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Original Research Article

Clinical study of conservative and surgical management of blunt abdominal trauma: a prospective observational study

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ABSTRACT

Background: Blunt abdominal trauma represents a significant cause of morbidity and mortality, particularly in developing countries. The management approach has evolved from primarily surgical to selective non-operative management in hemodynamically stable patients.
Methods: A prospective observational study was conducted at a tertiary care center over 18 months, including 50 patients with blunt abdominal trauma. Data were collected on demographics, clinical presentation, management approach, and outcomes. Statistical analysis was performed using chi-square test and Student's t-test.
Results: The study included 40 males (80%) and 10 females (20%), with mean age of 35.2 years. Road traffic accidents accounted for 50% of cases, followed by assault (38%) and falls (12%). Surgical management was required in 31 patients (62%), while 19 patients (38%) were managed conservatively. The overall mortality rate was 10% (5 patients), with 90% achieving complete recovery. Mesenteric tears were the most common intraoperative finding (60% of surgical cases). Significant associations were found between outcome and clinical features including abdominal distension ($p=0.026$), vomiting ($p=0.045$), and associated injuries ($p=0.023$).
Conclusions: Blunt abdominal trauma predominantly affects young males, with road traffic accidents being the leading cause. While surgical intervention remains necessary in the majority of cases, selective non-operative management can be safely applied in hemodynamically stable patients with appropriate monitoring. Early recognition and prompt intervention are crucial for optimal outcomes.

Keywords: Blunt abdominal trauma, Conservative management, Road traffic accidents, Surgical management, Trauma care

INTRODUCTION

Blunt abdominal trauma is a major cause of morbidity and mortality worldwide, accounting for approximately 7% of all trauma-related deaths.[1] The abdomen is the third most commonly injured region in trauma patients, with motor vehicle accidents, falls, and assaults being the predominant mechanisms of injury.[2] In developing countries like India, trauma-related fatality rates are significantly higher compared to developed nations, with a disproportionate impact on the younger population aged 15-45 years.[3]

The management of blunt abdominal trauma has evolved considerably over the past few decades. Historically, exploratory laparotomy was the standard approach for suspected intra-abdominal injuries. However, advances in diagnostic imaging, particularly computed tomography (CT), and improved understanding of injury patterns have led to a paradigm shift toward selective non-operative management (NOM) in hemodynamically stable patients.[4] This approach has proven successful in reducing unnecessary surgeries while maintaining patient safety, particularly for solid organ injuries involving the spleen, liver, and kidneys.[5]

The decision between conservative and surgical management depends on multiple factors including hemodynamic stability, clinical examination findings, imaging results, and the presence of peritoneal signs. Non-operative management requires intensive monitoring, serial clinical examinations, and the availability of immediate surgical intervention if the patient's condition deteriorates.[6] Studies have reported success rates of 85-95% for NOM of solid organ injuries in appropriately selected patients.[7]

The clinical presentation of blunt abdominal trauma can be subtle, and missed injuries remain a significant concern. Factors such as altered mental status, intoxication, or distracting injuries can mask abdominal findings, making diagnosis challenging.[8]

Given the significant burden of blunt abdominal trauma in the Indian healthcare system and the limited data available from tertiary care centers, this study aims to evaluate the patterns of presentation, management approaches, and outcomes of blunt abdominal trauma patients at our institution.

METHODS

Study design and setting

This prospective observational study was conducted at the Department of Surgery, Shri Bhausaheb Hire Government Medical College & Hospital, Dhule, Maharashtra, India, over a period of 18 months from June 2023 to November 2024. The study was approved by the Institutional Ethics Committee, and written informed consent was obtained from all patients or their legally authorized representatives.

Study population

All patients with blunt abdominal trauma of either gender presenting to the emergency department were considered for inclusion.

Inclusion criteria

Patients aged 18 years and above, patients with confirmed blunt abdominal trauma, and patients or legally authorized representatives providing informed consent were included.

Exclusion criteria

Patients with penetrating abdominal trauma, patients with breach in the abdominal wall, and patients not providing consent for participation were excluded.

Sample size calculation

The sample size was calculated using the formula:

$n= [Z^2p(1-p)]/d^2$

Where; Z = 0.95 (table value for 95% confidence interval), Power (p)=80%, Precision error(d)=5.5%. The calculated sample size was 47.7, rounded to 50 patients.

Data collection and management protocol

After initial resuscitation following Advanced Trauma Life Support (ATLS) protocols, detailed history and clinical examination were documented using a structured proforma. Hemodynamic parameters, clinical findings, and associated injuries were recorded.

The decision for conservative versus surgical management was based on hemodynamic stability, clinical examination findings, imaging results, presence of peritoneal signs, and response to initial resuscitation.

Statistical analysis

Data were analyzed using SPSS software trial version. Quantitative variables were expressed as mean ± standard deviation. Qualitative variables were expressed as frequencies and percentages and compared using chi-square test. A p-value less than 0.05 was considered statistically significant.

RESULTS

Demographics and baseline characteristics

A total of 50 patients with blunt abdominal trauma were included in the study. The majority were males (n=40, 80%) with a male-to-female ratio of 4:1. The mean age was 35.2 years, with the highest incidence in the 31-40 years age group (n=15, 30%), followed by 21-30 years (n=11, 22%) and 41-50 years (n=9, 18%) (Figure 1 and 2).

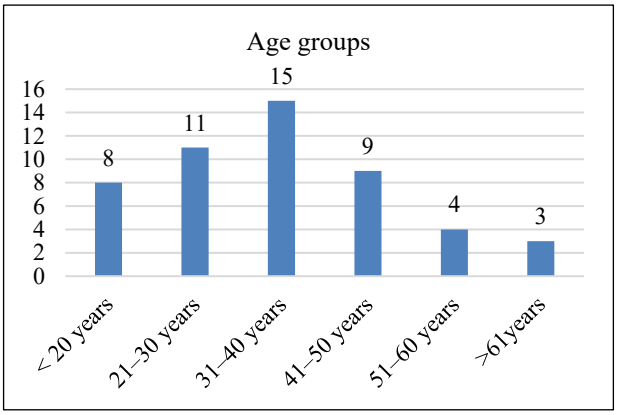

Figure 1: Distribution of patients according to age.

Mechanism of injury

Road traffic accidents were the predominant cause of blunt abdominal trauma, accounting for 25 cases (50%). Assault was the second most common mechanism, occurring in 19

patients (38%), while self-falls accounted for 6 cases (12%).

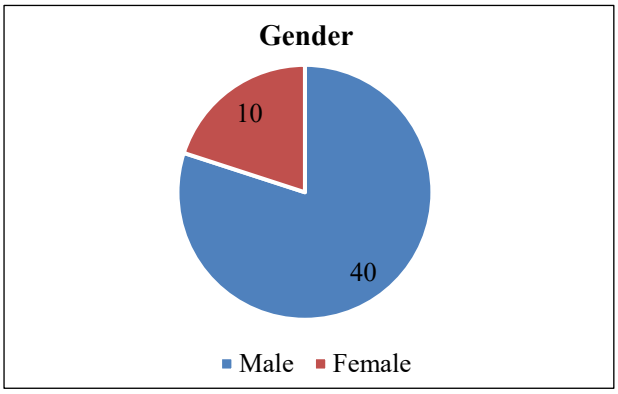

Figure 2: Distribution of patients according to gender.

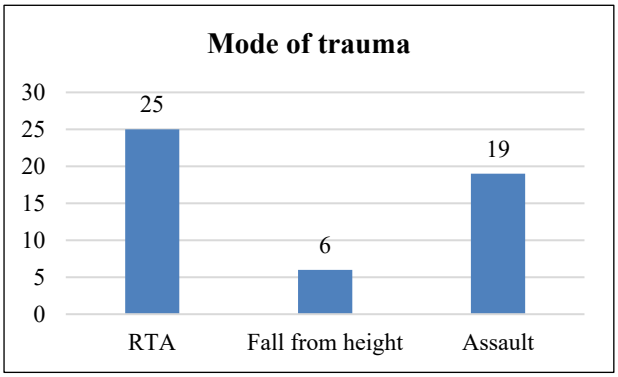

Figure 3: Distribution of patients according to mode of trauma.

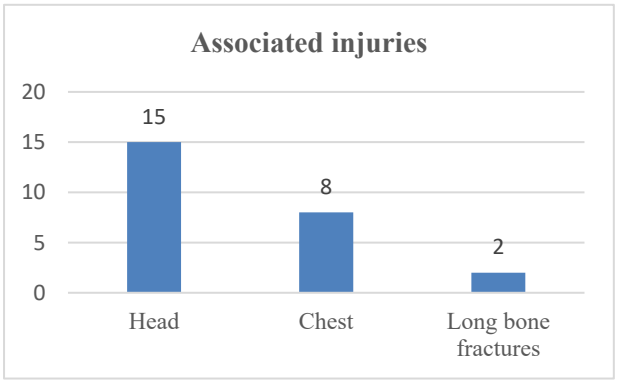

Figure 4: Distribution of patients according to associated injuries.

Clinical presentation

All patients presented with abdominal pain (100%). Other common clinical features included abdominal tenderness in 39 patients (78%), guarding and rigidity in 31 patients (62%), abdominal distension in 30 patients (60%), and vomiting in 29 patients (58%) (Table 1).

Management approaches

Surgical management was required in 31 patients (62%), while 19 patients (38%) were successfully managed conservatively. The decision was primarily based on hemodynamic status, clinical findings, and imaging results.

Table 1: Distribution of patients according to clinical features.

Clinical feature	Frequency	Percentage (%)
Abdominal pain	50	100.00
Distention	30	60
Vomiting	29	58
Tenderness	39	78
Guarding and rigidity	31	62
Loss of distal pulses	20	40
Cold clammy extremities	8	16

Intraoperative findings

Among the 31 patients who underwent surgery, mesenteric tear was the most common finding, observed in 30 patients (60%). Other findings included Grade 1 splenic injury in 8 patients (16%), Grade 2 splenic injury in 3 patients (6%), liver contusion in 2 patients (4%), and retroperitoneal hematoma in 2 patients (4%) (Table 2).

Outcomes

The overall recovery rate was 90% (n=45), with a mortality rate of 10% (n=5). The mortality was associated with severe injuries, delayed presentation, and the presence of associated injuries, particularly head trauma.

Table 2: Distribution of patients according to USG findings.

USG finding	Frequency	Percentage (%)
Moderate free fluid pelvis	35	70
Minimal free fluid in pelvis	7	14
Grade 1 splenic injury	1	2
Grade 2 splenic injury	2	4
Gross free fluid in pelvis	1	2
Oedematous pancreas	1	2
Grade 3 liver injury	1	2
Grade 1 liver injury	1	2
Grade 1 kidney injury	1	2
Total	50	100

Table 3: Distribution of patients according to intraoperative findings.

Intraoperative finding	Frequency	Percentage (%)	Most common day of operation
Mesenteric tear	30	60	Day 0
Grade 1 splenic injury	8	16	Day 0
Grade 2 splenic injury	3	6	Day 0
Liver contusion	2	4	Day 0
Retroperitoneal hematoma	2	4	Day 0
Grade 3 splenic injury	1	2	Day 0
Intestinal perforation	2	4	Day 1
Grade 4 splenic injury	2	4	Day 2
Liver laceration	1	2	Day 1
Small bowel gangrene with perforation	1	2	Day 0
Total	50	100	

Table 4: Association of various variables with outcome.

Variable	Category	Death, (n=5) (%)	Recovered, (n=45) (%)	Total (n=50)	P value
Gender	Male	4 (10)	36 (90)	40	1.000
	Female	1 (10)	9 (90)	10	
Mode of trauma	RTA	1 (4)	24 (96)	25	0.367
	Fall from Height	1 (16.7)	5 (83.3)	6	
	Assault	3 (15.8)	16 (84.2)	19	
Distension	Present	4 (12.9)	27 (87.1)	31	0.026*
	Absent	1 (5.3)	18 (94.7)	19	
Vomiting	Present	5 (17.2)	24 (82.8)	29	0.045*
	Absent	0 (0)	21 (100)	21	
Tenderness	Present	5 (12.5)	35 (87.5)	40	0.239
	Absent	0 (0)	10 (100)	10	
Guarding/rigidity	Present	3 (9.4)	29 (90.6)	32	0.013*
	Absent	2 (11.1)	16 (88.9)	18	
Loss of distal pulse	Present	2 (9.5)	19 (90.5)	21	0.924
	Absent	3 (10.3)	26 (89.7)	29	
Cold extremities	Present	0 (0)	9 (100)	9	0.269
	Absent	5 (12.2)	36 (87.8)	41	
Associated injuries	None	0 (0)	22 (91.7)	22	0.023*
	Head	3 (20)	12 (80)	15	
	Chest	0 (0)	9 (100)	9	
	Long bone fracture	2 (50)	2 (50)	4	
Management	Conservative	2 (10.5)	17 (89.5)	19	0.019
	Surgical	3 (9.7)	28 (90.3)	31	

*p value <0.05-Significant

Factors associated with outcomes

Statistical analysis revealed significant associations between clinical variables and patient outcomes. Abdominal distension was significantly associated with adverse outcomes (p=0.026). Vomiting at presentation was also significantly associated with poor outcomes (p=0.045). The presence of associated injuries showed a significant association with outcomes (p=0.023).

Overall mortality was 10% (5/50), with no significant difference by gender or crude management category proportions in this table alone.

Symptoms predicting mortality

Distension: Presence was associated with higher death proportion (12.9% vs 5.3% without), and this association was statistically significant (p=0.026), marking distension as an important bedside red flag for poor outcome.

Vomiting: All deaths occurred among those with vomiting (17.2% vs 0% without), a strong and statistically significant signal (p=0.045) that vomiting at presentation correlates with mortality risk and should heighten vigilance and trigger aggressive monitoring and re-evaluation.

Guarding/rigidity: This sign was significantly associated with outcome (p=0.013), reinforcing that peritoneal signs carry prognostic weight and often correlate with injuries that need timely operative intervention.

Injury pattern predictors

Associated injuries overall were significantly linked to mortality (p=0.023). Within categories:

Head injury had a higher death proportion (20%), underscoring the compounding effect of TBI on outcomes in abdominal trauma and the need for early neurotrauma co-management.

Long bone fracture group showed the highest death proportion (50%), though absolute numbers are small (2/4), suggesting severe polytrauma physiology rather than the fracture itself drives risk; nonetheless, it flags a high-risk cohort needing intensified resuscitation and surveillance.

Chest injuries showed 0% deaths in this sample (0/9), but small numbers limit inference.

Non-predictive or non-significant variables

Gender had no association with mortality (male 10% vs female 10%; p=1.000), indicating sex did not influence short-term survival in this cohort.

Mode of trauma (RTA 4% deaths, fall 16.7%, assault 15.8%) did not reach statistical significance (p=0.367), likely due to limited sample size per stratum; numerically, falls/assaults trended higher but remain inconclusive here.

Tenderness (present 12.5% vs absent 0%; p=0.239), loss of distal pulses (present 9.5% vs absent 10.3%; p=0.924), and cold extremities (present 0% vs absent 12.2%; p=0.269) were not statistically significant; tenderness is ubiquitous and less discriminative, while distal pulse/cold extremity readings may have been variably documented or influenced by early resuscitation.

DISCUSSION

This prospective study provides valuable insights into the patterns, management, and outcomes of blunt abdominal trauma in a tertiary care setting in Maharashtra, India. The findings are consistent with global trends while highlighting specific characteristics relevant to the Indian healthcare context.

Demographic profile and epidemiology

The predominance of young males (80%) in our study aligns with recent Indian literature from Eastern India, where male predominance was even more pronounced at 92%.[9] Our male-to-female ratio of 4:1 is consistent with contemporary studies showing ratios ranging from 6.35:1 in tertiary trauma centers to 11.5:1 in rural settings.[10,11] The peak incidence in the 31-40 years age group represents the economically productive population, highlighting the significant socioeconomic impact of these injuries, which is consistent with recent epidemiological data showing mean ages ranging from 23.2 to 32.6 years across different Indian regions.[12,13]

Mechanism of injury and prevention

Road traffic accidents accounting for 50% of cases in our study is lower than the 56.8-78% reported in recent Indian studies, suggesting regional variations in injury patterns.[10,12,13] This finding underscores the critical need for improved road safety measures and trauma prevention strategies in India. Recent data from the National Crime Records Bureau indicates that road traffic injuries remain the leading cause of trauma-related deaths among young people in India, making prevention strategies crucial.[14] The high prevalence of assault-related injuries (38%) in our series may reflect regional sociodemographic factors and parallels findings from urban trauma centers where interpersonal violence contributes significantly to trauma burden.[13]

Diagnostic advances and clinical presentation

The universal presentation of abdominal pain (100%) contrasts with recent literature reports that clinical examination can be unreliable in up to 40% of blunt trauma cases.[15] However, the high prevalence of peritoneal signs (78% with tenderness, 62% with guarding) suggests that many patients in our series had significant intra-abdominal pathology requiring intervention, which is consistent with recent studies showing high rates of operative intervention in patients with obvious peritoneal signs.[10]

Management evolution and decision-making

The surgical intervention rate of 62% in our study aligns with recent Indian data showing operative rates of 32-66.1% across different centers.[10,12,13] This is higher than the 15-20% reported in many Western trauma centers, where non-operative management rates often exceed 80% for solid organ injuries.[16] Recent systematic reviews indicate that this difference may be attributed to several factors:

Patient presentation patterns: Later presentation in Indian settings, with only 5.1% of patients arriving within the "golden hour" in recent studies.[10]

Resource limitations: Limited availability of intensive monitoring facilities may favor surgical intervention in borderline cases.

Injury severity: Higher rates of hollow viscus injuries requiring surgical repair.

Contemporary non-operative management success

Recent literature supports the safety and efficacy of selective non-operative management (NOM) in appropriately selected patients. A 2024 Brazilian study reported 84.6% success rates for NOM in solid organ injuries, while Indian studies demonstrate success rates of 77-96.82%.[17,18] The failure rate of conservative management in our study (approximately 10.5%) is comparable to recent data showing failure rates of 3.17-15.62% across different Indian centers.[18,19]

Resource utilization and healthcare burden

The mean ICU stay of 3.82 days and blood transfusion requirements in our study reflect the significant resource burden of blunt abdominal trauma. Recent Indian studies report similar hospital stays ranging from 9.78 to 10.6 days, with mean transfusion requirements of 2.2 units [10,18]. These findings have important implications for healthcare planning and resource allocation in trauma care systems, particularly given the increasing incidence of road traffic accidents in India.

Recent systematic reviews highlight common limitations in trauma studies, including single-center designs, relatively small sample sizes, and limited follow-up data on quality-of-life outcomes. Our study shares these limitations, and future multicenter studies with standardized data collection protocols would enhance the generalizability of findings.

CONCLUSION

This study demonstrates that blunt abdominal trauma predominantly affects young males, with road traffic accidents being the leading cause. While surgical intervention remains necessary in the majority of cases in our setting, selective non-operative management can be safely applied in appropriately selected hemodynamically stable patients with adequate monitoring capabilities.

The significant association between clinical features such as abdominal distension, vomiting, and associated injuries with adverse outcomes provides valuable prognostic information for clinical decision-making. Early recognition, prompt resuscitation, and appropriate triage between conservative and surgical management are crucial for optimal patient outcomes.

The higher surgical intervention rate compared to international standards may reflect patient presentation patterns, resource constraints, and injury severity in the Indian healthcare context. Despite these challenges, the overall outcomes are acceptable and support the importance of maintaining surgical expertise and intensive care capabilities in trauma centers.

Public health initiatives targeting road safety and trauma prevention could significantly reduce the burden of blunt abdominal trauma. Healthcare system improvements should focus on enhancing trauma care infrastructure, training, and implementation of evidence-based management protocols adapted to local resources and conditions. The integration of emerging technologies such as AI- assisted diagnosis and predictive scoring systems may further improve outcomes and resource utilization in the future.

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REFERENCES

1. Davis JJ, Cohn I Jr, Nance FC. Diagnosis and management of blunt abdominal trauma. Ann Surg. 1976;183(6):672-8.
2. Isenhour JL, Marx J. Advances in abdominal trauma. Emerg Med Clin North Am. 2007;25(3):713-33.
3. Gururaj G. Road traffic deaths, injuries and disabilities in India: current scenario. Natl Med J India. 2008;21(1):14-20.
4. Hotes LS, Kalman E. The evolution of care for the chronically critically ill patient. Clin Chest Med. 2001;22(1):1-11.
5. Stassen NA, Bhullar I, Cheng JD, Crandall ML, Friese RS, Guillamondegui OD, et al. Selective nonoperative management of blunt splenic injury: an Eastern Association for the Surgery of Trauma practice management guideline. J Trauma Acute Care Surg. 2012;73(5 Suppl 4):S294-300.
6. Velmahos GC, Toutouzas K, Radin R, Chan L, Rhee P, Tillou A, et al. High success with nonoperative treatment of blunt hepatic trauma: the liver is a sturdy organ. Arch Surg. 2003;138(5):475-80.
7. Raza M, Abbas Y, Devi V, Prasad KV, Rizk KN, Nair PP. Non operative management of abdominal trauma – a 10 years review. World J Emerg Surg. 2013;8(1):14.
8. Nishijima DK, Simel DL, Wisner DH, Holmes JF. Does this adult patient have a blunt intra-abdominal injury? JAMA. 2012;307(14):1517-27.
9. Panda A, Mohapatra S, Satapathy MC. A prospective study of injury pattern and outcome of blunt trauma abdomen patients in a tertiary care hospital in eastern part of India. Int Surg J. 2020;7(8):2557-62.
10. Kumar A, Sridhar R, Kumar H, Hakeem A, Khan AV, Anwer M. Blunt abdominal trauma: a retrospective study on clinical presentation, management and

outcomes at a level I trauma center in Eastern India. BMC Emerg Med. 2024;24:142.
11. Sharma RK, Gupta A, Singh V. Blunt abdominal trauma: the experience in rural India and review of literature. Int J Res Med Sci. 2019;8(1):322-6.
12. Patil SM, Manjunath R, Kumar A. A prospective study of injury pattern and outcome of blunt trauma abdomen patients in a tertiary care hospital. Int Surg J. 2020;7(8):2557-62.
13. Singh A, Agarwal N, Sinha SK. Challenges in management of blunt abdominal trauma: a prospective study. Int Surg J. 2018;5(10):3298-304.
14. National Crime Records Bureau. Accidental Deaths and Suicides in India 2023. Ministry of Home Affairs, Government of India; 2024.Available at: https://www.ncrb.gov.in/accidental-deaths-suicides-in-india-adsi.html. Accessed 01 June 2025.
15. Biffl WL, Kaups KL, Pham TN, Rowell SE, Jurkovich GJ, Burlew CC, et al. Validating the Western Trauma Association algorithm for managing patients with anterior abdominal stab wounds: a Western Trauma Association multicenter trial. J Trauma. 2011;71(6):1494-502.
16. Coccolini F, Montori G, Catena F, Di Saverio S, Biffl W, Moore EE, et al. Liver trauma: WSES 2020 guidelines. World J Emerg Surg. 2020;15(1):24.
17. Sarquis LM, Collaço IA, Toderke EL, Fontes HS, Nassif AT, Freitas AC. Epidemiological profile of patients undergoing non-operative management in a trauma hospital: a historical cohort study. Rev Col Bras Cir. 2024;51:e20243421.
18. Byateppanavar VR, Teggimani VK, Suhas MS, Gowda AK. A study of the outcome of non-operative management of blunt abdominal trauma with solid organ injury. Res. J. Med. Sci. 2024;18:189-93.
19. Gupta A, Singh RK, Pandey S. Outcome of conservative management of solid visceral injury in blunt trauma abdomen. JK Science. 2024;26(3):145-9.

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