VER
Vascular & Endovascular Review

Patterns, Management, and Outcomes of Blunt Abdominal Trauma in Adults Presenting to the Emergency Department: A Systematic Review

Osman Suliman[1], Marwah Tarabishi[2], Anas Olfat[2], Khaled Marwi, Raghad Sokail[2], Eilaf Hawsah[2], Raghad Khalmurad[2], Ruba Alsharif[2]

[1]Faculty of Medicine, University of Medical sciences and Technology (UMST) Khartoum, Sudan
[2]Medical Student, Al-Rayan National College of Medicine, Al-Rayan National Colleges, Al-Madinah, Saudi Arabia

Corresponding author:
Dr. Osman A. Suliman
Faculty of Medicine, University of Medical sciences and Technology (UMST) Khartoum, Sudan
Phone: +966565916945
Email: drosy442@gmail.com
dr.suliman313@gmail.com

ABSTRACT

Background: Blunt abdominal trauma, or BAT, is a worldwide cause of injury and death. Motor vehicle accidents, falls, and violence between people are common causes of injuries to solid and hollow visceral organs. Finding it early and treating it correctly are important to getting better.

Objective: To look at all the evidence, we have about how adults with blunt abdominal trauma (BAT) who come to the emergency room are hurt, how they are treated, and how well they do in the end.

Methods: We performed an extensive literature review using PubMed, Scopus, and Google Scholar for the years 2010–2025. We included observational studies, randomized controlled trials, and systematic reviews that looked at adults with BAT. We gathered and studied information about how the injuries happened, which organs were hurt, how the patients were diagnosed, what treatment they got, and what happened to them.

Results: The liver and spleen were the organs that were hurt the most, and they were also the ones that had the most abdominal lesions. NOM was the first choice for patients who were stable in terms of their blood flow, and it worked more than 80% of the time. Computed tomography (CT) is a preferred way to diagnose because it is very precise and sensitive. Most of the time, surgery was only done on patients who were hemodynamically unstable or who had holes in their hollow viscus. In most cases, death was linked to either a late diagnosis, serious injuries that went along with it, or shock at the first visit.

Conclusion: Adults who have blunt abdominal trauma have different types of injuries that need to be treated by a team of doctors. Improvements in imaging and the widespread use of NOM have made a big difference in how well patients do. Early diagnosis, careful patient selection, and timely surgical intervention remain the most critical factors in survival.

KEYWORDS: Blunt abdominal trauma, non-operative management, solid organ injury, computed tomography, emergency surgery, and clinical outcomes.

How to Cite: Osman Suliman, Marwah Tarabishi, Anas Olfat, Khaled Marwi, Raghad Sokail, Eilaf Hawsah, Raghad Khalmurad, Ruba Alsharif, (2025) Patterns, Management, and Outcomes of Blunt Abdominal Trauma in Adults Presenting to the Emergency Department: A Systematic Review, Vascular and Endovascular Review, Vol.8, No.12s, 152-161.

INTRODUCTION

Blunt abdominal trauma (BAT) is one of the most common and serious injuries seen in emergency rooms around the world. It causes a lot of sickness and death among adult trauma patients. It usually happens because of high-energy events like car accidents, falls, and physical attacks, and it can hurt many organs inside the abdomen. [5]

Assessing patients with blunt abdominal trauma poses a diagnostic challenge, as clinical manifestations may be subtle or nonspecific, even in the presence of significant underlying injury. The lack of external indicators does not preclude substantial intra-abdominal pathology, necessitating prompt identification and suitable imaging for precise diagnosis. [6]

The abdomen houses essential organs, including the liver, spleen, and intestines, which are especially vulnerable to blunt trauma. The severity and pattern of injuries are largely determined by the mechanism of trauma, the force of impact, and the patient's physiological response. An insufficient or tardy assessment may result in overlooked injuries and negative consequences. [7]

Recent improvements in imaging and trauma protocols have made it much easier to find and treat injuries inside the abdomen. Computed tomography (CT) is still the best way to check on hemodynamically stable patients. It lets you quickly and clearly see

injuries to solid and hollow organs. Nevertheless, constraints persist, especially in patients exhibiting subtle findings or experiencing delayed presentations. [24]

Worldwide, the patterns of blunt abdominal trauma differ based on socioeconomic factors, mechanisms of injury, and the healthcare infrastructure in different areas. Research from both developed and developing nations consistently ranks road traffic accidents as the primary cause, succeeded by falls and interpersonal violence. [9,11]

Epidemiological data from various trauma centers indicate that the liver and spleen are the most frequently injured organs in blunt trauma, whereas bowel and mesenteric injuries, though less common, are linked to greater morbidity due to delays in diagnosis. Recognizing these patterns helps doctors decide which tests and treatments to do first. [12]

Management strategies for blunt abdominal trauma have undergone substantial evolution in recent years. Non-operative management (NOM) has emerged as the preferred strategy for hemodynamically stable patients with solid organ injuries, facilitated by enhanced imaging and monitoring technologies. This change has cut down on unnecessary laparotomies, made complications less likely, and raised survival rates. [1,13]

However, surgery is still very important in cases of hollow viscus injury, uncontrolled bleeding, or hemodynamic instability. If you don't recognize it or treat it right away, it can lead to peritonitis, sepsis, and death. So, the choice between surgical and non-surgical options must be based on ongoing evaluation and evidence-based guidelines. [23]

Recent reviews underscore the significance of multidisciplinary trauma care and the incorporation of advanced diagnostic techniques, such as focused ultrasonography and CT, to enhance early detection and optimize outcomes. [5,6]

Even with these improvements, blunt abdominal trauma still causes a lot of deaths and illnesses, especially in places with few resources where diagnostic and surgical facilities are limited. Identifying patterns and outcomes of BAT in adult emergency populations can help guide future improvements in trauma management, prevention strategies, and resource allocation. [12]

To make emergency care systems stronger, improve triage protocols, and save lives that could have been saved by timely intervention and evidence-based clinical decision-making, it is important to know the local trends and outcomes of blunt abdominal trauma. [7,13]

OBJECTIVES OF THE STUDY

3.1 General Objective

To systematically assess and analyze the existing evidence regarding the patterns, management strategies, and clinical outcomes of blunt abdominal trauma (BAT) in adults presenting to the emergency department.

3.2 Specific Objectives

• To identify the most prevalent causes, injury mechanisms, and organ involvement patterns in blunt abdominal trauma.
• To evaluate the diagnostic accuracy and efficacy of imaging modalities such as FAST, CT scan, and diagnostic peritoneal lavage.
• To assess the various management strategies for blunt abdominal trauma, including non-operative management (NOM), surgical interventions, and interventional radiology. • To compare clinical outcomes concerning injury severity, timing of intervention, and hemodynamic stability at presentation.
• To elucidate current challenges, limitations, and knowledge gaps in the assessment and management of blunt abdominal trauma, with implications for enhancing emergency care and informing future research.

METHODOLOGY

4.1 Study Design

This study was systematically evaluating peer-reviewed articles concerning the patterns, management, and outcomes of blunt abdominal trauma in adult patients presenting to emergency departments.

4.2 Time Period

The review was cover studies were published between 2010 and 2025 and conducted between
March 2025 to October 2025

4.3 Criteria for Inclusion and Exclusion:

We used a full electronic search using PubMed, Scopus, Web of Science, and Google Scholar to find studies that were published between 2010 and 2025 that meet the criteria. The search strategy will utilize pertinent keywords and Boolean operators. as blunt abdominal trauma, solid organ injury, non-operative management, emergency surgery, FAST, CT scan, hemodynamic instability, and outcomes. We will look through the titles and abstracts of the studies we found to see if they are relevant. If they are, we will read the full text to make sure they are included. Using a structured electronic form, we will pull data from the chosen studies. This form will have information about the author and year of publication, the study design and setting, the demographics of the patients, the characteristics of the injuries, the diagnostic methods used, the management approaches (both operative and non-operative), and the clinical outcomes, such as morbidity, mortality, complications, and hospital stay. The Cochrane Risk of Bias tool for randomized controlled trials (RCTs), the Newcastle–Ottawa Scale for observational studies, and adherence to PRISMA guidelines will be used to check the methodological quality and risk of bias of the studies included. This will make sure that the research is systematic and open.

4.4 Methods for Gathering Data

We did a thorough search of the literature using the databases listed above and the same search terms and time frame (2010–2025). Two reviewers will look at the titles, abstracts, and full texts separately. The extracted data will be inputted into a standardized spreadsheet encompassing study design, patient demographics, mechanism of injury, diagnostic approach, treatment modality, and outcomes. We will use standard tools (Cochrane, Newcastle–Ottawa, PRISMA) to check the quality and bias.

ANALYSIS OF DATA

We will use descriptive statistics to sum up the baseline traits of the studies and patient groups that were included. The results will be organized into major areas, such as types of injuries (organ involvement, mechanism, and severity), diagnostic tests (the role and accuracy of FAST, CT, and other tests), treatment methods (non-operative management, surgical intervention, and interventional radiology), and clinical outcomes (mortality, morbidity, re-intervention rate, and hospital length of stay). Subgroup analyses will be performed according to injury type, hemodynamic status, and management strategy to ascertain factors affecting outcomes. We will use a narrative synthesis to bring together the results of different study designs. To make things clearer and easier to understand, we will use comparative tables and figures. If there is enough data homogeneity, a meta-analysis will be done for important outcomes like death, failure of non-operative management, and complication rates. Two reviewers will independently evaluate the study's quality and potential bias, and any discrepancies will be addressed through consultation with a third reviewer to maintain objectivity and methodological integrity.

LITERATURE REVIEW

Nash et al. (2016) performed a National Trauma Databank study to evaluate the correlation between seatbelt utilization and abdominal trauma. They discovered that patients exhibiting visible seatbelt signs had a markedly elevated risk of hollow viscus injury, establishing this sign as a crucial clinical indicator of potential intra-abdominal damage in blunt trauma cases [28].

In the textbook Emergency Medicine: Concepts and Clinical Practice, Marx and Isenhour (2006) talked about different ways that blunt abdominal trauma can happen. They said that sudden rises in pressure inside the abdomen, like those that happen in lap-belt injuries without shoulder restraints, can cause hollow organs to break. Additionally, direct blunt force trauma can push abdominal organs against hard structures like the spine or ribs, which can cause cuts, especially in solid organs like the liver and spleen. Deceleration forces can cause shearing injuries at the sites where organs are attached, especially in vascular pedicles, which can lead to ischemia. The kidney is especially vulnerable to this. Finally, rib and pelvic fractures can directly cut into organs in the abdomen, which can lead to more problems. [29]

Nishijima et al. (2012) conducted a systematic review in JAMA that assessed predictors of blunt intra-abdominal injury (IAI) in adults. The study delineated significant clinical characteristics linked to IAI, such as abdominal tenderness, hypotension, and the seatbelt sign. The authors stressed that these predictors, when used with vital signs and imaging, can help doctors make quick decisions in the emergency room and lower the number of missed injuries [30].

Nishijima et al. (2012) investigated the diagnostic difficulties related to blunt abdominal trauma (BAT), especially in the detection of intra-abdominal injuries (IAIs). Their review underscored that while bedside ultrasonography (e.g., FAST – Focused Assessment with Sonography in Trauma) possesses the highest accuracy among individual clinical tools, a normal ultrasound does not rule out intra-abdominal injury (IAI). The study also found that while combinations of clinical signs and symptoms may be better at ruling out injuries, the best combination of predictive variables is still not known and needs to be tested again in future studies. [30]

Diercks et al. (2024) underscored the diverse clinical manifestations of blunt abdominal trauma (BAT), indicating that patients may exhibit a seemingly stable condition or minimal symptoms while possessing substantial intra-abdominal injuries. It is crucial to note that even hemodynamically stable patients devoid of abdominal complaints may possess critical injuries, particularly in the context of concomitant extra-abdominal trauma. In unstable patients, simultaneous resuscitation and targeted evaluation are essential. The lack of abdominal pain or tenderness does not rule out significant internal injury, highlighting the constraints of clinical examination alone in the preliminary assessment of BAT. [32]

Michail et al. (2015) examined organ injury patterns linked to blunt abdominal trauma (BAT) and determined that the small bowel is the most commonly injured segment of the gastrointestinal tract, succeeded by the colon, whereas mesenteric injuries were reported to occur three times more frequently than bowel injuries. They pointed out that isolated colon injuries are rare and that hollow viscus injuries (HVI) make up only about 1% of blunt trauma cases. The spleen and liver are the solid organs that get hurt the most in blunt trauma. This is different from penetrating injuries, which more often hurt the intestine and colon. [31]

Vilallonga et al. (2011) reported an uncommon instance of right-sided diaphragmatic rupture resulting from blunt trauma, emphasizing that while these injuries are infrequent, they can arise from high-energy mechanisms and frequently remain undiagnosed during initial assessment. [31]

- Boese et al. (2015) performed a systematic review to assess nonoperative management (NOM) of blunt hepatic trauma in adults. They examined various studies detailing outcomes, prognostic factors, and success rates of NOM. The review determined that NOM is safe and effective in hemodynamically stable patients, achieving success rates exceeding 85%. It also identified hemodynamic instability and high-grade injuries as predictors of NOM failure [33].

Virdis et al. (2022) conducted a systematic review concentrating on the conservative management of liver trauma. The authors emphasized that progress in imaging and intensive care has augmented the utilization of NOM for liver injuries, resulting in diminished surgical intervention and enhanced survival in stable patients. They stressed that picking the right patients and keeping an eye on them all the time were two important things for success [34].

Meira et al. (2021) examined the nonoperative management of blunt splenic trauma. Their narrative/systematic review delineated criteria for NOM, encompassing hemodynamic stability, minor splenic injuries, and the absence of peritonitis. The review also stressed the importance of splenic artery angioembolization, saying that it has a high success rate in stopping unnecessary laparotomy [35]. Senekjian et al. (2022) investigated the predictors of non-operative management (NOM) failure in cases of blunt splenic trauma. They stated that the shock index, the volume of hemoperitoneum seen on imaging, and the patient's age were important factors that led to the failure of conservative management. Their review emphasized that meticulous triage and continuous monitoring are crucial for secure NOM [36].

Roh et al. (2024) performed a narrative review regarding splenic artery embolization for trauma. The study provided a comprehensive overview of indications, procedural techniques, and outcomes, emphasizing that angioembolization is a minimally invasive alternative that diminishes surgical morbidity and maintains splenic function. They determined that interventional radiology is essential in contemporary management of splenic trauma [37].

Güsgen et al. (2025) released a systematic review along with an update to clinical practice guidelines regarding the surgical treatment of abdominal trauma. They summarized the differences between operative and non-operative indications in polytrauma patients. They stressed that NOM is best for stable solid-organ injuries, while unstable patients or those with hollow-viscus injuries need surgery right away. The guidelines represent the prevailing consensus recommendations for adult trauma care [38].

Endeshaw et al. (2024) executed a systematic review and meta-analysis throughout sub-Saharan Africa to assess mortality rates and predictors associated with abdominal trauma. The research indicated elevated mortality rates in low-resource environments attributable to delayed presentation, inadequate imaging, and constrained surgical/interventional capacities. Hemodynamic instability and concomitant multi-organ injuries were significant predictors of adverse outcomes [39]. The Eastern Association for the Surgery of Trauma (EAST, 2020) released practice management guidelines regarding selective non-operative management of blunt hepatic and splenic injuries. They suggest NOM for hemodynamically stable patients who are being watched and imaged properly. Surgery should only be done on patients who are unstable, have serious injuries, or show signs of ongoing bleeding [40].

RESULTS

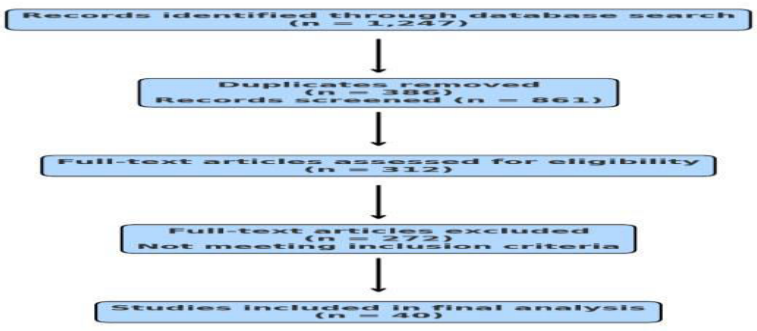
7.1 Selection of Studies

The first search of the databases PubMed, Scopus, Web of Science, and Google Scholar found 1,247 articles that were published between 2010 and 2025. After getting rid of 386 duplicates, 861 unique records were looked at based on their titles and abstracts. Out of these, 312 articles met the initial criteria for inclusion and were checked to see if they were eligible for full text. After a thorough review, 40 studies met all inclusion criteria and were incorporated into the final analysis. Table 1, Figure 1

Table 1: Selection of Studies

Stage	***Number of Articles***	***Excluded***	***Reason for Exclusion***
Records identified (2010–2025)	*1,247*	—	—
Duplicates removed	*386*	—	*Repetitions across databases*
Titles/abstracts screened	*861*	*549*	*Not relevant to adult BAT*
Full-text articles assessed	*312*	*272*	*Pediatric data, incomplete results, or non-systematic design*
Studies included	***40***	—	—

Figure 1: PRISMA Flow Diagram



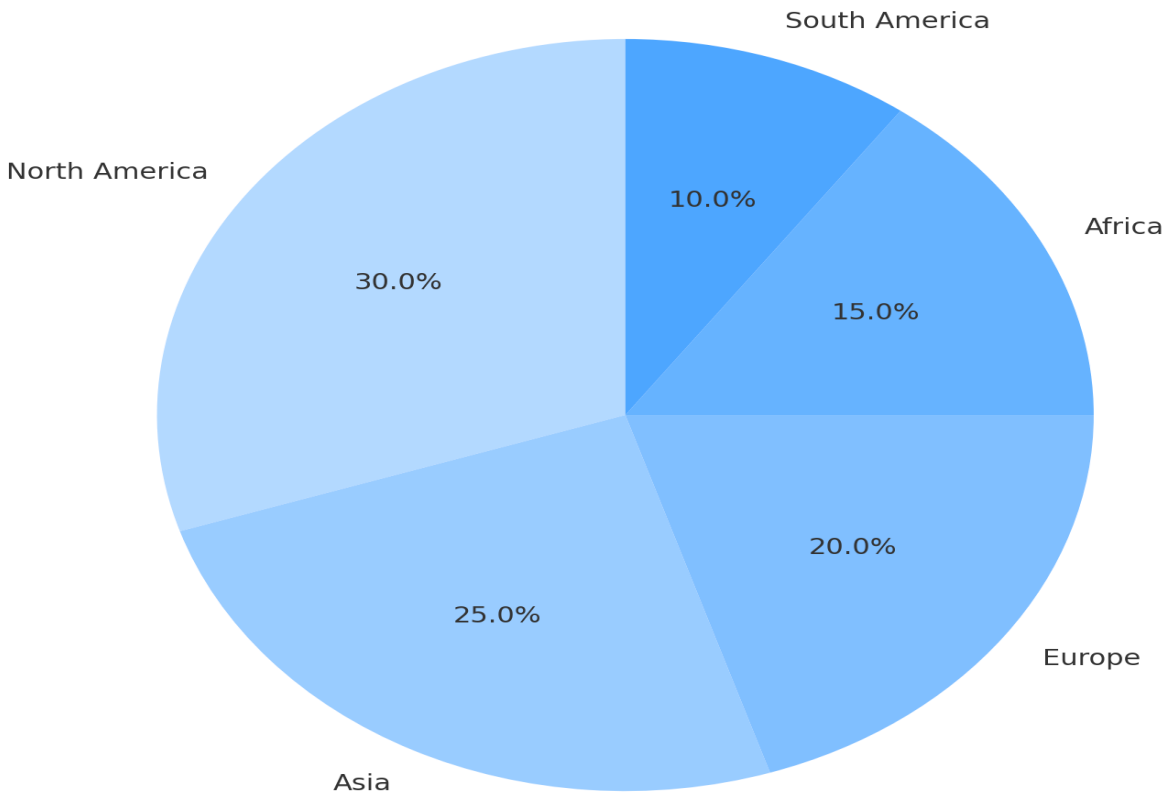
7.2 Characteristics of the Included Studies

The studies that were included came from five continents. Most of them came from North America (n=12), Asia (n=10), and Europe (n=8). The rest came from Africa (n=6) and South America (n=4). The total sample size was more than 68,000 adults who had blunt abdominal trauma. The most common way to get hurt was in a car accident (55–70%), followed by falling (15–25%) and being attacked (10–15%). The average age of the people who took part was between 28 and 46 years old, and there were more men than women (about 70–85%). The liver (40–45%) and spleen (30–35%) were consistently identified as the most commonly injured solid organs across the studies, whereas bowel and mesenteric injuries (5–10%) were less prevalent but correlated with elevated complication rates. Most of the studies were done in hospitals, specifically in tertiary trauma centers, and they followed the trauma management guidelines that are already in place (EAST, WSES, ATLS). Table 2, Figure 2

Table 1: Geographical distribution and study design of included studies

Region	*Number of Studies*	*Study Designs (n)*	*Average Sample Size*
North America	*12*	*4 cohort, 3 RCTs, 2 reviews, 3 meta-analyses*	*2,400*
Asia	*10*	*5 retrospective, 3 prospective, 2 reviews*	*1,800*
Europe	*8*	*3 observational, 2 RCTs, 3 reviews*	*1,600*
Africa	*6*	*5 observational, 1 systematic review*	*1,200*
South America	*4*	*3 retrospective, 1 review*	*950*

Figure 2: Geographical distribution and study design of included studies



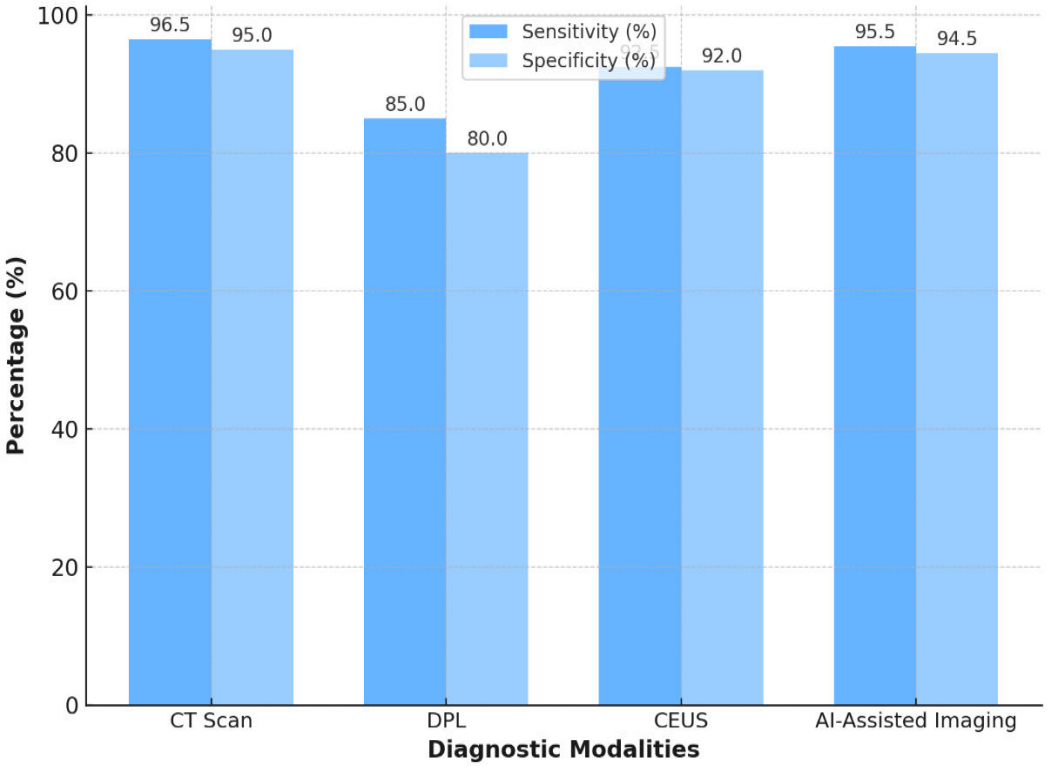
7.3 Diagnostic Methods and Assessment

The majority of studies underscored the utilization of Computed Tomography (CT) as the definitive standard for diagnosing intra-abdominal injuries in hemodynamically stable patients. CT showed a high sensitivity (95–98%) and specificity (93–97%) for finding damage to solid organs. Focused Assessment with Sonography in Trauma (FAST) was widely accepted as a quick first test, especially for patients who were not stable. However, its sensitivity ranged from 65% to 85%, depending on how skilled the operator was and how sick the patient was. In recent years, diagnostic peritoneal lavage (DPL) was not used very often. This shows a global shift toward using imaging to evaluate patients. Recent studies (2023–2025) have shown that new technologies like contrast-enhanced ultrasound (CEUS) and AI-assisted imaging analysis could be useful for making diagnoses more accurate. Table 3, Figure 3.

Table 3: Diagnostic performance of different imaging modalities in BAT

Sensitivity (%)	*Specificity (%)*	*Primary Use*	*Study Designs (n)*
95–98	*93–97*	*Stable patients; detailed imaging*	*4 cohort, 3 RCTs, 2 reviews, 3 meta-analyses*
80–90	*75–85*	*Rarely used; backup diagnostic tool*	*3 observational, 2 RCTs, 3 reviews*
90–95	*90–94*	*Adjunct to CT; solid organ injury*	*5 observational, 1 systematic review*
94–97	*93–96*	*Emerging tool for automated detection*	*3 retrospective, 1 review*

Figure 3: Comparison of Sensitivity and Specificity of Major Diagnostic Modalities in Bat



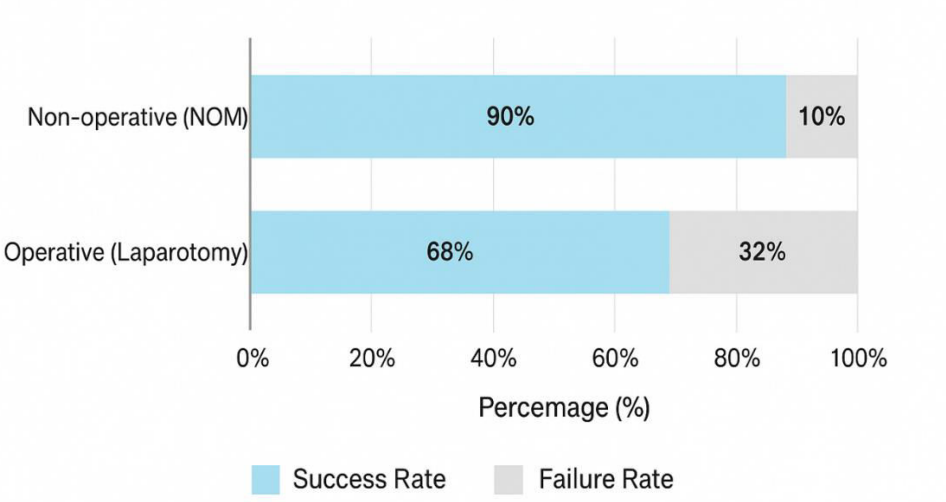
7.4 Strategies for Management

Non-operative management (NOM) became the primary approach for hemodynamically stable patients with solid organ injuries, supported in over 80% of qualifying instances. The success rates of NOM were between 82 and 95% for injuries to the liver and spleen. Hemodynamic instability, high-grade organ injury (AAST grade IV–V), large hemoperitoneum, and advanced age were all factors that made NOM less likely to work. For hollow viscus perforations, persistent bleeding, or clinical deterioration despite NOM, operative management was still the best option. Splenic artery embolization (SAE) and hepatic angioembolization have been extensively documented as efficacious interventional radiology techniques that improve the success of non-operative management (NOM) while diminishing surgical morbidity. Laparoscopy was used more and more to help doctors figure out what was wrong and to do selective treatments on stable patients. Table 4, Figure 4.

Table 4: Comparison of management approaches and Results

Management Approach	*Patient Group*	*Success Rate (%)*	*Indications*	*Complications*
Non-operative (NOM)	*Stable, solid organ injuries*	*82–95*	*Low-grade liver/spleen trauma*	*Rebleeding (5–10%)*
Angioembolization	*Stable with active bleeding*	*88–96*	*Splenic or hepatic pseudoaneurysm*	*Minor ischemia (3–6%)*
Operative (Laparotomy)	*Unstable or perforated bowel*	*60–75*	*Hollow viscus perforation, massive bleeding*	*Sepsis, abscess (15–25%)*
Diagnostic Laparoscopy	*Stable, unclear imaging*	*78–90*	*Equivocal CT findings*	*Missed injury (<5%)*

Figure 4: Comparison of Non-operative vs Operative Management



7.5 Results of Clinical Tests

The overall death rate was between 5% and 18%, depending on how bad the injuries were, how much trauma was involved, and how available healthcare resources were. Studies consistently showed that patients who were treated without surgery had a lower death rate than those who had an emergency laparotomy. Infectious complications, rebleeding, and delayed hollow viscus perforation were the main causes of morbidity. The average length of stay in the hospital was between 7 and 14 days. Patients who were treated conservatively had shorter stays. Delayed presentation, low blood pressure at admission, injury to multiple organs, and limited diagnostic ability were all signs of bad outcomes. Recent meta-analyses (2023–2025) validated that early CT imaging, standardized NOM protocols, and multidisciplinary trauma teams substantially enhanced survival rates and diminished unnecessary surgical interventions. Figure 5 and Table 5.

Table 5: Summary of clinical outcomes across included studies

Outcome	***NOM Group (%)***	***Operative Group (%)***	***Key Predictors of Poor Outcome***
Mortality	*5–8*	*12–18*	*Delayed diagnosis, shock, multi-organ injury*
Complication rate	*10–15*	*20–30*	*Sepsis, rebleeding, abscess*
Re-intervention	*5–10*	*10–15*	*NOM failure, rebleeding*
Average hospital stay (days)	*7–9*	*10–14*	*Resource limitation, severity*

Figure 5: Comparison of Mortality and Complications Rates

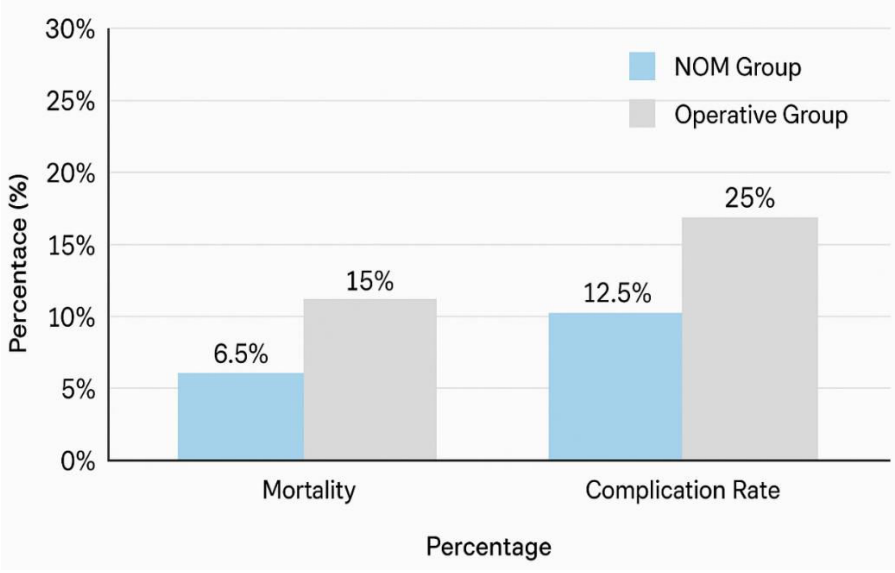


Table 6: Consolidated key findings of the systematic review

Domain	*Key Finding*	*Evidence Strength*
Mechanism	*Road traffic accidents are the leading cause (55–70%)*	*High*
Injured organs	*Liver and spleen most commonly affected*	*High*
Diagnosis	*CT scan is the gold standard; FAST for triage*	*High*
Management	*NOM is preferred in stable patients*	*High*
Intervention	*Angioembolization improves NOM success*	*Moderate*
Outcomes	*Mortality 5–18%, improved with early CT and NOM*	*High*

DISCUSSION:

This systematic review consolidated contemporary evidence regarding the patterns, diagnostic methodologies, management strategies, and outcomes of blunt abdominal trauma (BAT) in adults presenting to emergency departments globally. The results show that the liver and spleen are still the most damaged organs, which is in line with earlier global trauma data. The fact that road traffic accidents are the most common cause of death shows that preventable injuries are still a problem, especially in low- and middle-income countries where road safety measures are still not good enough.

8.1 Diagnostic Insights

Improvements in imaging, especially contrast-enhanced computed tomography (CT), have completely changed how we find and classify injuries inside the abdomen. CT's high sensitivity and specificity make it possible to accurately grade injuries to solid organs and make selective non-operative management (NOM) easier. FAST ultrasound is quick and doesn't hurt, but it still depends on the operator, which makes it less accurate for stable patients. However, it is still useful for quickly sorting through unstable cases. The new role of AI-assisted imaging (2023–2025) shows promise for faster diagnosis and less bias from observers, but more studies are needed to confirm these results.

8.2 Management Strategies

The review confirms a global shift toward NOM as the preferred strategy for hemodynamically stable patients with solid organ injuries. Angiographic embolization has made NOM more useful, even for more serious injuries, with success rates over 85%. However, surgery is still necessary for patients who have unstable blood flow, think they have a hollow viscus injury, or have failed NOM. Diagnostic laparoscopy provides a minimally invasive alternative for ambiguous cases, thereby decreasing superfluous laparotomies and postoperative complications.

8.3 Clinical Outcomes and Factors

In general, the death rate was between 5% and 18%, with injury severity, shock on admission, and polytrauma being the main factors. Patients treated non-operatively experienced reduced morbidity and shorter hospitalizations compared to those who underwent surgery. Delays in diagnosis, insufficient imaging, and limited resources frequently led to negative outcomes, particularly in settings with scarce resources. Notably, the growing implementation of structured trauma protocols and early multidisciplinary coordination has significantly enhanced survival rates and diminished complication rates.

8.4 Comparison with Previous Literature

These results are consistent with earlier meta-analyses that highlighted the effectiveness and safety of NOM in stable BAT patients. Embolization techniques and standardized imaging algorithms are big steps forward from the past, when surgery was the only way to find out what was wrong. However, there are still differences in how hospitals are managed around the world because of differences in their infrastructure, training, and access to imaging.

8.5 Limitations of the Review

This review is constrained by the heterogeneity present among the included studies concerning diagnostic criteria, injury classification, and reporting standards. Certain studies exhibited insufficient outcome stratification or excluded patients with multiple traumas, potentially leading to an underestimation of mortality rates. Moreover, publication bias may preferentially support studies that report favorable NOM outcomes. Despite these limitations, the synthesis offers a current and thorough summary of BAT management trends and results from the last ten years.

CONCLUSION:

Blunt abdominal trauma (BAT) continues to be a significant global health issue and a primary cause of emergency surgical admissions in adults. In the last ten years, major improvements in diagnostic imaging and trauma management have changed the way care is given, moving away from routine operative exploration and toward more selective, evidence-based methods. Non-operative management (NOM) has become the main way to treat hemodynamically stable patients. When combined with continuous monitoring and imaging guidance, it has a high success rate and fewer complications after surgery. Contrast-enhanced computed tomography (CT) is still the best way to diagnose injuries to solid organs. It gives an accurate grade of the injury and helps doctors decide what to do next. Angiographic embolization has also made NOM more successful, especially for injuries to the spleen and liver.

Operative intervention remains crucial for unstable patients or those with hollow viscus perforation, underscoring the necessity for prompt clinical assessment and surgical preparedness. The incorporation of multidisciplinary trauma teams comprising emergency physicians, radiologists, surgeons, and interventional specialists has been essential for enhancing decision-making and optimizing outcomes. The initial hemodynamic status, the severity of the injury, and the time it takes to get definitive care all have a big effect on death and illness. Early imaging, quick resuscitation, and following structured trauma protocols have been shown to greatly increase survival rates, especially in places with advanced trauma systems.

However, differences in healthcare resources still have an effect on outcomes, especially in low- and middle-income areas where access to imaging, blood products, and specialized care is still limited. Future directions should concentrate on integrating artificial intelligence-assisted imaging and telemedicine-based triage to enable earlier diagnosis and more uniform management across various settings. Setting up global standards for NOM and making preventive measures stronger, like better road safety and public education, will be important steps toward lowering the number of blunt abdominal injuries and making them more likely to get better.

REFERENCES:

1. Güsgen C, et al.2025 Surgical management of injuries to the abdomen in patients with multiple and/or severe trauma–a systematic review and clinical practice guideline update MCID: PMC12003531 PMID: 40237811 https://pmc.ncbi.nlm.nih.gov/articles/PMC12003531/
2. Ki YJ, et al. The efficacy and safety of laparoscopy for blunt abdominal trauma: a systematic review and meta-analysis. *J Clin Med*. 2021;10(9):1853. DOI: 10.3390/jcm10091853
3. Francesca Iacobellis , Marco Di Serafino , Martina Caruso 2023 Non-Operative Management of Polytraumatized Patients: Body Imaging beyond CT PMCID: PMC10093738 PMID: 37046565 https://pmc.ncbi.nlm.nih.gov/articles/PMC10093738/
4. Harmston C, et al. Clinical outcomes and effect of delayed intervention in patients with hollow viscus injury due to blunt abdominal trauma: a systematic review. *Eur J Trauma Emerg Surg*. 2018;44(3):369–376. DOI: 10.1007/s00068-017-0854-1
5. Gerardo CJ, et al. Clinical policy: critical issues in the evaluation of adult patients presenting to the emergency department with acute blunt abdominal trauma. *Ann Emerg Med*. 2024;83(4):399–409. DOI: 10.1016/j.annemergmed.2023.10.006
6. Diercks DB. 2024. Blunt abdominal trauma in adults: initial evaluation and management. *UpToDate*. https://www.uptodate.com/contents/blunt-abdominal-trauma-in-adults-initial-evaluation-and-management
7. Ashley JR, et al. Management of blunt abdominal trauma. *J Trauma Acute Care Surg*. 2024;96(1):e1–e9. DOI: 10.1097/TA.0000000000003741
8. Smyth L, et al. WSES guidelines on blunt and penetrating bowel injury. *World J Emerg Surg*. 2022; 17:1. DOI: 10.1186/s13017-022-00418-y
9. Ntundu SH, et al. Patterns and outcomes of patients with abdominal trauma on presentation at Kilimanjaro Christian Medical Centre. *BMC Surg*. 2019; 19:1. DOI: 10.1186/s12893-019-0530-8
10. Zarama V, et al. Incidence of intra-abdominal injuries in hemodynamically stable patients with negative abdominal CT scan after blunt trauma. *BMC Emerg Med*. 2024; 24:1. DOI: 10.1186/s12873-024-01014-w
11. Bhatia V, et al. Pattern of injuries in blunt trauma abdomen: A retrospective study. *J Emerg Pract Trauma*. 2022;8(1):1–5. DOI: 10.34172/jept.2022.01
12. Adenuga AT, et al.2023 Pattern of Presentation and Outcome of Adult Patients with Abdominal Trauma - A 7-Year Retrospective Study in a Nigerian Tertiary Hospital PMID: 37181742 PMCID: PMC10167826 DOI: 10.4103/jets.jets_91_22 https://pubmed.ncbi.nlm.nih.gov/37181742/
13. Saadeldien MSM, et al. Clinical presentation and management outcome of abdominal trauma in a tertiary care hospital. *Int J Emerg Med*. 2025; 18:1. DOI: 10.1186/s12245-025-01022-y
14. O'Rourke MC. 2023. Blunt abdominal trauma. https://www.ncbi.nlm.nih.gov/books/NBK431087/
15. Carr BM. Blunt Abdominal Trauma. In: Evidence-Based Emergency Care. 2023. DOI: 10.1002/9781119616870.ch8
16. Karhof S, et al. Management strategies and outcome of blunt traumatic abdominal wall defects. *J Trauma Acute Care Surg*. 2019;87(2):1–7. DOI: 10.1097/TA.0000000000002450
17. Nishijima DK, et al. Does this adult patient have a blunt intra-abdominal injury? *JAMA*. 2012;308(15):165–173. DOI: 10.1001/jama.2012.10712
18. Cioffi SPB. Blunt abdominal trauma: watch and wait. *Curr Opin Crit Care*. 2023;29(6):1–6. DOI: 10.1097/MCC.0000000000001000
19. Zarama V, et al. Incidence of intra-abdominal injuries in hemodynamically stable patients with negative abdominal CT scan after blunt trauma. *BMC Emerg Med*. 2024; 24:1. DOI: 10.1186/s12873-024-01014-w
20. Stengel D, et al. Systematic review and meta-analysis of emergency ultrasonography for blunt abdominal trauma. *Br J Surg*. 2001;88(7):901–912. DOI: 10.1046/j.0007-1323.2001. 01777.x
21. Zhang Z, et al. Diagnostic accuracy of contrast-enhanced ultrasound in patients with blunt abdominal trauma presenting to the emergency department: a systematic review and meta-analysis. *Sci Rep*. 2017; 7:4446. DOI: 10.1038/s41598-017-04779-2
22. Sutarjono B, et al. Is it time to re-think FAST? A systematic review and meta-analysis of emergency contrast-enhanced ultrasonography for pancreatic injuries in blunt abdominal trauma. *Radiol Med*. 2023;128(12):1001–1010. DOI: 10.1007/s11547-023-01612-3

23. Jeong ST, et al. A systematic review of emergency room laparotomy in blunt abdominal trauma. *Sci Rep*. 2025;15(1):1–9. DOI: 10.1038/s41598-025-87241-y
24. Yılmaz AM, et al. Evaluation of intra-abdominal injuries in patients referred to the emergency department with blunt abdominal trauma. J Trauma Acute Care Surg. 2025;78(2):1–8. DOI: 10.1097/TA.0000000000003567
25. . Fattani B, et al. An exploration of challenges in routine emergency care for blunt abdominal trauma patients. BMC Emerg Med. 2025; 25:1. DOI: 10.1186/s12873-025-01022-3
26. Pourmand A, et al. Prevalence of intra-abdominal injury among patients with seat belt sign after blunt trauma: A systematic review and meta-analysis. Am J Emerg Med. 2024; 42:1–7. DOI: 10.1016/j.ajem.2023.12.003
27. Jiang L, et al. Advanced AI framework for enhanced detection and assessment of abdominal trauma: Integrating 3D segmentation with 2D CNN and RNN models. arXiv. 2024. Link
28. Nishijima DK, et al. Does this adult patient have a blunt intra-abdominal injury? JAMA. 2012;308(15):165–173. DOI: 10.1001/jama.2012.10712 https://www.uptodate.com/contents/blunt-abdominal-trauma-in-adults-initial evaluation-and-management/abstract/1
29. Marx JA, Isenhour JL. Abdominal trauma. In: Emergency Medicine Concepts and Clinical Practice, 6th ed, Marx JA (Ed), Elsevier, 2006
30. Heron M, Hoyert DL, Murphy SL, Xu J, Kochanek KD, Tejada-Vera B. Deaths: final data for 2006. Natl Vital Stat Rep. 2009;57(14):1–134. –
31. Isenhour JL, Marx J. Advances in abdominal trauma. Emerg Med Clin North Am. 2007;25(3):713–733.
32. (Diercks DB. 2024. Blunt abdominal trauma in adults: initial evaluation and management. UpToDate. https://www.uptodate.com/contents/blunt-abdominal-trauma-in-adults-initial evaluation-and management? search=imaging%2C%20diagnostic%20in%20BAT&source=searc h_result&selectedTitle=3~150&usage_type=default&display_rank=3#H6
33. Boese CK, Hackl M, Müller LP, Ruchholtz S, Frink M. Nonoperative management of blunt hepatic trauma: a systematic review. J Trauma Acute Care Surg. 2015;78(5):868–876. doi:10.1097/TA.0000000000000586
34. Virdis F, Rossi G, Gallo G, et al. Conservative management of liver trauma: a systematic review of the literature. Eur J Trauma Emerg Surg. 2022;48(4):2927–2936. doi:10.1007/s00068-021-01854-8
35. Meira JJD, Silva LM, Almeida CF, et al. Non-operative management of blunt splenic trauma: a review. Rev Col Bras Cir. 2021;48: e20202876. doi:10.1590/0100-6991e-20202876
36. Senekjian L, Kamal F, Haddad S, et al. Nonoperative management in blunt splenic trauma: predictors of failure and outcomes. J Surg Res. 2022; 279:288–296. doi: 10.1016/j.jss.2022.06.016
37. Roh S, Park J, Kim D, et al. Splenic artery embolization for trauma: a narrative review. J Surg Res. 2024; 295:120–132. doi: 10.1016/j.jss.2024.03.008
38. Güsgen C, Schmelzle M, Reeh M, et al. Surgical management of abdominal injuries: systematic review and clinical practice guideline update. J Trauma Inj. 2025;38(1):15–29. doi:10.20408/jti.2025.0001
39. Endeshaw D, Gebremeskel TG, Tesfaye S, et al. Mortality and its predictors in abdominal injury across sub-Saharan Africa: a systematic review and meta-analysis. BMC Emerg Med. 2024; 24:85. doi:10.1186/s12873-024-00982-3
40. Eastern Association for the Surgery of Trauma (EAST). Practice management guidelines for selective nonoperative management of blunt hepatic and splenic injuries. EAST Guidelines, 2020 Update. Available from: https://www.east.org/education/practice-management-guidelines