



PELVIC TRAUMA ASSOCIATED WITH ABDOMINAL INJURY: A REVIEW OF MULTIDISCIPLINARY MANAGEMENT AND CLINICAL OUTCOMES

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ABSTRACT

Introduction: pelvic trauma associated with abdominal injury represents a life-threatening condition frequently resulting from high-energy mechanisms and is associated with significant morbidity and mortality. Its management requires a multidisciplinary approach due to the frequent coexistence of skeletal, vascular, and visceral injuries.

Objective: to analyze current evidence regarding multidisciplinary management strategies and clinical outcomes in patients with pelvic trauma associated with abdominal injury.

Methods: a narrative literature review was conducted using PubMed, Scopus, and Google Scholar databases, including studies published between 2010 and 2026. Keywords included pelvic trauma, abdominal injury, polytrauma, and damage control. Studies addressing adult patients, management strategies, and clinical outcomes were included.

Results: pelvic trauma associated with abdominal injury is commonly caused by high-energy mechanisms such as motor vehicle collisions and falls from height. Mortality ranges between 10% and 40%, particularly in patients with hemorrhagic shock. The most frequent associated injuries involve the spleen, liver, bowel, and genitourinary system. Early hemorrhage control strategies such as pelvic stabilization, packing, and angioembolization are associated with improved survival. Multidisciplinary management improves diagnostic speed, hemorrhage control, and overall outcomes.

Conclusions: pelvic trauma associated with abdominal injury requires an integrated multidisciplinary approach to reduce mortality and improve functional outcomes. Early identification, damage control strategies, and coordinated care remain essential in modern trauma systems.

KEYWORDS: Pelvic Trauma, Abdominal Injury, Polytrauma, Damage Control, Hemorrhage Control, Multidisciplinary Management.

INTRODUCTION

Pelvic trauma represents one of the most severe forms of injury encountered in trauma care because it is frequently associated with multisystem involvement and elevated morbidity and mortality. High-energy mechanisms such as motor vehicle collisions and falls from height commonly result in pelvic fractures accompanied by intra-abdominal injuries, including solid organ injuries, hollow viscus injuries, and vascular injuries. The coexistence of pelvic and abdominal trauma substantially increases diagnostic and therapeutic complexity and often requires coordinated multidisciplinary management to improve survival and clinical outcomes(1).

The management of pelvic trauma associated with abdominal injury has evolved from isolated specialty interventions toward an integrated multidisciplinary model.

Hemodynamic instability, active hemorrhage, visceral damage, and pelvic ring disruption frequently occur simultaneously, requiring coordinated participation among trauma surgeons, orthopedic surgeons, anesthesiologists, interventional radiologists, intensive care specialists, and emergency physicians. Contemporary trauma protocols emphasize early resuscitation, rapid imaging assessment, hemorrhage control, and timely operative and non-operative decision-making as essential strategies to reduce mortality and improve functional outcomes in these critically injured patients(2).

Pelvic trauma associated with abdominal injury remains a major challenge in modern trauma care because of the close anatomical relationship between the pelvic ring, vascular structures, and intra-abdominal organs. High-energy mechanisms may generate simultaneous skeletal and visceral



damage, increasing the need for rapid diagnosis and coordinated intervention. Although advances in trauma systems have improved survival, variability persists regarding the timing of intervention, sequencing of procedures, and coordination among specialties. Therefore, further evaluation of integrated management strategies and their impact on clinical outcomes remains necessary. The present study aims to analyze multidisciplinary management strategies and clinical outcomes in patients presenting with pelvic trauma associated with abdominal injury(3,4).

MATERIALS AND METHODS

Study Design

This study was designed as a narrative literature review aimed at analyzing current evidence regarding pelvic trauma associated with abdominal injury, with particular emphasis on multidisciplinary management strategies and clinical outcomes. The review focused on evaluating diagnostic approaches, hemorrhage control methods, surgical and non-surgical interventions, and factors influencing patient prognosis.

Expanded Search Strategy

The literature search was conducted using the PubMed, Scopus, and Google Scholar databases. Studies published between January 2010 and June 2026 were included. The search strategy combined MeSH terms and free-text keywords—including “pelvic fracture,” “pelvic trauma,” “abdominal injury,” “polytrauma,” “damage control,” “hemorrhage control,” and “clinical outcomes”—using the Boolean operators AND/OR.

Articles in English and Spanish were included. Selection focused on studies addressing clinical management, surgical strategies, hemorrhage control, and outcomes in adult patients.

Although a formal meta-analysis was not performed, the review followed general principles for the identification, selection, and synthesis of evidence available in the literature.

Eligibility Criteria

Studies were included if they addressed adult patients presenting pelvic trauma associated with abdominal injury and discussed diagnostic evaluation, multidisciplinary management, treatment strategies, or clinical outcomes. Original articles, systematic reviews, clinical guidelines, retrospective studies, and prospective observational studies were considered. Case reports, conference abstracts, duplicate publications, and studies lacking relevant outcome data were excluded.

Study Selection and Data Extraction

Relevant studies were screened according to title and abstract. Eligible articles underwent full-text review. Information extracted included study characteristics, patient population, mechanism of injury, associated abdominal lesions, therapeutic interventions, multidisciplinary involvement, complications, mortality, and reported clinical outcomes.

Data Synthesis

The collected evidence was analyzed descriptively and organized into thematic categories including epidemiology, diagnostic evaluation, multidisciplinary management,

hemorrhage control strategies, surgical decision-making, and patient outcomes. Findings were summarized to identify current trends and areas requiring further investigation.

RESULTS

Epidemiology and mechanisms of injury

Pelvic trauma associated with abdominal injury is predominantly related to high-energy trauma mechanisms and represents a major contributor to morbidity and mortality in polytraumatized patients. Motor vehicle collisions remain the leading cause, followed by falls from height, crush injuries, and high-impact occupational trauma. The incidence of associated abdominal lesions increases with unstable pelvic fracture patterns and severe disruption of the pelvic ring. Common concomitant abdominal injuries include hepatic, splenic, bowel, mesenteric, and genitourinary injuries, which may complicate diagnosis and treatment and increase the need for urgent intervention(1,5).

Hemodynamic instability and hemorrhage control

Hemodynamic instability is one of the principal determinants of mortality in patients with pelvic trauma and abdominal injury. Bleeding may originate from venous plexuses, cancellous bone surfaces, arterial injury, or intra-abdominal sources, frequently requiring simultaneous evaluation and management. Current trauma strategies emphasize early resuscitation, damage-control principles, pelvic stabilization, transfusion protocols, operative control of abdominal bleeding, and selective use of angioembolization to optimize outcomes and reduce preventable mortality(2).

Multidisciplinary management and clinical outcomes

Management of patients with combined pelvic and abdominal trauma requires close coordination among trauma surgeons, orthopedic surgeons, anesthesiologists, interventional radiologists, emergency physicians, and intensive care teams. Evidence suggests that structured multidisciplinary approaches contribute to faster diagnosis, improved hemorrhage control, reduction of treatment delays, and improved survival. Outcomes are influenced by injury severity, timing of intervention, associated organ damage, and institutional resources(2).

Temporary external fixation and pelvic stabilization remain essential adjuncts during early hemorrhage control in unstable patients.

Clinical outcomes reported in the literature

Mortality in patients with unstable pelvic trauma associated with abdominal injury varies widely, ranging from 10% to 40%, and increases significantly in the presence of hemorrhagic shock upon admission. Leading causes of death include uncontrolled massive hemorrhage and secondary multiple organ failure. The most common associated abdominal injuries include splenic (approximately 20–30%), hepatic (15–35%), intestinal (5–15%), and genitourinary (5–10%) injuries, although these proportions vary depending on the mechanism of trauma and the severity of the pelvic injury pattern. Early hemorrhage control via external fixation, pelvic packing, and angioembolization is associated with a significant reduction in

mortality compared to delayed or uncoordinated strategies(1,2,6–8).

Suggested initial approach in pelvic trauma with suspected associated abdominal injury:

Polytrauma patient → ATLS assessment

→ Hemodynamic instability

→ Placement of pelvic binder

→ Positive FAST or clinical suspicion

→ Damage control laparotomy + pelvic hemorrhage control (packing / external fixation / angioembolization depending on availability)

→ Hemodynamic stability

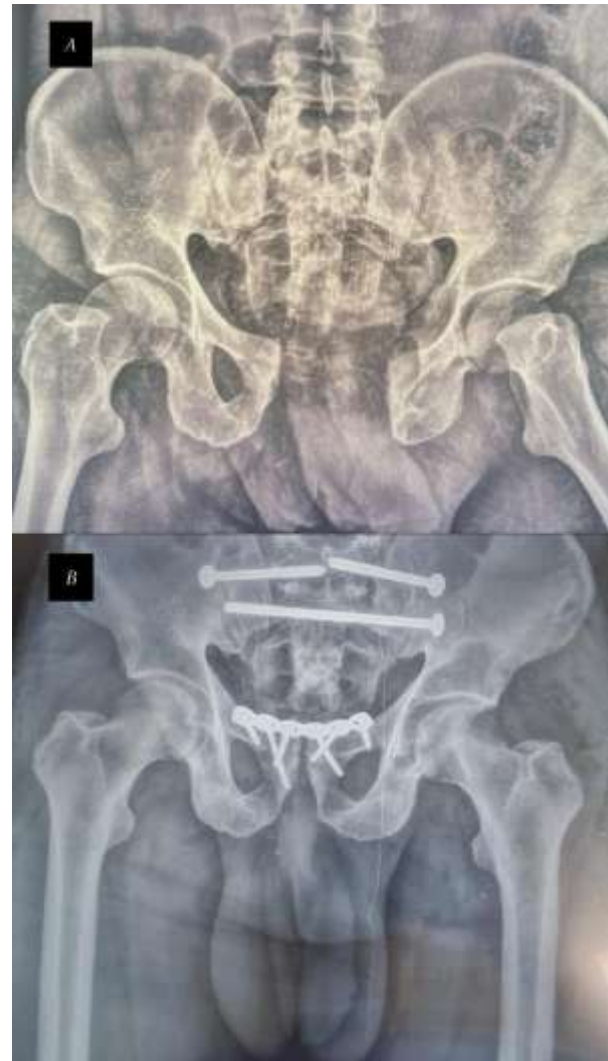
→ Whole-body CT scan

→ Significant abdominal injury → surgery or non-operative management depending on the organ involved

→ Unstable pelvic injury → DCO vs definitive fixation depending on physiological status

This approach emphasizes prioritization of hemorrhage control over definitive reconstruction during the acute phase of trauma.

Figure 1. Preoperative and postoperative anteroposterior pelvic radiographs of an unstable pelvic ring injury. (A) Preoperative radiograph demonstrating pubic symphysis diastasis. (B) Postoperative radiograph after definitive fixation with anterior symphyseal plating and posterior sacroiliac/transiliac screw fixation following removal of the temporary external fixator.



Source: Authors.

DISCUSSION

The findings of the present review are consistent with previous reports describing pelvic trauma as a complex clinical entity frequently associated with severe systemic involvement and high-energy injury mechanisms. Previous literature has emphasized that pelvic ring instability, associated visceral lesions, and hemodynamic compromise substantially influence prognosis and therapeutic decision-making. In addition, anatomical understanding and early structured assessment remain fundamental elements for optimizing patient care. These observations support the concept that management of pelvic trauma associated with abdominal injury should extend beyond isolated interventions and be approached through coordinated multidisciplinary strategies to improve outcomes(9).

The complexity of pelvic trauma associated with abdominal injury extends beyond skeletal disruption and frequently involves principles shared with broader trauma management. Previous analyses of traumatic abdominal injuries have emphasized the importance of rapid clinical assessment, early identification of associated lesions, and prioritization of life-threatening conditions to optimize outcomes. In patients with combined pelvic and abdominal trauma, these concepts become particularly relevant because delayed recognition of intra-abdominal injury may contribute

to increased morbidity and prolonged hospitalization. Therefore, integrated evaluation protocols and coordinated multidisciplinary care remain essential components of contemporary trauma management(10).

The findings of this review reinforce the importance of maintaining a systematic diagnostic approach in patients with combined pelvic and abdominal trauma. Previous analyses of intestinal and abdominal injuries have highlighted that delayed recognition of visceral damage may increase morbidity, prolong hospitalization, and negatively affect survival. Diagnostic strategies integrating clinical evaluation, serial examination, FAST ultrasound, computed tomography, and selective operative assessment remain fundamental for identifying associated injuries and guiding therapeutic decisions in complex trauma scenarios(11).

Another relevant concept identified across previous trauma literature is the role of damage control principles during the initial management of severe multisystem injury. Patients presenting pelvic trauma associated with abdominal lesions frequently exhibit hemorrhage, physiological instability, and concurrent priorities between orthopedic stabilization and abdominal intervention. In this context, staged treatment strategies based on early hemorrhage control, abbreviated procedures, intensive resuscitation, and delayed definitive reconstruction may contribute to improved survival and reduction of trauma-related complications. Furthermore, structured application of ATLS principles facilitates multidisciplinary coordination and prioritization of life-threatening injuries during the acute phase of treatment(12).

Damage control orthopedics and surgical timing

An additional consideration in patients with pelvic trauma associated with abdominal injury is the selection of the orthopedic strategy according to physiological status. The concepts of Damage Control Orthopedics (DCO) and Early Total Care (ETC) have gained relevance in polytraumatized patients presenting hemorrhage, systemic inflammatory response, and hemodynamic instability. While ETC promotes early definitive fixation in physiologically stable patients, DCO prioritizes temporary stabilization techniques—such as external fixation and staged procedures—to minimize additional physiological stress during the acute phase of trauma. In patients with combined pelvic and abdominal injuries, individualized decision-making and multidisciplinary coordination remain essential to optimize survival and functional recovery(7,13).

Successful management of pelvic trauma associated with abdominal injury depends less on isolated specialty interventions and more on early integration and coordination of a multidisciplinary trauma team. Early coordination among trauma surgery, orthopedics, and interventional radiology is a key factor in reducing preventable mortality in these critically ill patients.

Figure 2. Damage-control stabilization of a patient with high-energy pelvic trauma. (A) Clinical photograph demonstrating the anterior pelvic external fixator used for temporary damage-control stabilization (white arrow). (B) Coronal computed tomography scout image (CT scanogram) showing the external

fixation construct and the associated pelvic ring injury prior to definitive surgical fixation.



Source: Authors.

Limitations

This study presents several limitations inherent to its design as a narrative literature review. First, there is heterogeneity among the included studies, which limits the possibility of making direct quantitative comparisons. Second, the majority of the evidence comes from retrospective studies and case series, which may introduce selection and publication bias.

Furthermore, variability in trauma management protocols across different centers may influence the reported results. Finally, neither a statistical analysis nor a formal meta-analysis was performed; therefore, the conclusions must be interpreted within the descriptive context of the available evidence.

CONCLUSIONS

Pelvic trauma associated with abdominal injury remains one of the most challenging conditions in modern trauma care due to the high frequency of multisystem involvement, hemodynamic instability, and the need for rapid therapeutic decision-making. The coexistence of skeletal, vascular, and visceral injuries substantially increases morbidity and mortality and requires an integrated approach that extends beyond isolated specialty



interventions. Early identification of associated lesions through systematic assessment and appropriate imaging plays a fundamental role in optimizing outcomes and reducing preventable complications.

Current evidence supports the implementation of multidisciplinary management strategies involving trauma surgery, orthopedics, emergency medicine, anesthesiology, intensive care, and interventional radiology. Concepts such as damage control, early hemorrhage management, staged surgical intervention, and individualized orthopedic stabilization contribute to improved survival and functional recovery. Further studies are required to standardize management protocols and evaluate long-term outcomes in patients with combined pelvic and abdominal trauma.

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