matter.
- Injury to any organ.
- Extent of injury.
- Visceral status.

POSTOPERATIVE CARE

- Administration of IV antibiotics, fluids, analgesics, and blood transfusions as required.
- Monitoring and management of postoperative complications.
- Any complications encountered were managed accordingly.

STATISTICAL ANALYSIS

Descriptive statistics including mean and frequency were calculated using SPSS version 22.

RESULTS

Table1: Age distribution of Study participants

Age	Frequency	Percentage
18-30	9	36.0
31-40	7	28.0
41-50	8	32.0
51-60	1	4.0
Total	25	100.0

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In our study, 9 (36.0%) cases were aged between 18-30 years, 7 (28.0%) were aged between 31-40 years, 8 (32.0%) were aged between 41-50 years and 1 (4.0%) was aged between 51-60 years. The mean age in our study was 34.72±10.52 years.

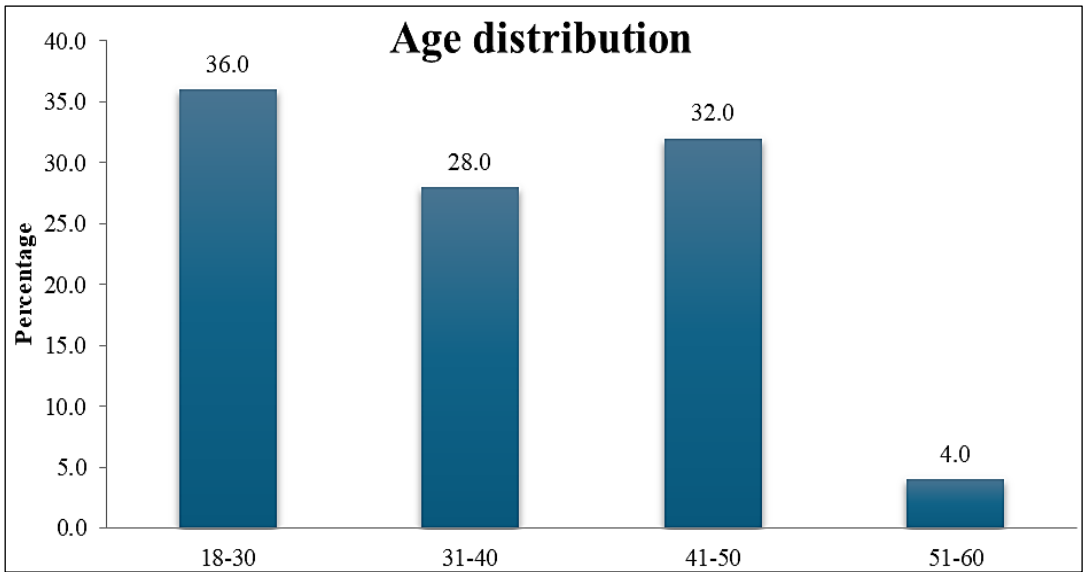

Table2: Distribution of Associated Injuries of Study Participants

Associated Injuries/Organ Injuries	Frequency (n=25)	Percentage
Splenic Injury	25	100.0
Liver Injury	9	36.0
Kidney Injury	8	32.0
Mesenteric Tear	5	20.0
Pancreatic Injury	1	4.0
Hollow Viscus Perforation	2	8.0
Head Injury	11	44.0
Spine Injury	9	36.0
Chest Injury	20	80.0

In our study, all the participants were RTA. The most common associated injury was splenic injury 25 (100.0%), followed by chest injury 20 (80.0%), head injury 11 (44.0%), spine injury 9 (36.0%), liver injury 9 (36.0%), kidney injury 8 (36.0%), Mesenteric Tear 5 (20.0%), Hollow Viscus Perforation 2 (8.0%) and Pancreatic Injury 1 (4.0%).

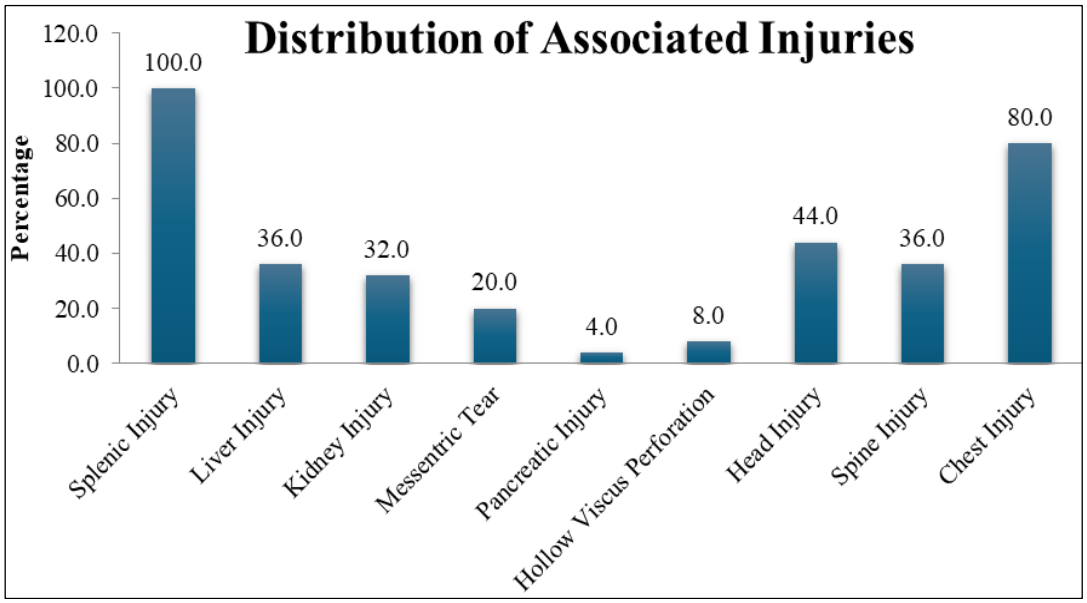

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Table3: Distribution of Clinical Features

Clinical Features	Frequency (n=25)	Percentage
Abdominal Bruise	4	16.0
Abdominal Guarding	11	44.0
Pain Abdomen	19	76.0
Tenderness	18	72.0
External Superficial Injury	22	88.0
Hypotension	13	52.0
Extremity Fracture	15	60.0
RIB Fracture	20	80.0
Abdominal Distension	6	24.0
Vomiting	1	4.0
Pelvic Fracture	1	4.0

External Superficial Injury was the most common clinical feature 22 (88.0%), followed by RIB fracture 20 (80.0%), pain abdomen 19 (76.0%), tenderness 18 (72.0%), extremity fracture 15 (60.0%), hypotension 13 (52.0%), abdominal guarding 11 (44.0%), abdominal distension 6 (24.0%), abdominal bruise 4 (16.0%), vomiting 1 (4.0%) and pelvic fracture 1 (4.0%).

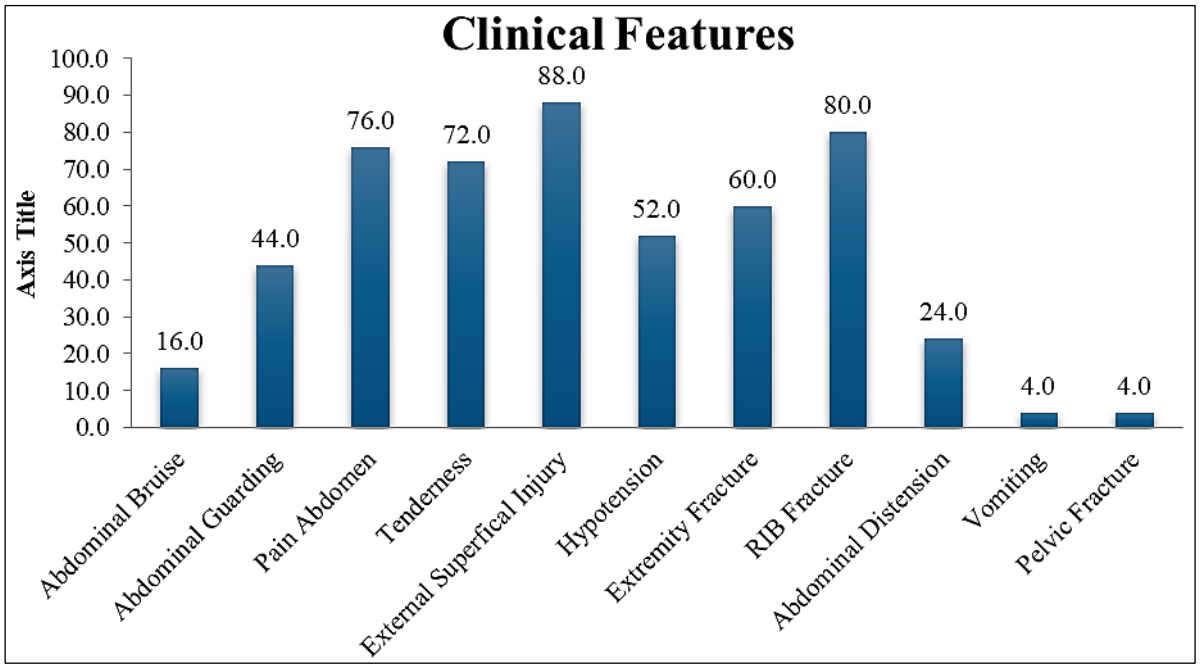

Table4: Distribution of Post Operative Complications

Post Operative Complication	Frequency (n=25)	Percentage
NIL	24	96.0
Sepsis	1	4.0
Peritonitis	1	4.0
Respiratory Disorder	1	4.0
MODS	1	4.0

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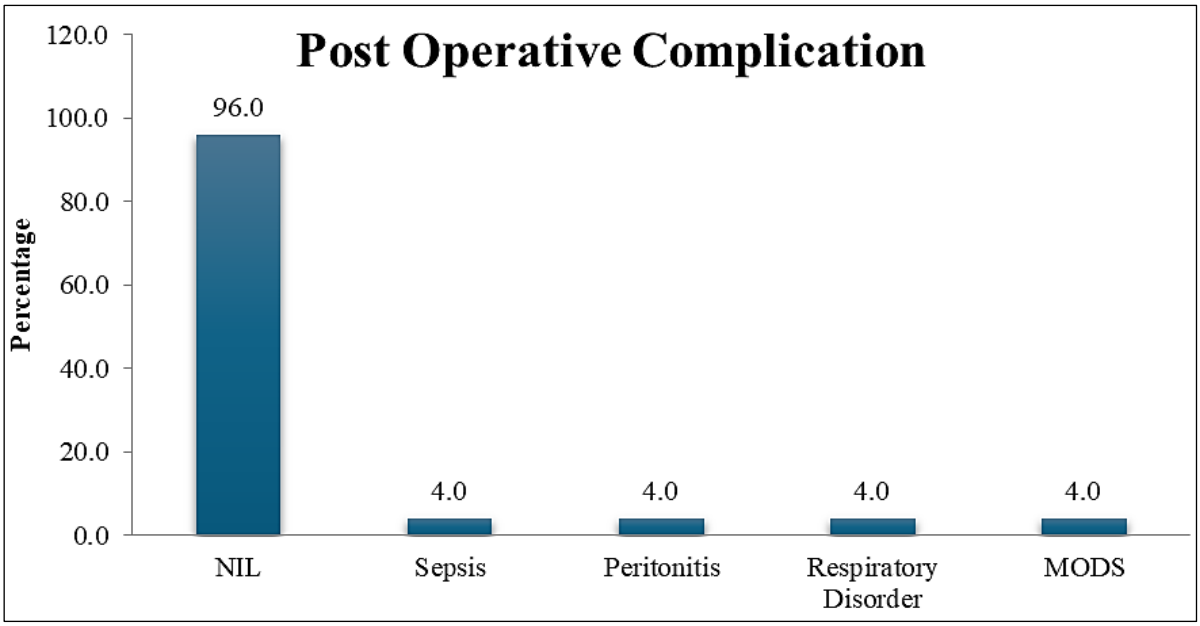

Out of 25 cases, majority of the cases had no complication 24 (96.0%). Only one patient had sepsis, peritonitis, respiratory disorder and MODS.

Table5: Distribution of Mortality

Mortality	Frequency	Percentage
No	21	84.0
Yes	4	16.0
Total	25	100.0

Out of 25 cases, 4 (16.0%) had expired and 21 (84.0%) survived.

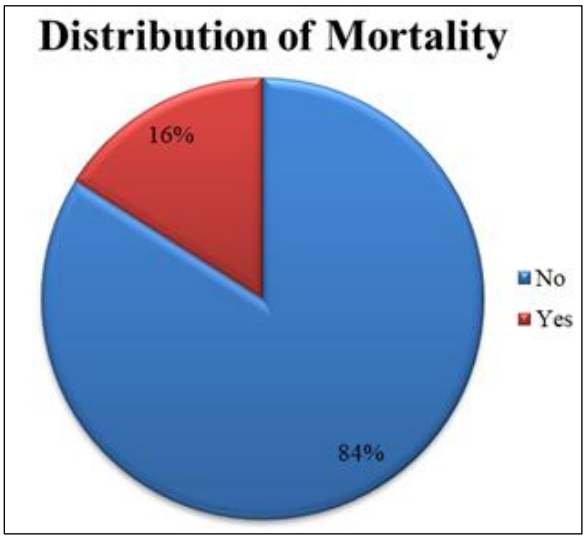

Table6: Distribution of Outcome of study participants

Outcome	Frequency	Percentage
DAMA	1	4.0
Expired	4	16.0
Survived	20	80.0
Total	25	100.0

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In our study, 20 (80.0%) cases were discharged, 4 (16.0%) were expired and 1 (4.0%) was DAMA.

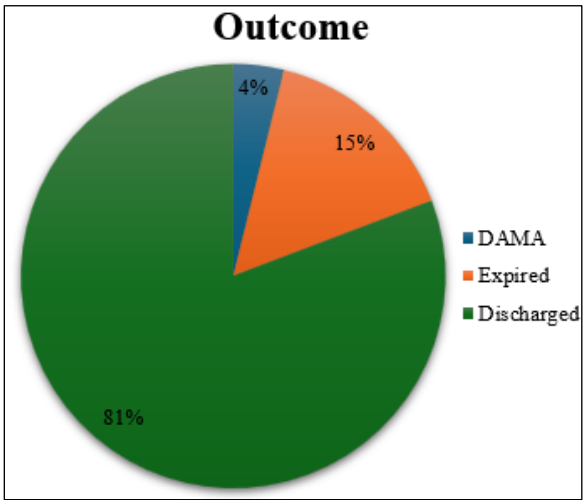

Table7: Distribution of Procedure

Procedures	Frequency	Percentage
Conservative	15	60.0
Surgical	10	40.0
Total	25	100.0

In our study, 15 (60.0%) cases was treated with conservative management and 10 (40.0%) had undergone surgical procedure.

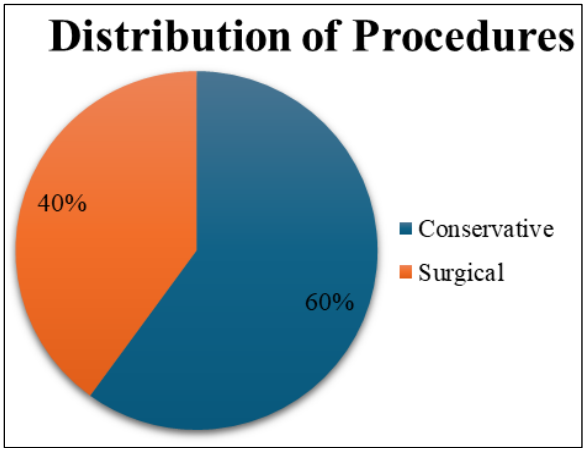

Table8: Association between Mortality and Procedure

Procedures	Mortality				p Value
	No		Yes		
	n	%	N	%	
Conservative (n=15)	13	86.7	2	13.3	0.656
Surgical (n=10)	8	80.0	2	20.0	

The mortality rate was 13.3% (2/15) in conservative management and 20.0% (2/10) in surgical procedures. There is no association between mortality and procedure.

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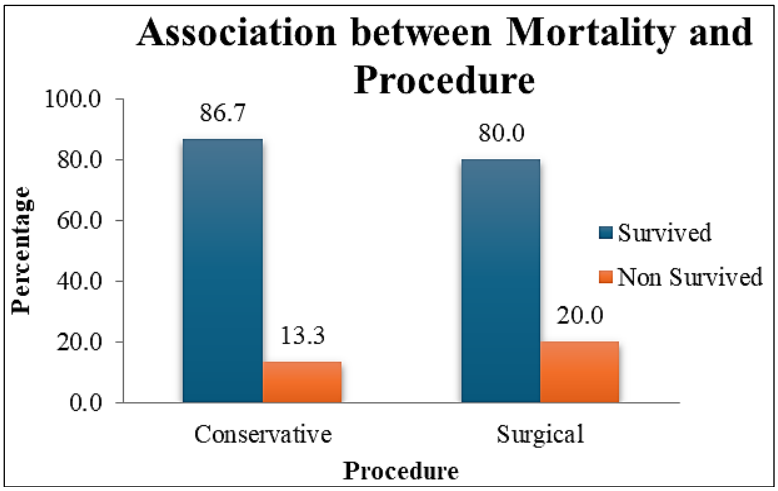

Splenic injury	Frequency	Percentage
Grade 1	2	8.0
Grade 2	11	44.0
Grade 3	5	20.0
Grade 4	6	24.0
Grade 5	1	4.0
Total	25	100

A total of 25 cases of splenic injury were observed during my study with various grades of injury (grade 1-grade 5). With highest being GRADE 2 injury (44.o).

Liver Injury	Frequency	Percentage
Grade 1	2	22.2
Grade 2	5	55.6
Grade 3	1	11.1
Grade 4	1	11.1
Total	9	100.0

A total of 9 cases of liver injury were observed during my study with various grades of injury (grade 1-grade 4). With highest being GRADE 2 injury (55.6)

Kidney Injury	Frequency	Percentage
Grade 1	1	12.5
Grade 2	4	50.0
Grade 3	2	25.0
Grade 4	1	12.5
Total	8	100.0

A total of 8 cases of liver injury were observed during my study with various grades of injury (grade 1-grade 4). With highest being GRADE 2 injury (50.0).

DISCUSSION

Blunt trauma abdomen (BTA) is a significant cause of morbidity and mortality worldwide, particularly in young and middle-aged individuals. Our study found that the majority of patients affected were between 18-50 years of age, with a mean age of 34.72 ± 10.52 years. Similar findings have been reported in previous studies where young adults were the most commonly affected demographic, primarily due to their increased exposure to road traffic accidents (RTAs)[9,10].

In our study, RTAs were the sole cause of BTA, which aligns with global trends indicating RTAs as the leading cause of blunt abdominal trauma[3].The spleen was the most frequently injured organ (100%), followed by chest injuries (80%), head injuries (44%), spine injuries (36%), liver injuries (36%), and kidney injuries (32%). Several studies corroborate these findings, identifying the spleen as the most commonly injured organ in BTA due to its anatomical location and vulnerability to deceleration forces[11, 12].Liver injuries were also significant, with Grade 2 being the most common severity level. This observation is consistent with existing literature, where liver injuries often accompany high-impact trauma[13].

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Clinical features in our study population were dominated by external superficial injuries (88%), rib fractures (80%), abdominal pain (76%), and tenderness (72%). The presence of hypotension (52%) and abdominal guarding (44%) underscores the need for early identification and intervention to prevent adverse outcomes. Prior research highlights that external injuries and rib fractures are reliable indicators of underlying intra-abdominal injuries[14, 15].

Regarding complications, 96% of cases had no reported complications, while only one case developed sepsis, peritonitis, respiratory distress, and multiple organ dysfunction syndrome (MODS). This low complication rate may be attributed to timely diagnosis and management, as reported in other tertiary care settings[16].

The overall mortality rate in our study was 16%, with 4 out of 25 patients succumbing to their injuries. Although the mortality rate was slightly higher in surgically managed patients (20%) compared to those managed conservatively (13.3%), statistical analysis revealed no significant association between mortality and management strategy. Literature suggests that timely intervention, whether surgical or conservative, plays a crucial role in reducing mortality, with patient hemodynamic stability being the key determinant[17, 18].

Conservative management was the preferred approach in 60% of cases, while 40% required surgical intervention. This aligns with the shift towards non-operative management (NOM) of blunt abdominal trauma, particularly for hemodynamically stable patients with solid organ injuries[17].NOM has been associated with reduced morbidity, shorter hospital stays, and comparable survival outcomes[19].

The grading of organ injuries in our study revealed that Grade 2 splenic and hepatic injuries were the most common. This finding underscores the necessity of standardized grading systems such as the American Association for the Surgery of Trauma (AAST) classification, which aids in determining appropriate management strategies[20].

CONCLUSION

In conclusion, our study highlights RTAs as the primary cause of blunt abdominal trauma, with splenic injuries being the most prevalent. While conservative management was the predominant treatment modality, surgical intervention was necessary in a significant proportion of cases. Despite a low complication rate, mortality remains a concern, emphasizing the need for early recognition, appropriate triage, and timely intervention. Further large-scale studies are warranted to refine management protocols and improve patient outcomes.

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