International Journal of Research in Orthopaedics
Chatrashali SA et al. Int J Res Orthop. 2024 Jul;10(4):794-798
http://www.ijoro.org

DOI: https://dx.doi.org/10.18203/issn.2455-4510.IntJResOrthop20241705

Case Series

Surgical and functional outcome of management of anterior column with posterior hemitransverse fracture of acetabulum

Shivaraj A. Chatrashali, Alok C. Patil, Chetan M. Nataraja, Rakshith A. Gaddi*

Department of Orthopaedics, Mahadevappa Rampure Medical College, Kalaburagi, Karnataka, India

Received: 27 December 2023
Revised: 03 February 2024
Accepted: 14 June 2024

***Correspondence:**
Dr. Rakshith A. Gaddi,
E-mail: rgaddi211@gamil.com

ABSTRACT

Fractures of acetabulum are relatively uncommon, but as they involve the major weight bearing joint in lower extremity, they assume great clinical importance. The displaced acetabular fracture fragments result in hip joint incongruity which in turn leads to abnormal pressure distribution over the articular cartilage surface. This may lead to accelerated breakdown of the articular cartilage, resulting in disabling irreversible arthritis of hip joint. The aim of treatment of these difficult acetabular fractures is concentric reduction of femur head under the weight bearing dome of acetabulum resulting in anatomic reduction and followed by a stable fixation. This can be achieved only by adequately exposing the acetabulum and by rigid internal fixation. In our series 20 patients were included. Majority of the patients were males with mean age of 43.85±16.88 years. Most common mechanism of injury was road traffic accident. Right side was most affected. Most of the cases were isolated injuries. Majority of the cases had no complications. At the final follow up, most of the cases had Excellent follow-up according to Modified Merle d'Aubigne and Postel score. Surgical management of Anterior column with posterior hemitransverse fracture of acetabulum gives excellent outcomes with least number of complications.

Keywords: Acetabular fracture, Anterior column with posterior hemitransverse fracture, Ilioinguinal approach, Modified Stoppa approach, Modified Merle d'Aubigne, Postel score

INTRODUCTION

Fractures of the acetabulum, although relatively rare, are extremely significant due to their involvement in the major weight-bearing joint of the lower extremity. These fractures predominantly occur in young adults as a result of high-impact trauma, and in the elderly, they can happen with even minimal trauma. Over the past 25 years, enhancements in vehicle safety, emergency medical services, resuscitation techniques, and standardized treatment protocols have markedly improved survival rates following severe pelvic injuries. However, only 10% of pelvic injuries affect the acetabulum.

When there is displacement in the fractured acetabular fragments, it causes hip joint incongruity, leading to uneven pressure distribution over the articular cartilage. This uneven pressure can cause the cartilage to deteriorate more rapidly, potentially resulting in severe, irreversible arthritis of the hip joint.

Acetabular fractures commonly coincide with injuries to other parts of the pelvis and lower limbs, affecting treatment options, surgical approaches, and clinical and radiological outcomes. Several factors influence treatment decisions, including the patient's age, fracture stability, presence of other health conditions, osteoporosis, and the experience of the surgeon.

Historically, non-operative treatment was the norm for

acetabular fractures due to a lack of comprehensive understanding of the acetabulum's normal and pathological anatomy and the surgical approaches required for the pelvis. However, in the 1960s, Judet and colleagues revolutionized the operative treatment of these fractures through the continuous refinement of pre-operative evaluation and fracture classification.[1]

The primary goal in treating challenging acetabular fractures is to achieve a concentric reduction of the femoral head under the weight-bearing dome of the acetabulum, leading to anatomic reduction and subsequent stable fixation. This requires adequate exposure of the acetabulum along with rigid internal fixation. Addressing displaced pelvic fractures that involve the acetabulum poses considerable difficulty. Closed methods alone often fail to completely restore the articular congruity and achieve necessary stability for early hip joint mobilization

Managing acetabular fractures is complex and involves a significant learning curve. It remains a sophisticated area within orthopedics, subject to continuous refinement.[2] Therefore, this study aims to evaluate the effectiveness and complications associated with the surgical management of anterior column fractures with posterior hemitransverse fractures of the acetabulum.

CASE SERIES

The study was conducted on 20 patients with Acetabular injury from 2018 to 2020. Clinically and radiologically diagnosed cases of Anterior column with posterior hemitransverse fractures of acetabulum and evaluating postoperatively at 6 weeks, 3 months and 6 months interval using Modified Merle d'Aubigne and Postel scoring system.

Statistical analysis was done using software version IBM SPSS 20.00. Collected data were spread on excel sheet and master chart was prepared. Through the master chart, tables, graphs and diagrams were prepared. For quantitative data analysis, paired and unpaired t-tests were applied.

Written and informed consent were taken in patient's own vernacular language.

Inclusion criteria

Patients who had following criteria were included clinically and radiologically diagnosed cases of anterior column with posterior hemitransverse fracture of acetabulum; age group 18 to 75 years of either sexes; fracture duration less than 14 days after haemodynamic stabilization; and failed internal fixation less than 15 days.

Exclusion criteria

Patients who had following criteria were excluded that having isolated posterior column fractures of acetabulum; compound fractures of pelvis; unfit for surgery; pregnant and associated major visceral injury.

Study observed that, maximum number of cases 9 (45.0%) belonged to the age group of 20-35 years, followed by 3 (15.0%) cases which belonged to the age group of 36-50 years, 4 (20.0%) cases which belonged to the age group of 51-65 years, 4 (20.0%) cases which belonged to the age group of 66-80 years. The mean age of cases was 43.85±16.88.

Table 1: Age distribution.

Age in years	N	%
20-35	9	45.0
36-50	3	15.0
51-65	4	20.0
66-80	4	20.0
Total	20	100.0
Mean±SD	43.85±16.88	

Study observes that, males were dominant with 13 (65.0%) cases and female cases were 7 (35.0%).

Table 2: Gender-wise distribution.

Gender	N	%
Male	13	65.0
Female	7	35.0
Total	20	100.0

Study observed that out of 40 cases, 11 (55.0%) of cases had right side injury and 9 (45.0%) cases had left side injury.

Table 3: Side-wise distribution.

Side	N	%
Left	9	45.0
Right	11	55.0
Total	20	100.0

In the present study, 15 (75.0%) cases were injured by RTA (road traffic accidents), 5 (25.0%) cases got injured due to fall from height.

Table 4: Mode of injury wise distribution of cases.

Mode of injury	N	%
RTA	15	75.0
Fall from height	5	25.0
Total	20	100.0

According to our study, 14 of the cases had excellent score, 1 had very good score, 3 had good score, 1 fair and 1 poor score at the final follow up as per modified Merle d'Aubigne and Postel score.

Table 5: Mode of injury wise distribution of cases.

Modified Merle d'Aubigne and Postel score	N	%
Excellent	14	70.0
Very good	1	5.0
Good	3	15.0
Fair	1	5.0
Poor	1	5.0
Total	20	100.0

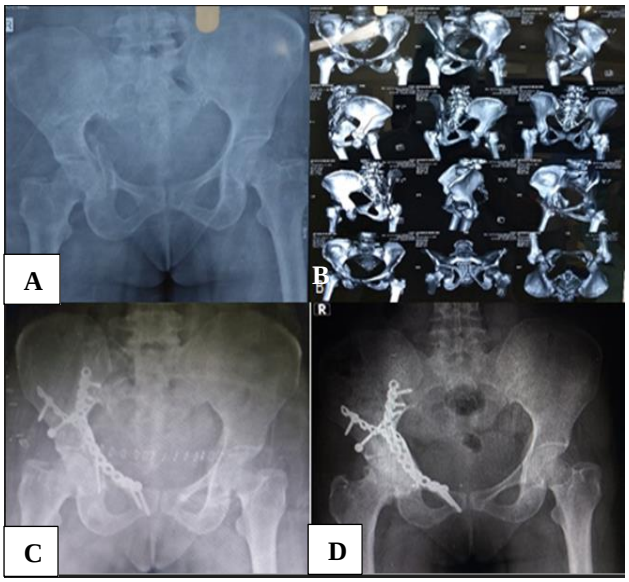

Figure 1: 40-year-old female right sided ACPHT fracture (A) pre-op X-ray; (B) pre-op CT scan; (C) immediate post-op X-ray; and (D) 6 months' post-op X-ray.

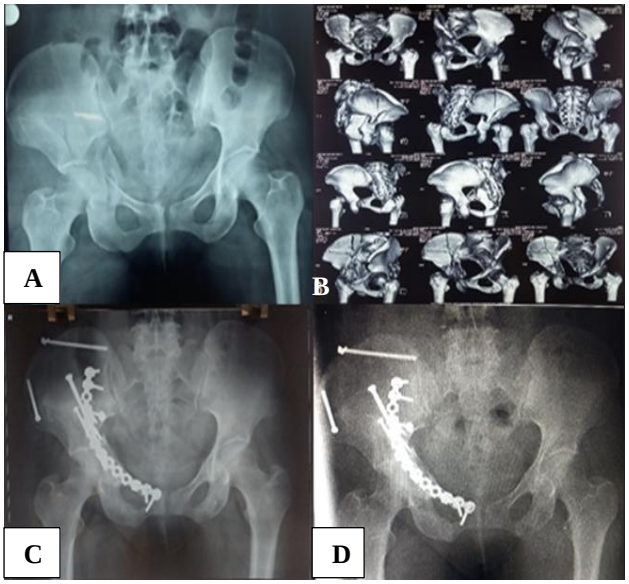

Figure 2: 34-year-old female right sided ACPHT fracture (A) pre-op X-ray; (B) pre-op CT scan; (C) immediate post-op X-ray; and (D) 6 months' post-op X-ray.

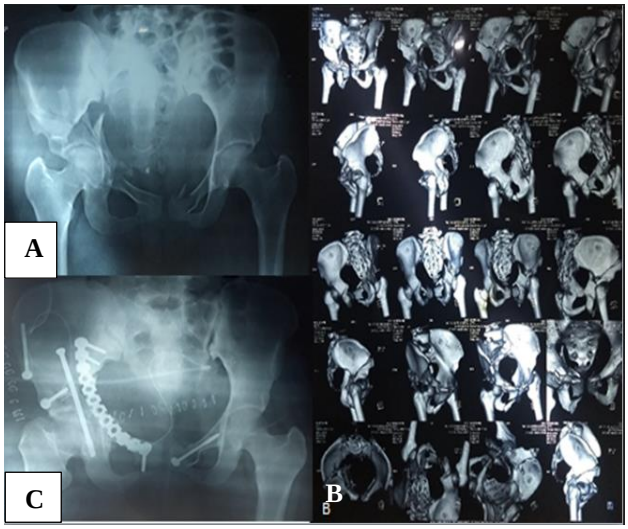

Figure 3: 24-year-old female right sided ACPHT fracture (A) pre-op X-ray; (B) pre-op CT scan; (C) immediate post-op X-ray.

DISCUSSION

Associated anterior column plus posterior hemitransverse fractures are uncommon injuries with an expected frequency of approximately 2-7% of all acetabular fractures; however, depending on demographical changes, this fracture type will be seen more frequently in the future. The supposed injury mechanism is a lateral compression against the greater trochanteric area. Bony instability depends on the level of the anterior column component and in high ending posterior hemitransverse fractures on involvement of the greater sciatic notch. Approximately half of the fractures are minorly displaced and can sufficiently be treated nonoperatively. Surgical treatment is indicated in displaced or unstable fractures.

The options for acetabular fracture management are wide and are being continuously refined over time. Acetabular fracture is encountered mostly in young individuals and mainly due to road traffic accidents. Our study confirms the same.

According to Tile et al transverse fracture has the best prognosis and anterior column with posterior hemitransverse.[3] Our study confirms the same with prognosis of anterior column with posterior hemitransverse fracture of acetabulum.

The mean age group in our study was 43.85 years with Swiontkowski et al having a similar mean age. Males predominated as in other studies.[4]

Even though this current study comprised a small cohort of 20 patients, following a standard protocol of good pre-operative planning, use of modified Stoppa approach with lateral window of ilioinguinal approach and early rehabilitation, we were able to achieve excellent results as per modified Merle d'Aubigne and Postel scoring system.[5]

However, further long term follow up is needed to comment on the final functional outcome.

Results of Letournel et al reported an incidence of this fracture type of 6.6%.[6] Overall, in 65 fractures, the sex ratio was 3:1 (male: female). Fifty patients had open reduction and internal fixation within 3 weeks. In 38 cases, the ilioinguinal approach was used, in 5 patients, the extended iliofemoral approach; and in 5 other patients, the K-L approach. An anatomical reduction was achieved in 68%. Clinical and radiological follow-up was available in 41 patients, 75.6% had an excellent result using the Merle d'Aubigne score. The overall rate of good to excellent clinical results was 85.4%. In our study, Male to female ratio was 2:1 and we used Modified Stoppa approach with lateral window of ilioinguinal approach in all cases, anatomical reduction was achieved in most cases and 90 % overall rate of good to excellent results according to modified Merle d'Aubigne and Postel score. These results were also similar in a study done by Mears et al.[7]

Results of Matta et al out of 262 acetabular fractures, 15 patients were seen with an associated anterior column plus posterior hemitransverse fracture (5.7%).[8] Fourteen patients were stabilized using the ilioinguinal approach and one patient using the extended iliofemoral approach. Anatomical reduction was achieved in seven patients and six had near anatomical reduction. According to the Merle d'Aubigne score, results included eight excellent, five good, one moderate, and one poor.

Management of displaced fractures of the acetabulum requires adequate exposure with minimal morbidity. According to Tile et al even with the best hands, depending upon the type and complexity of these fractures, anatomic reduction can be achieved in only 70% cases of acetabular fractures.[3] In this study, we were able to obtain good reduction and favorable result in short term which were similar to a metaanalysis from Giannoudis et al which showed good to excellent results in 72% of anterior column with posterior hemitransverse fractures and Briffa et al were able to achieve anatomical reduction in 9 of 9 cases in their series with 100% good to excellent outcomes.[9,10]

The highlight of open reduction and internal fixation is accurate anatomic reduction, rigid stable fixation and early mobilization which can keep the joint functional as stated by Matta.[8] Pennal et al documented that the quality of clinical outcome depends directly on the quality of the fracture reduction achieved during open reduction and internal fixation.[11] In our study, these findings were also reflected as patients with imperfect reductions had lower functional outcomes.

The advocated non-extensile approaches had an average blood loss and operating time similar to those reported by other studies, which were similar in this study.[4,8]

Kreder et al enlisted various factors influencing the outcome like- degree of primary displacement, damage to the superior weight bearing roof or femoral head, amount of hip joint instability caused by posterior wall fracture, adequacy of closed or open reduction and late complications like chondrolysis, heterotrophic ossification, AVN or nerve injuries.[12] In our current study, majority of the cases had excellent functional outcome with least complications.

Extensile approaches around the hip joint have resulted in a high rate of complications. Alonso et al reported the incidence of heterotopic ossification to be 53% with Triradiate approach and 86% with the use of extended iliofemoral approach.[13] In non-extensile approaches, Kaempffe et al had reported a 20% incidence heterotopic ossification.[14] Only 1 case of heterotopic ossification had been encountered till now in our study and oral Indomethacin given post operatively for 4 weeks.

No patient had intra articular screw penetration after fixation and no restriction of movements at hip. The complication rate is very low when compared to the earlier studies of Matta and Swiontkowski.

CONCLUSION

Acetabular fractures, treated surgically by open reduction and internal fixation have an excellent functional outcome. Every chance of reducing the fracture fragments anatomically, fixing it rigidly and mobilizing early should be done for better functional outcome which is not achievable by conservative means. With a definitive learning curve, proper pre-operative planning, use of non-extensile exposure, accurate anatomic reduction, rigid fixation and early rehabilitation, it is possible to achieve an improved outcome.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Judet R, Judet J, Letournel E. Fractures of the acetabulum: classification and surgical approaches for open reduction. Preliminary report. J Bone Joint Surg Am. 1964;46:1615-46.
2. Guyton JL, Perez EA. Fractures of acetabulum and pelvis. Canale and Beaty. Campbell's Operative Orthopaedics. 11th ed. Mosby: Elsivier; 2007: 3306.
3. Tile M. Fractures of the pelvis and acetabulum. 2nd ed. Baltimore: Williams and Wilkins; 1996.
4. Routt ML, Swiontkowski MF. Operative treatment of complex acetabular fractures. Combined anterior and posterior exposures during the same procedure. J Bone Joint Surg Am. 1990;72(6):897-904.
5. D'aubigne R, Postel M. Functional results of hip arthroplasty with acrylic prosthesis. J Bone Joint Surg Am. 1954;36-A(3):451-75.

6. Letournel E, Judet R. Fractures of the Acetabulum. 2nd ed. New York, NY: Springer-Verlag; 1993.
7. Mears DC, Velyvis JH, Chang CP. Displaced acetabular fractures managed operatively: indicators of outcome. Clin Orthop Relat Res. 2003;(407):173-86.
8. Matta JM. Fractures of the acetabulum: accuracy of reduction and clinical results in patients managed operatively within three weeks after the injury. J Bone Joint Surg Am. 1996;78(11):1632-45.
9. Giannoudis PV, Grotz MR, Papakostidis C, Dinopoulos H. Operative treatment of displaced fractures of the acetabulum. A meta-analysis. J Bone Joint Surg Br. 2005;87(1):2-9.
10. Briffa N, Pearce R, Hill AM, Bircher M. Outcomes of acetabular fracture fixation with ten years' follow-up. J Bone Joint Surg Br. 2011;93(2):229-36.
11. Pennal GF, Davidson J, Garside H, Plewes J. Results of treatment of acetabular fractures. Clin Orthop Relat Res. 1980;(151):115-23.
12. Kreder HJ, Rozen N, Borkhoff CM, Laflamme YG, McKee MD, Schemitsch EH, et al. Determinants of functional outcome after simple and complex acetabular fractures involving the posterior wall. J Bone Joint Surg. 2006;88:776-82.
13. Alonso JE, Davila R, Bradley E. Extended iliofemoral versus triradiate approaches in management of associated acetabular fractures. Clin Orthop Relat Res. 1994;(305):81-7.
14. Kaempffe FA, Bone LB, Border JR. Open reduction and internal fixation of acetabular fractures: heterotopic ossification and other complications of treatment. J Orthop Trauma. 1991;5(4):439-45.

Cite this article as: Chatrashali SA, Patil AC, Nataraja CM, Gaddi RA. Surgical and functional outcome of management of anterior column with posterior hemitransverse fracture of acetabulum. Int J Res Orthop 2024;10:794-8.