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Anterior Column and Posterior Hemitransverse Acetabular Fractures: A Retrospective Case Series and Fresh Look at Contemporary Management

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Abstract : Anterior column and posterior hemitransverse (ACPHT) fractures have shown a rising prevalence within the acetabular injuries. While previously seen in high-energy trauma among younger patients, their incidence has risen sharply and now constitutes up to 25% of all acetabular fractures in the growing elder population, typically resulting from low-energy lateral compression falls. Diagnosing and classifying these fractures remains a clinical challenge due to their complex three-dimensional morphology; a defining feature of the ACPHT pattern is that the quadrilateral plate remains in continuity with the internally rotated posterior column. This report presents a retrospective series of six surgical cases, highlighting the clinical presentation, radiographic diagnosis, and evolving surgical approaches, with particular emphasis on the modern anterior intrapelvic (AIP) or modified Stoppa approach. Our case series demonstrates that using this single anterior, non-extensile intrapelvic approach, often improved by a lateral iliac window and posterior column screws, effectively minimizes the morbidity, reduces operative time, and enormous blood loss, traditionally associated with extensile or combined anterior-posterior exposures. By allowing direct visualisation and buttressing of the quadrilateral plate from the intrapelvic side, the modified Stoppa approach facilitates the simultaneous indirect reduction of the posterior hemitransverse component. When combined with a posterior column lag screw, this technique achieves rigid anatomical joint reconstruction with biomechanical stability comparable to conventional double-column plating. Ultimately, this approach allows for early patient mobilisation, helps prevent post-traumatic osteoarthritis, and establishes the isolated modified Stoppa approach as a safe, definitive, and highly adequate standard of care for these complex injuries.

IndexTerms **– ACPHT,Anterior column posterior hemitransverse,modified Stoppa.**

I. INTRODUCTION

The classification of acetabular fractures is universally guided by the Judet and Letournel system, which divides these injuries into elementary and associated fracture patterns. Despite this standardised system, diagnosing and classifying acetabular fractures remains a clinical challenge, as complex three-dimensional anatomy and transitional fracture forms do not always fit perfectly into a simple algorithm based on conventional X-rays (Gänsslen et al., 2024).

While historically considered less common, the incidence of ACPHT fractures has seen a sharp increase, now constituting approximately 20% of all acetabular fractures in the elderly, making it one of the most frequent fracture patterns observed in geriatric trauma (Chen et al., 2023; Krappinger, Freude, et al., 2024).

The criteria for an ACPHT fracture encompass fragments of anterior column fracture combined with a simple posterior hemitransverse fracture line (Krappinger, Gänsslen, et al., 2024). Importantly, the morphology of this fracture shows that the quadrilateral plate remains in continuity with the posterior column (Krappinger, Freude, et al., 2024; Le Quang et al., 2021). This allows for the internal rotation of the posterior column and the attached quadrilateral plate as the femoral head is rotated medially (Krappinger, Freude, et al., 2024).

In the elderly population, the predominant mechanism of injury is a low-energy lateral compression, typically a simple fall from standing height directly onto the greater trochanter (Heimke et al., 2022; Krappinger, Freude, et al., 2024). The force transmits through the femoral neck, mainly impacting the anterior and superior portions of the acetabulum first, followed by the posterior hemitransverse fracture component (Krappinger, Freude, et al., 2024).

While anteroposterior and Judet oblique pelvic radiographs are standard, CT scans with multi-plane reconstructions are imperative for a more accurate diagnosis (Gänsslen et al., 2024). On CT, ACPHT fractures can be distinguished from associated both-column (ABC) fractures by the absence of the ‘spur sign’ and the presence of an articular fragment which is still connected to the intact ilium (Gänsslen et al., 2024). Furthermore, the current mode of imaging frequently shows an “ACPHT fractures in the elderlies, which is a critical predictor of joint instability as well as poor prognosis (Krappinger, Freude, et al., 2024).

II. Case Series Presentation

We present a case series of six patients who were surgically treated for ACPHT fractures:

Case 1: A 25-year-old male underwent surgery (duration: 201 minutes) via a Modified Stoppa approach with a lateral window. Fixation involved plating of the iliac wing, suprapectineal and intrapelvic reconstruction plates crossing the symphysis pubis, a QLS buttress plate, and posterior column screw fixation. Figure 1(a) demonstrates the preoperative radiographic evaluation of a right anterior column and posterior hemitransverse acetabular fracture, while Figure 1(b) depicts the corresponding postoperative imaging and fixation construct.

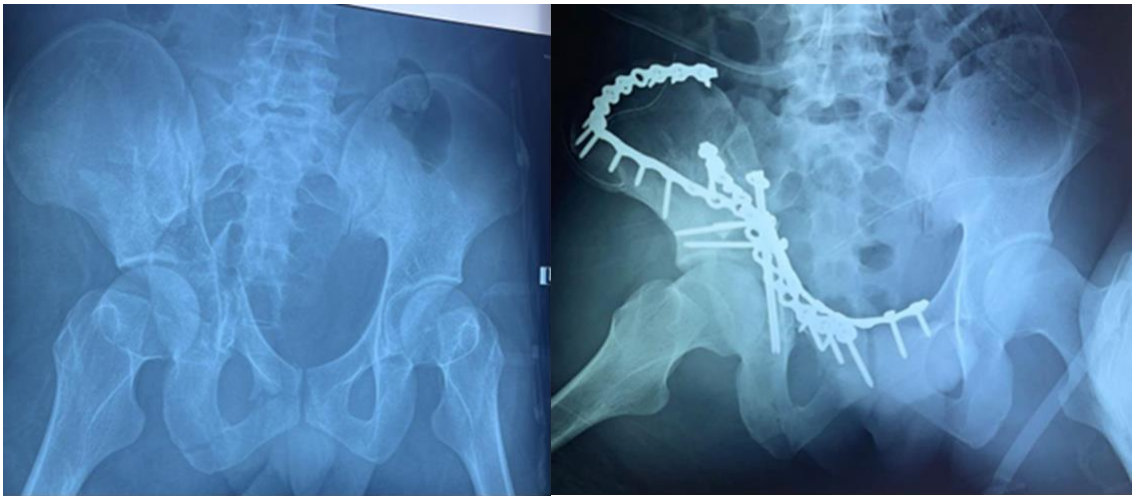


Figure 1(a): Preoperative radiographic assessment of a *right anterior column* and *posterior hemitransverse acetabular fracture.*
Figure 1(b): Postoperative imaging demonstrating an *iliac wing plating construct* and *quadrilateral surface buttressing* via an *intrapelvic reconstruction plate* and *suprapectineal plate* spanning the symphysis pubis; additional *posterior column screw fixation* was achieved through a *single Modified Stoppa approach augmented by a lateral window*.

Case 2: A 32-year-old male was treated percutaneously with a duration of 125 minutes utilising anterior column and supraacetabular screws. The application of a percutaneous anterior column screw alongside a supraacetabular screw is illustrated in Figure 2.



Figure 2(a): Preoperative radiographic assessment of a *right anterior column* and *posterior hemitransverse acetabular fracture*
Figure 2(b): Postoperative radiographic view demonstrating *percutaneous anterior column* and *supraacetabular screw fixation*, representing the definitive management for Case 2.

Case 3: A 29-year-old male was treated via a lateral window approach (duration: 4h 43m; EBL: 1.6L). Fixation included iliac wing plating with anterior column, supraacetabular, and posterior column screws. Figure 3 details the right-sided fracture morphology (3a) and the final construct (3b) achieved through this single-window approach.



Figure 3(a): Preoperative imaging detailing the *fracture morphology* of a *right-sided anterior column* with an associated *posterior hemitransverse component*.
Figure 3(b): Postoperative imaging showing *iliac wing plating* combined with *anterior column* and *posterior column screw fixation*, performed via a *lateral window approach*.

Case 4: A 24-year-old male was managed with percutaneous and lateral window approaches (duration: 2 hours, 5 minutes) using an anterior column screw, a supraacetabular screw, and a posterior column screw. The preoperative imaging (4a) and the definitive fixation construct (4b) for Case 4.

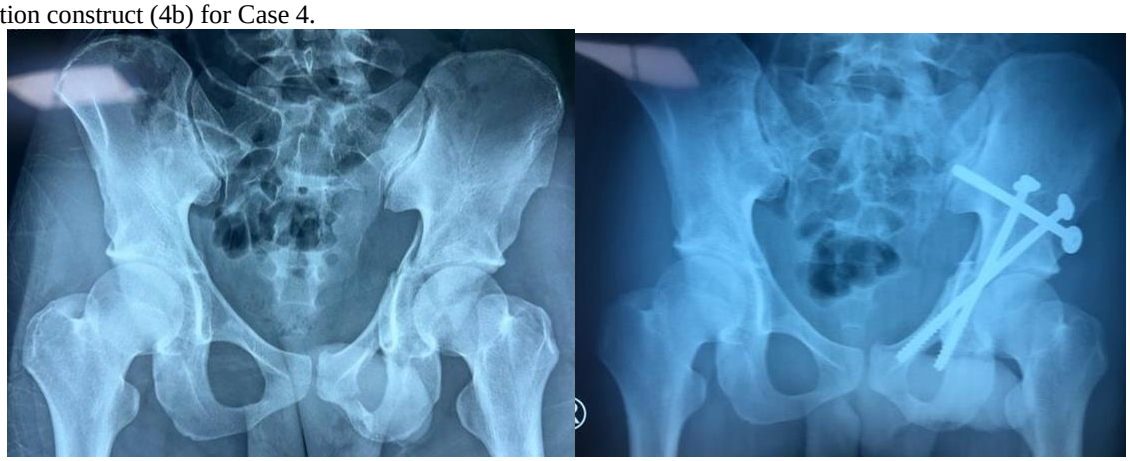


Figure 4(a): Preoperative radiographic assessment demonstrating the *fracture morphology* of a *left-sided anterior column* with an associated *posterior hemitransverse component*.

Figure 4(b): Postoperative radiographic view demonstrating *percutaneous anterior column* and *supraacetabular screw fixation*, complemented by a *posterior column screw* inserted through a *lateral window approach*.

Case 5: A 67-year-old male underwent a lateral window approach with a duration of 114 minutes for fixation with anterior column, supraacetabular, and posterior column screws. Figure 5 illustrates the clinical findings for Case 5.



Figure 5(a): Preoperative radiographic assessment demonstrating the *fracture morphology* of a *left-sided anterior column* with an associated *posterior hemitransverse component*.

Figure 5(b): Postoperative radiographic view demonstrating *percutaneous anterior column* and *supraacetabular screw fixation*, complemented by a *posterior column screw* inserted through a *lateral window approach*.

Case 6: A patient treated via a Modified Stoppa with a lateral window approach (duration: 4 hours, 21 minutes; estimated blood loss: 1.5L) using a suprapectineal J plate for the anterior column and a screw placed through the plate to the posterior column. The clinical findings for Case 6 are presented in Figure 6.

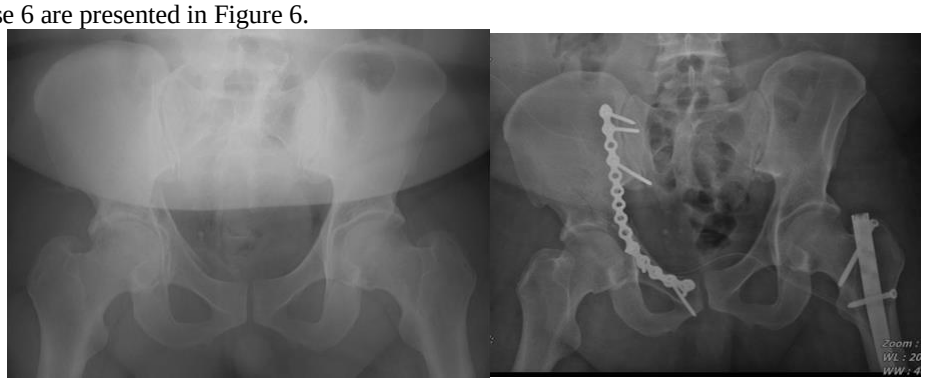


Figure 6(a): Preoperative radiographic assessment demonstrating the *fracture morphology* of a *right-sided anterior column* with an associated *posterior hemitransverse component*.

Figure 6(b): Postoperative imaging demonstrating *suprapectineal J-plating* for the *anterior colum*n, supplemented by *trans-plate posterior column screw fixation*; the construct was achieved via a *single Modified Stoppa approach augmented by a lateral window*.

III. Discussion

The hallmark of managing anterior column and posterior hemitransverse (ACPHT) fractures, being an intraarticular fracture, is restoring joint congruency through anatomical reduction of the articular surface (Kumar et al., 2023; Tanoğlu et al., 2018). Fixation through a rigid construct is critical to facilitate joint motion and enable early rehabilitation, hence preventing post-traumatic osteoarthritis, thereby optimizing functional outcomes and minimizing the high morbidity rates associated with prolonged bed rest (Debuka et al., 2021; Kumar et al., 2023). Non-operative management of displaced fractures often results in secondary arthritis and

poor functional outcome, rendering conservative management reserved strictly for stable, minimally displaced fractures without joint subluxation or the presence of a "gull sign" (Antunez-Muiños et al., 2025; Krappinger, Freude, et al., 2024).

Open reduction and internal fixation remain the gold standard for displaced fractures (Krappinger, Freude, et al., 2024). Recent biomechanical studies confirm that the combination of single-column plating with an inter-column lag screw, such as an anterior plate with a posterior column screw, provides biomechanical stability comparable to dual-column plating, traditionally done via extensive combined approaches (Krappinger, Freude, et al., 2024; Le Quang et al., 2021). For elderly patients with severe osteopenia, pre-existing arthritis, or extensive superomedial dome impaction, osteosynthesis failure rates remain high, possibly rendering primary total hip arthroplasty in combination with fracture fixation, a more successful alternative (Antunez-Muiños et al., 2025; Höch et al., 2022; Krappinger, Freude, et al., 2024).

Although traditional, more extensive exposures through a combined anterior and posterior approaches are highly traumatic, with severe soft-tissue injury, massive haemorrhage, and prolonged operative times, a shift towards a more contemporary surgery which favours a single, less invasive intrapelvic approach that allows direct visualization of the true pelvis, while minimising surgical morbidity, is gaining preference (Giordano et al., 2009; Wang et al., 2023; Kumar et al., 2026; Pohlemann et al., 2020; Sahin et al., 2023).

The anterior intrapelvic approach, or modified Stoppa, offers direct, intrapelvic extraperitoneal access to the true pelvic brim and quadrilateral surface without the need to dissect the inguinal canal or femoral neurovascular bundle (Kumar et al., 2026). This exceptionally versatile approach allows surgeons to directly buttress the quadrilateral plate using infrapectineal or suprapectineal plates to neutralize medializing forces, and to easily place antegrade posterior column lag screws without requiring a separate posterior incision (Chen et al., 2023). Despite its numerous advantages, the modified Stoppa technique has a steep learning curve and carries inherent risks, including obturator nerve injury, and potential catastrophic bleeding from the corona mortis. Restricted access is also seen in patients who are severely obese or have a history of prior lower abdominal surgeries (Baraka et al., 2022; Kumar et al., 2026; Tanoğlu et al., 2018).

When comparing contemporary literature to our six cases, the surgical strategies perfectly reflect the extreme evolution of the more minimally invasive techniques in acetabular reconstruction. All of our cases completely spared the posterior soft tissues and musculature and were managed exclusively through the anterior or lateral window. The novelty in our cohort is particularly evident in the highly sophisticated, single-approach anterior fixation constructs utilized in two of the cases. For instance, one case demonstrated trans-plate inter-columnar fixation by placing a screw directly through an anterior Recon J plate and driving it into the posterior column. This technique directly applies recent biomechanical concepts proving that a single anterior plate combined with a posterior column lag screw offers stability comparable to traditional double-column plating, achieving rigid dual-column stability without a posterior approach (Busuttil et al., 2019; Le Quang et al., 2021). Another case showcased a highly customized intrapelvic buttressing construct involving a suprapectineal plate, an intrapelvic reconstruction plate crossing the symphysis pubis, and a quadrilateral surface buttress plate combined with posterior column screws. Crossing the symphysis pubis with an intrapelvic reconstruction plate to anchor the construct is an aggressive method to achieve massive mechanical stability for a young patient through a single anterior window.

Furthermore, the remaining cases push the boundaries of minimally invasive osteosynthesis by relying on ultra-minimally invasive, screw-heavy constructs rather than extensive intrapelvic plating (Debuka et al., 2021). While standard practice typically dictates that a plate must be applied via an intrapelvic approach to physically buttress the medially displaced quadrilateral plate, several of our patients were successfully managed with isolated lateral windows or purely percutaneous techniques using only anterior column, supraacetabular, and posterior column screws (Singh et al., 2025). Notably, one case was managed entirely percutaneously with just an anterior column and supraacetabular screw, achieving fixation of a complex fracture in just 125 minutes with minimal blood loss. The other cases managed the complex posterior hemitransverse component using targeted posterior column and supraacetabular screws via a lateral window and percutaneous approach, completely avoiding deep intrapelvic dissection. This demonstrates that complex anterior column and posterior hemitransverse fractures—which traditionally required massive, morbid surgeries, can now be successfully managed with either screw-only constructs that reduce blood loss to near zero, or with single-window intrapelvic plating combined with trans-plate inter-columnar lag screws that provide the rigid stability of a dual-plate construct without the morbidity of a posterior surgical exposure (Debuka et al., 2021).

The modified Stoppa approach, frequently augmented by a lateral iliac window for high anterior column extensions, is now widely considered the standard and most common approach for surgically treating ACPHT fractures (Çaglar et al., 2020; Kumar et al., 2026; Pohlemann et al., 2020). When comparing contemporary literature to our six cases, the surgical strategies perfectly reflect modern minimally invasive trends. Our cohort utilised the modified Stoppa approach, lateral windows, and percutaneous techniques to manage the complex fracture patterns. Recent evidence highlights that combining anterior approaches with percutaneous posterior column screws significantly reduces operative times and blood loss while achieving precise fixation (Debuka et al., 2021; Wang et al., 2023).

The operative durations in our series, ranging from roughly two to eight hours, and estimated blood loss up to 1.6L, mirror the technical demands of these reconstructive procedures but successfully avoid the excessive morbidity seen with historical combined dual-incision approaches (Debuka et al., 2021; Kumar et al., 2026; Wang et al., 2023). The single anterior intrapelvic approach is mechanically appropriate and highly adequate for ACPHT fractures because the quadrilateral plate in this specific fracture pattern remains structurally contiguous with the internally rotated posterior column (Krappinger, Freude, et al., 2024; Krappinger et al., 2019; Le Quang et al., 2021). Therefore, directly buttressing and reducing the quadrilateral plate from the intrapelvic side simultaneously and indirectly reduces the posterior hemitransverse component (Collinge & Lebus, 2015; Le Quang et al., 2021). Extensive biomechanical and clinical analyses have consistently proven that a single anterior plate combined with a posterior column screw provides sufficient stiffness to withstand physiological weight-bearing forces, establishing the isolated modified Stoppa approach as a safe, definitive, and highly adequate standard of care for these complex injuries (Busuttil et al., 2019; Krappinger, Freude, et al., 2024; Le Quang et al., 2021).

IV. Conclusion

Anterior column and posterior hemitransverse (ACPHT) fractures are a complex, growing challenge in geriatric orthopaedic trauma. The highly morbid traditional exposures have largely been supplanted by the modified Stoppa (anterior intrapelvic)

approach. By providing direct extraperitoneal access to the true pelvis, it facilitates excellent anatomical reduction and allows surgeons to neutralize medializing forces using buttress plates. Furthermore, combining single-column anterior plating with a posterior column lag screw delivers stability equivalent to traditional dual-column plating, significantly reducing operative time, massive blood loss, and soft-tissue morbidity.

However, successful management demands careful patient selection. As mentioned, elderly patients with severe comminution, profound osteopenia, or superomedial dome impaction (the "gull sign"), surgeons should strongly consider acute total hip arthroplasty ("fix and replace") as a primary intervention to prevent early fixation failure and osteoarthritis. Ultimately, in appropriately selected patients, the modified Stoppa approach provides robust fixation that promotes early mobilization, restores joint congruency, and improves long-term functional outcomes.

V. Conflict of Interest (COI)

The authors declare that they have no conflicts of interest relevant to the content of this article.

VI. AI Declaration Statement

The authors used Gemini Pro and NotebookLM to refine language and overall readability of the manuscript. All AI-generated suggestions were critically reviewed, verified, and edited by the authors, who maintain full accountability for the integrity and accuracy of the final article.

VII. Acknowledgement

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