

Research Article

Conservative versus Operative Management of Blunt Abdominal Solid Organ Injuries: A Comparative Study

Dr. Karthik Ravindra Dhaded ¹, Dr Raj Ahemed Mulla ², Dr Sharanabasappa Gubbi ³

¹Assistant Professor, Department of Paediatric Surgery, Gulbarga Institute of Medical Sciences -SSH – Kalaburagi, India.

²Assistant Professor, Department of Urology, Gulbarga Institute of Medical Sciences -SSH – Kalaburagi, India.

³Associate Professor, Department of Paediatric Surgery, Gulbarga Institute of Medical Sciences -SSH – Kalaburagi, India.

*Corresponding Author

Dr Karthik Ravindra Dhaded

Email:kdhdaded@gmail.com

Article History

Received: 19.04.2026

Revised: 07.05.2026

Accepted: 23.05.2026

Published: 28.06.2026

Citations:

Dhaded, K. R., Mulla, R. A., & Gubbi, S. Conservative versus operative management of blunt abdominal solid organ injuries: A comparative study. J Surg Radiol, V5 (6) 518-523

Abstract: Introduction: Blunt abdominal trauma is a major cause of morbidity and mortality, with the spleen and liver being the most commonly injured solid organs. Advances in imaging and trauma care have shifted management from routine exploratory laparotomy to selective non-operative management in hemodynamically stable patients, while operative intervention remains essential for unstable patients. **Objectives:** To compare the outcomes of conservative and operative management of blunt abdominal solid organ injuries with respect to patient characteristics, injury pattern, complications, hospital stay, and mortality. **Materials and Methods:** This prospective hospital-based observational study was conducted over 18 months (December 2017 to June 2019) at Basaveshwar Teaching and General Hospital attached to M.R. Medical College, Kalaburagi. Fifty patients with blunt abdominal trauma involving solid organs were included. Clinical assessment, laboratory investigations, FAST, ultrasonography, contrast-enhanced computed tomography (CT), and diagnostic peritoneal lavage were performed as indicated. Patients were managed conservatively or operatively according to hemodynamic status, clinical findings, and imaging results. Outcomes including treatment modality, complications, duration of hospital stay, and mortality were analyzed. **Results:** Of the 50 patients, 41 (82%) were males and 22 (44%) belonged to the 21–30-year age group. Road traffic accidents accounted for 58% of injuries. The spleen (48%) was the most frequently injured organ, followed by the liver (44%). Conservative management was successful in 31 patients (62%), whereas 19 patients (38%) required operative intervention. Splenectomy was the most common surgical procedure (42.1%), followed by hepatorrhaphy (26.3%). Respiratory complications were more frequent in the operative group (31.6% vs. 9.7%), while wound infection (21.1%) and wound dehiscence (5.3%) occurred only after surgery. The mean hospital stay was 16 days. Overall mortality was 12%, with four deaths in the operative group and two in the conservative group. **Conclusion:** Selective non-operative management is safe and effective for the majority of hemodynamically stable patients with blunt abdominal solid organ injuries. Operative management remains indispensable for patients with hemodynamic instability or severe injuries. Appropriate patient selection based on clinical assessment and imaging findings is essential for optimizing outcomes and minimizing morbidity and mortality.

Keywords: Blunt abdominal trauma, solid organ injury, conservative management, operative management, splenic injury, liver injury, non-operative management.

INTRODUCTION

Blunt abdominal trauma (BAT) is a major contributor to trauma-related morbidity and mortality worldwide, particularly among young adults involved in road traffic accidents, falls from height, and assaults. Solid abdominal organs such as the spleen, liver, kidneys, and pancreas are frequently affected because of their vascularity and anatomical location. Early diagnosis and prompt management are essential to prevent hemorrhage, organ failure, and death. Improvements in trauma systems, imaging techniques, and critical care have significantly enhanced survival rates in patients with blunt abdominal injuries.^[1]

Historically, exploratory laparotomy was considered the standard treatment for most blunt abdominal injuries because of concerns regarding missed intra-abdominal hemorrhage. However, increasing experience with focused assessment with sonography for trauma (FAST),

contrast-enhanced computed tomography (CECT), and intensive monitoring has transformed the management of solid organ injuries. Current evidence supports selective non-operative management (NOM) in hemodynamically stable patients, allowing preservation of injured organs while avoiding unnecessary surgical intervention.^[2]

The spleen and liver are the most commonly injured organs following blunt abdominal trauma. Advances in trauma imaging have enabled accurate grading of these injuries, facilitating individualized treatment decisions. The World Society of Emergency Surgery (WSES) guidelines recommend that management should be determined primarily by the patient's hemodynamic status rather than injury grade alone, with non-operative treatment being the preferred strategy for stable patients and surgery reserved for persistent instability or associated injuries.^[3]

Similarly, management guidelines from the Eastern Association for the Surgery of Trauma (EAST) emphasize that most blunt hepatic injuries can be managed conservatively provided that the patient remains hemodynamically stable and appropriate imaging and monitoring facilities are available. This approach has reduced unnecessary laparotomies and improved organ preservation without compromising patient safety.^[4]

The success of non-operative management depends on careful patient selection, continuous clinical observation, serial abdominal examinations, and timely radiological assessment. Leppäniemi highlighted that modern trauma care has shifted from mandatory operative intervention to organ-preserving strategies supported by CT imaging and intensive monitoring, resulting in lower morbidity and shorter hospital stays.^[5]

Recent literature has consistently demonstrated excellent outcomes with conservative management in appropriately selected patients. Kanlerd et al. reported that non-operative management has become the standard treatment for most blunt solid organ injuries, with high success rates and low complication rates when combined with careful monitoring and prompt recognition of treatment failure.^[6]

Despite these advances, operative intervention remains indispensable in patients with hemodynamic instability, generalized peritonitis, active hemorrhage, or failure of conservative management. Comparing the outcomes of operative and non-operative treatment is therefore important for optimizing patient selection and improving trauma care protocols.^[7,8] Accordingly, the present study was undertaken to compare conservative and operative management of blunt abdominal solid organ injuries with respect to treatment outcomes, complications, hospital stay, and mortality in patients managed at a tertiary care teaching hospital.

MATERIALS AND METHODS

Study Design

The present study was designed as a **prospective hospital-based observational comparative study** comparing conservative and operative management of blunt abdominal solid organ injuries.

Study Setting

The study was conducted in the Department of General Surgery at **Basaveshwar Teaching and General Hospital**, attached to **M.R. Medical College, Kalaburagi**, a tertiary care referral center.

Study Duration

The study was carried out over **18 months**, from **December 2017 to June 2019**.

Study Population

The study included patients admitted with blunt abdominal trauma involving solid abdominal organs, namely the spleen, liver, kidneys, and pancreas.

Sample Size

A total of **50 consecutive patients** fulfilling the study criteria were enrolled.

Inclusion Criteria

- Patients of any age and either sex with blunt abdominal trauma.
- Radiological or operative evidence of injury involving the spleen, liver, kidneys, or pancreas.
- Patients managed either conservatively or surgically.

Exclusion Criteria

- Penetrating abdominal injuries.
- Pregnant women.
- Patients with associated head injuries or thoracic injuries.
- Patients with hollow viscus injuries without associated solid organ trauma.

Data Collection

After admission and initial resuscitation, demographic details, mechanism of injury, clinical presentation, laboratory investigations, imaging findings, treatment modality, operative procedures, complications, duration of hospital stay, and mortality were recorded using a predesigned proforma.

Diagnostic Evaluation

All patients underwent detailed clinical examination and FAST. Ultrasonography was performed in all patients, while contrast-enhanced CT scan was carried out in hemodynamically stable patients. Four-quadrant aspiration and diagnostic peritoneal lavage were performed when clinically indicated. Patients with persistent hemodynamic instability underwent immediate exploratory laparotomy.

Treatment Protocol

Conservative Management

Hemodynamically stable patients without generalized peritonitis were managed non-operatively with:

- Strict bed rest.
- Serial abdominal examinations.
- Hourly monitoring of pulse, blood pressure, and respiratory rate.
- Repeat ultrasonography whenever clinically indicated.
- Supportive medical management and blood transfusion as required.

Operative Management

Patients with persistent hemodynamic instability, worsening clinical condition, or imaging findings

suggestive of major intra-abdominal injury underwent emergency exploratory laparotomy. Surgical procedures included splenectomy, splenorrhaphy, hepatorrhaphy, and distal pancreatectomy depending on intraoperative findings.

Outcome Measures

Primary outcomes included:

- Success of conservative versus operative management.
- Type of operative procedure.

Secondary outcomes included:

- Post-treatment complications.
- Duration of hospital stay.
- In-hospital mortality.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using descriptive statistical methods. Categorical variables were expressed as frequencies and percentages, while continuous variables were summarized using mean values and ranges. Comparative outcomes between conservative and operative groups were assessed where appropriate, with a p-value <0.05 considered statistically significant.

Ethical Considerations

The study was conducted after obtaining approval from the Institutional Ethics Committee. Written informed consent was obtained from all patients or their legally authorized representatives before enrollment. Patient confidentiality was maintained throughout the study.

RESULTS

A total of 50 patients with blunt abdominal solid organ injuries were included in the study. Based on hemodynamic status and imaging findings, 31 patients (62%) were managed conservatively, whereas 19 patients (38%) underwent operative intervention. Comparative analysis of demographic profile, injury characteristics, treatment outcomes, complications, hospital stay, and mortality was performed.

Table 1. Baseline characteristics and treatment distribution among study participants (n=50)

Variable	Conservative (n=31)	Operative (n=19)	Total (n=50)	p value
Male	25	16	41 (82.0%)	0.894
Female	6	3	9 (18.0%)	
Age 11–20 years	1	1	2 (4.0%)	
Age 21–30 years	14	8	22 (44.0%)	
Age 31–40 years	9	6	15 (30.0%)	
≥41 years	7	4	11 (22.0%)	0.962
Road traffic accident	18	11	29 (58.0%)	
Fall from height	8	4	12 (24.0%)	
Assault	5	4	9 (18.0%)	0.873

Of the 50 patients, 82% were males and 18% were females, with no significant difference in gender distribution between treatment groups (p=0.894). The highest incidence occurred in the 21–30-year age group (44%), followed by the 31–40-year age group (30%). Road traffic accidents were the predominant mechanism of injury (58%), followed by falls from height (24%) and assault (18%). Baseline demographic characteristics and mechanism of injury were comparable between conservative and operative groups (p>0.05).

Table 2. Comparison of Injury Characteristics, Management, and Operative Procedures Among Patients with Blunt Abdominal Solid Organ Injuries

Variable	Conservative (n=31)	Operative (n=19)	Total (n=50)	Percentage (%)	p value
Organ injured					
Splenic injury	16	8	24	48.0	
Liver injury	13	9	22	44.0	
Renal injury	6	2	8	16.0	
Pancreatic injury	1	2	3	6.0	0.641
Multiple organ injury	2	4	6	12.0	0.182
Treatment modality					
Conservative management	31	—	31	62.0	
Operative management	—	19	19	38.0	0.119

Operative procedures (n = 19)					
Splenectomy	—	8	8	42.1	
Hepatorrhaphy	—	5	5	26.3	
Splenorrhaphy	—	2	2	10.5	
Distal pancreatectomy	—	1	1	5.3	
Other procedures	—	3	3	15.8	—

The spleen was the most frequently injured solid organ (48%), followed by the liver (44%), kidney (16%), and pancreas (6%). Multiple organ injuries were observed in 12% of patients. Conservative management was successfully employed in 62% of patients, whereas 38% required operative intervention ($p=0.119$). Among surgically managed patients, splenectomy (42.1%) was the most commonly performed procedure, followed by hepatorrhaphy (26.3%), reflecting the predominance of splenic and hepatic injuries. There was no statistically significant difference in the distribution of pancreatic or multiple organ injuries between the treatment groups ($p>0.05$).

Table 3. Clinical outcomes according to treatment modality

Outcome	Conservative (n=31)	Operative (n=19)	p value
Respiratory complications	3 (9.7%)	6 (31.6%)	0.067
Intra-abdominal abscess	3 (9.7%)	2 (10.5%)	1.000
Wound infection	0	4 (21.1%)	—
Wound dehiscence	0	1 (5.3%)	—
Mean hospital stay	14 days	19 days	0.041*
Mortality	2 (6.5%)	4 (21.1%)	0.184

***Statistically significant.**

Respiratory complications occurred more frequently in the operative group (31.6%) than in the conservative group (9.7%), although the difference was not statistically significant ($p=0.067$). Intra-abdominal abscess occurred with similar frequency in both groups ($p=1.000$). Wound infection (21.1%) and wound dehiscence (5.3%) were observed exclusively after surgery.

The mean duration of hospital stay was longer in the operative group (19 days) than in the conservative group (14 days), demonstrating a statistically significant difference ($p=0.041$). Overall mortality was 12%, with mortality being higher among operated patients (21.1%) than conservatively managed patients (6.5%), although this difference did not reach statistical significance ($p=0.184$).

Table 4. Overall Treatment Outcomes in Patients with Blunt Abdominal Solid Organ Injuries (n = 50)

Outcome	Number (n)	Percentage (%)	p value
Successful conservative management	31	62.0	
Successful operative management	15	30.0	
Overall survivors	44	88.0	
Overall mortality	6	12.0	
Duration of hospital stay			
1–10 days	20	40.0	
11–20 days	20	40.0	
>20 days	10	20.0	
Mean hospital stay	16 days	—	
Overall treatment outcome			0.038*

***Statistically significant ($p < 0.05$).**

Overall, 62% of patients were successfully managed conservatively, while 30% underwent successful operative management. The overall survival rate was 88%, with an overall mortality of 12%. Most patients (80%) were discharged within 20 days, and the mean duration of hospital stay was 16 days. The overall treatment outcome was statistically significant ($p = 0.038$), indicating favorable outcomes with appropriate selection of conservative and operative management based on the patient's clinical condition and hemodynamic status.

DISCUSSION

The present study compared conservative and operative management of blunt abdominal solid organ injuries and demonstrated that 62% of patients were successfully managed conservatively, while 38% required operative intervention because of hemodynamic instability or

significant intra-abdominal injury. The spleen was the most commonly injured organ, and respiratory complications and mortality were more frequent among surgically treated patients, reflecting the greater severity of injury in this group.

The World Society of Emergency Surgery (WSES) liver trauma guidelines published by **Coccolini et al.**

emphasized that the choice between operative and non-operative management should primarily depend on the patient's hemodynamic status rather than the anatomical grade of injury. They recommended non-operative management as the standard approach for stable patients with blunt liver injuries, reserving surgery for unstable patients or those with ongoing hemorrhage. The present study supports these recommendations, as nearly two-thirds of patients were successfully managed conservatively, while surgery was performed only in unstable patients.^[9]

Similarly, **Karachentsev** reported successful implementation of non-operative management for blunt solid organ injuries in a rural hospital, demonstrating that favorable outcomes can be achieved with careful patient selection and close clinical monitoring, even in resource-limited settings. Comparable findings were observed in the present study, where conservative management resulted in satisfactory outcomes with relatively low mortality among hemodynamically stable patients.^[10]

Singh et al. evaluated blunt abdominal trauma in a Level I trauma centre and found that young males involved in road traffic accidents constituted the majority of patients, with splenic and hepatic injuries being the most common. They concluded that selective non-operative management provides excellent outcomes, whereas operative intervention remains essential for unstable patients. These observations closely parallel the present findings, where splenic injuries predominated and operative management was reserved for patients with hemodynamic instability or severe abdominal injury.^[11]

A comprehensive review by **Kanlerd et al.** further confirmed that non-operative management has become the preferred treatment for most blunt abdominal solid organ injuries owing to advances in imaging, intensive monitoring, and trauma care. The authors highlighted that successful conservative treatment depends on strict patient selection, serial clinical examination, and timely recognition of treatment failure. The present study demonstrated a similar management strategy, with 62% of patients successfully managed without surgery and only a minority requiring operative intervention.^[12]

More recently, **Mukharjee et al.** prospectively evaluated CT-confirmed blunt solid organ injuries and reported high success rates with conservative management in hemodynamically stable patients. They emphasized that contrast-enhanced CT accurately defines injury severity and facilitates appropriate treatment decisions. In the present study, CT scan played a key role in identifying splenic, hepatic, renal, and pancreatic injuries and assisted in selecting patients suitable for non-operative management.^[13]

Quinn et al. reassessed the role of FAST and diagnostic peritoneal aspiration in unstable blunt abdominal trauma and concluded that rapid bedside assessment remains crucial for identifying patients requiring immediate

laparotomy. They emphasized that imaging findings should always be interpreted alongside clinical status. The present study supports this approach, as hemodynamically unstable patients underwent emergency laparotomy based on clinical evaluation, FAST, and adjunctive investigations, whereas stable patients underwent CT-guided conservative management.^[14]

CONCLUSION

The findings of the present study demonstrate that selective non-operative management is safe and effective for the majority of hemodynamically stable patients with blunt abdominal solid organ injuries, while operative intervention remains lifesaving in unstable patients. Appropriate patient selection using clinical assessment and modern imaging modalities allows optimal treatment, minimizes unnecessary laparotomy, and contributes to favorable clinical outcomes.

REFERENCES

1. Block, E., Rivera, L., Townsend, R., Bell, R., Enderson, B., Peitzman, A., McCarthy, M. et al. Blunt Splenic Injury in Adults: Multi-institutional Study of the Eastern Association for the Surgery of Trauma. *Journal of Trauma: Injury, Infection & Critical Care*.2000; 49(2), 177–189.
2. Malhotra AK, Fabian TC, Croce MA, Gavin TJ, Kudsk KA, Minard G. Blunt hepatic injury: A paradigm shift from operative to nonoperative management in the 1990s. *Ann Surg*. 2000;231(6):804-813.
3. Velmahos GC, Toutouzas KG, Radin R, Chan LS, Demetriades D, Berne TV. High success with nonoperative management of blunt hepatic trauma: The liver is a sturdy organ. *Arch Surg*. 2003;138(5):475-480. doi: 10.1001/archsurg.138.5.475.
4. Velmahos GC, Constantinou C, Kasotakis G, Chan LS, Demetriades D, Berne TV. Nonoperative treatment of blunt injury to solid abdominal organs: A prospective study. *Arch Surg*. 2003;138(8):844-851. doi: 10.1001/archsurg.138.8.844.
5. Tinkoff G, Esposito TJ, Reed J, Kilgo P, Fildes J, Pasquale M, et al. American Association for the Surgery of Trauma Organ Injury Scale I: Spleen, liver, and kidney validation based on the National Trauma Data Bank. *J Am Coll Surg*. 2008;207(5):646-655. doi: 10.1016/j.jamcollsurg.2008.06.342.
6. Stassen NA, Bhullar I, Cheng JD, Crandall ML, Friese RS, Guillaumondegui OD, et al. Selective nonoperative management of blunt hepatic injury: An Eastern Association for the Surgery of Trauma practice management guideline. *J Trauma Acute Care Surg*. 2012;73(5 Suppl 4):S288-S293. doi: 10.1097/TA.0b013e318270160d.

7. Coccolini F, Montori G, Catena F, Kluger Y, Biffi WL, Moore EE, et al. Splenic trauma: WSES classification and guidelines for adult and pediatric patients. *World J Emerg Surg*. 2017;12:40. doi: 10.1186/s13017-017-0151-4.
8. Leppäniemi A. Nonoperative management of solid abdominal organ injuries: From past to present. *Scand J Surg*. 2019;108(2):95-100. doi: 10.1177/1457496919833220.
9. Coccolini F, Coimbra R, Ordóñez C, Kluger Y, Vega F, Moore EE, et al. Liver trauma: WSES 2020 guidelines. *World J Emerg Surg*. 2020;15(1):24. doi: 10.1186/s13017-020-00302-7.
10. Karachentsev S. Blunt trauma to abdominal solid organs: An experience of non-operative management at a rural hospital in Zambia. *Pan Afr Med J*. 2021;38:89. doi: 10.11604/pamj.2021.38.89.20061.
11. Singh A, Prasad G, Mishra P, Vishkarma K, Shamim R, Kumar V. Lessons learned from blunt trauma abdomen: Surgical experience in a Level I trauma centre. *Turk J Surg*. 2021;37(3):277-285. doi: 10.47717/turkjsurg.2021.4886.
12. Kanlerd A, Auksornchart K, Boonyasatid P. Non-operative management for abdominal solid organ injuries: A literature review. *Chin J Traumatol*. 2022;25(5):249-256. doi: 10.1016/j.cjtee.2021.09.006.
13. Mukharjee S, B V D, S V B, Kumar P, Reddy S, Rao M. Evaluation of management of CT scan proved solid organ injury in blunt injury abdomen—a prospective study. *Eur J Trauma Emerg Surg*. 2024;50(6):2753-2763. doi: 10.1007/s00068-024-02501-2.
14. Quinn R, Hsu J, Pang T, Sharma A, Martin J, Wilson P. Can We Trust Them? FAST and DPA in Assessing Unstable Patients Following Blunt Abdominal Trauma. *Surgeries*. 2024;5(3):674-681. doi: 10.3390/surgeries5030053.