

# EVALUATION OF RESULTS OF OPEN REDUCTION AND INTERNAL FIXATION OF ACETABULUM FRACTURES

Muhammad Shoaib Khan, Hidayat Ullah, Muhammad Khalid Khan, Muhammad Siraj,  
Abdus Samad Khan, Zahid Askar

Department of Orthopedics & Trauma, Khyber Teaching Hospital, Peshawar - Pakistan

## ABSTRACT

**Objectives:** To study the early results of open reduction and internal fixation of acetabulum fractures.

**Material and Methods:** This multicenter study was conducted at Orthopedic Units Ayub Teaching Hospital and Khyber Teaching Hospital from January 2007 to December 2013. Thirty-five patients both male and female were included having age of 17-70 years. Clinical evaluation was done according to D'Aubigne and postel and criteria of Matta was used.

**Results:** Fourteen patients (40%) had excellent results, 7 (20%) had good results, 3 (8.6%) patients had fair results and 11 (31.4%) had poor results.

**Conclusion:** Open anatomical reduction and rigid fixation with 3.5mm Reconstruction plates in Acetabulum fractures gives excellent and good results even in delayed presentation and aged patients with osteoporotic bones, and chances of AVN and Osteoarthritis of hip are minimized.

**Key Words:** Acetabulum, fracture, open reduction, internal fixation.

## INTRODUCTION

Acetabulum fractures occur as a result of high energy trauma<sup>1</sup> like road traffic accidents or fall from a height. It is more common in young people. Previously these fractures were managed conservatively using skeletal traction and bed rest. The work of Judet and Leuternal has changed the management from conservative towards surgical management<sup>1,2</sup>. Since then open anatomical reduction and rigid internal fixation has become the standard treatment<sup>3-6</sup>. This has led to a decrease in the overall incidence of post-traumatic osteoarthritis, AVN and better clinical outcome<sup>3,4,7-9</sup>.

For a trauma surgeon the operative procedure on the acetabulum is a major challenge<sup>1</sup>. Complication rates are high and 20-25% are having poor outcome<sup>10</sup>. Delay in operative treatment<sup>11,12</sup>, fracture pattern<sup>13-15</sup>, age of patient<sup>16,17</sup>, associated osteochondral damage to femoral head and acetabulum<sup>18,19</sup>, dislocation at the time of injury<sup>20</sup>, associated neurovascular injury and the surgeon experience are the factors that influence the final functional outcome. Ideally acetabulum fractures should be fixed within first week after trauma, and the results are poor when fixed after 3-4 weeks.

The objective of this study is to evaluate the results

of open reduction and internal fixation with Reconstruction plates and screws in acetabulum fractures.

## MATERIAL AND METHODS

This prospective study was conducted at Orthopedic B unit Ayub Teaching Hospital and Orthopedic B Unit Khyber Teaching Hospital, Peshawar from January 2007 to December 2013. Inclusion criterion was patients of either gender with the age range from 18-70 years, having Acetabular fracture presenting within one month of injury. The exclusion criterion was open fracture and trochanteric pin for traction as a treatment modality.

Proper evaluation with X-rays (pelvis AP and judet views) and Computerized Three Dimensional tomograms (CT/3D) was done to know the extent of involvement of the column/wall of the acetabulum and to plan the surgical procedure accordingly.

The approaches used for surgery were Kocher-langenbech, ilioinguinal and triradiate extensile approaches. Trochanteric osteotomy was used in selected cases through posterior approach. The implants used were 3.5mm Reconstruction (Recon) plates and 3.5mm screws. Double Recon plates were used in posterior wall and column fractures. Indirect fixation of anterior column with 4.5mm cortical screw was done along with plating of posterior column in selected cases. Per-op fluoroscopy was used to assess reduction when needed.

Patients were followed for a minimum of 6 months. Clinical grading was done according to D'Aubigne and Postel<sup>21</sup> modified by Matta<sup>22</sup>. Pain, gait and range of

---

### Address for Correspondence:

**Dr. Muhammad Shoaib Khan**

Associate Professor

Orthopedics Department,

Khyber Teaching Hospital, Peshawar - Pakistan

Cell: 0333-6402190

Email: drshoaibortho@yahoo.com

motion were assessed. Radiological grading was done on last visit according to Matta<sup>22</sup> criteria as: excellent (normal appearing hip joint), good (mild changes with minimal sclerosis and joint narrowing less than 1mm), fair (intermediate changes with moderate sclerosis and joint narrowing less than 50%), and poor (advanced changes). Both the clinical and radiological findings were calculated and the results were summed as.

- Excellent: Normal appearing hip joint and fracture unites in 4 months, no pain, normal gait, with good range of joint moments and the patient can walk without support.
- Good: Fracture unites in 6 months with minimal sclerosis, no pain with good range of joint moments or patient can work/ walk without support.
- Fair: Fracture union after 6 months with moderate sclerosis or joint narrowing, pain on prolonged walking, or limping gait, or mild limited range of motion.
- Poor: OA/AVN (Osteoarthritis/ Avascular necrosis) and the patients can-not walk without support, pain on walking and had limping gait and severely restricted range of motion.

## RESULTS

Data collected was entered and analyzed using SPSS 19. Mean age of patient was 40 years (17-70). Out of 35 patients, 27(77.1%) were male and 8(22.9%) were female. 26(74.3%) had RTA and 9(25.7%) had fall from height. Right side was involved in 21 (60%) cases while 14(40%) had left sided fracture. There was Posterior column/wall fracture in 14(40%) cases, posterior and anterior column fracture in 11(31.4%) cases, posterior wall fracture only in 8(22.8%) cases and complex type fracture in 2(5.8%) cases.

Majority of the cases were referred from other hospitals and presented within first 10 days after trauma. 6 patients had posterior dislocation of the hip at presentation, which was manipulated and femoral skeletal traction was applied. Trochanteric osteotomy was done in 7 cases in both column fracture and dome fracture for better exposure.

Out of 35, 14(40%) had excellent results, 7(20%) had good results, 3(8.6%) had fair results and 11(31.4%) had poor results. Out of the 11 with poor results, 5(14.3%) had OA of the hip, 3(8.6%) developed AVN, and 1(2.5%) patient had postoperative posterior dislocation of the hip with signs of AVN in femoral head after 4 months. 1(2.5%) patient had deep infection, in which implant was removed followed by total hip replacement and 1(2.5%) patient had post-operative sciatic nerve injury which did not recovered.

In 3 patients, there was sciatic nerve involvement at presentation, after 6 months follow-up there was complete recovery in 1 patient. One case had postop-

erative footdrop, which recovered in 4 months. None of the patient developed heterotrophic ossification.

## DISCUSSION

In our study Posterior column/wall fractures were the most common, followed by both columns which is consistent with other studies as well<sup>1,23</sup>. Posterior hip dislocation is usually present with posterior wall/column fractures. The Kocher-Lengenbach was the most commonly used approach. Recon plates and screws were used for fixation.

In our study 14 patients (40%) had excellent results, 7 (20%) had good results, 2 (8.6%) patients had fair results and 11 (31.4%) had poor results, which is comparable with other studies<sup>1,23</sup>.

In our study 4 cases were between 65-70 years of age with osteoporotic fractures having posterior column/wall fractures, which were fixed with recon plates and screws and had good results upto 4 years follow-up. In one young case, there was posterior wall fracture with posterior dislocation of hip, which was 1 month old with no signs of AVN preoperatively, underwent open reduction and internal fixation (ORIF) and was followed for 4 years with excellent results.

The most common complication in our patients was OA (14.3%) with a follow-up of 6months to 7 years. The rate of OA in other studies ranges from 20-50%<sup>1,23</sup>, we believe that this high rates is because of associated posterior dislocation at initial presentation and longer follow-up in these studies. AVN occurred in 3(8.6%) of our patients which is comparable with other studies.

Preoperative Sciatic nerve palsy occurred in 3 of our patients, 2 had complete recovery. The incidence of sciatic nerve injury is 16% in acitabular fractures while in our study it is 2.5%. Deep infection occurred in 1 patient (2.5%) while in other studies it is upto 6%. The implant was removed and the patient underwent staged THR after 3 months.

## CONCLUSION

Early open anatomical reduction and rigid fixation with 3.5mm Recon plates in Acetabulum fractures gives excellent and good results even in delayed and aged patients with osteoporotic bones, and the chances of AVN and osteoarthritis of hip are minimized.

## REFERENCES

1. Briffa N, Pearce R, Hill AM, Bircher M. Outcomes of acitabular fracture fixation with ten years follow-up. J Bone Joint Surg Br. 2011 Feb; 93(2): 229-36.
2. Letournel E. Acetabulum fractures: classification and management. Clin Orthop 1980; 151: 81-106.
3. Matta J, Anderson L, Epstein H, Hendricks P. Fractures of the acetabulum: a retrospective analysis. Clin Orthop 1986; 205: 230-40.

4. Matta JM, Mehne DJK, Roffi R. Fractures of the acetabulum: early results of a prospective study. Clin Orthop 1986; 205: 241-50.
5. Matta JM, Merritt PO. Displaced acetabular fractures. Clin Orthop 1988; 230: 83-97.
6. Routt ML Jr, Swiontkowski MF. Operative treatment of complex acetabular fractures: combined anterior and posterior exposures during the same procedure. J Bone Joint Surg [Am] 1990; 72-A: 897-904.
7. Brueton RN. A review of 40 acetabular fractures: the importance of early surgery. Injury 1993; 24: 171-74.
8. Harris WH. Traumatic arthritis of the hip after dislocation and acetabular fractures: treatment by mold arthroplasty: an end-result study using a new method of result evaluation. J Bone Joint Surg [Am] 1969; 51-A: 737-55.
9. Ragnarsson B, Mjoberg B. Arthrosis after surgically treated acetabular fractures: a retrospective study of 60 cases. Acta Orthop Scand 1992; 63: 511-14.
10. 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-B: 2-9.
11. Bircher M, Lewis A, Halder S. Delays in definitive reconstruction of complex pelvic and acetabular fractures. J Bone Joint Surg [Br] 2006; 88-B: 1137-40.
12. Brueton RN. A review of 40 acetabular fractures: the importance of early surgery. Injury 1993; 24: 171-74.
13. Matta JM, Mehne DK, Raffi R. Fractures of the acetabulum: early results of a prospective study. Clin Orthop 1996; 205: 241-50.
14. Moed BR, Yu PH, Gruson KI. Functional outcomes of acetabular fractures. J Bone Joint Surg [Am] 2003; 85-A: 1879-83.
15. Murphy D, Kaliszer M, Rice J, McElwain JP. Outcome after acetabular fracture: prognostic factors and their inter-relationships. Injury 2003; 34: 512-17.
16. Mears DC, Velyvis JH, Chang CP. Displaced acetabular fractures managed operatively: indicators of outcome. Clin Orthop 2003; 407: 173-86.
17. Ferguson TA, Patel R, Bhandari M, Matta JM. Fractures of the acetabulum in patients aged 60 years and older: an epidemiological and radiological study. J Bone Joint Surg [Br] 2010; 92-B: 250-57.
18. Murray MM, Zurakowski D, Vrahas MS. The death of articular chondrocytes after intra-articular fracture in humans. J Trauma 2004; 56: 128-31.
19. Malkani AL, Voor MJ, Rennert G, et al. Increased peak contact stress after incongruent reduction of transverse acetabular fractures: a cadaveric model. J Trauma 2001; 51: 704-09.
20. Hougaard K, Thomsen PB. Traumatic posterior dislocation of the hip: prognostic factors influencing the incidence of avascular necrosis of the femoral head. Arch Orthop Trauma Surg 1986; 106: 32-35.
21. D'aubigne RM, Postel M. Functional results of hip arthroplasty with acrylic prosthesis. J Bone Joint Surg Am. 1954; 36(3): 451-75.
22. 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.
23. Kim HT, Ahn JM, Hur JO, Lee JS, Cheon SJ. Reconstruction of Acetabular Posterior Wall Fractures, Clin Orthop Surg. 2011 Jun; 3(2): 114-120.

### **AUTHOR'S CONTRIBUTION**

Following authors have made substantial contributions to the manuscript as under:

- Khan MS:** Idea and operating surgeon.  
**Ullah H:** Data collection and typing  
**Khan MK:** Bibliography.  
**Siraj M:** Statistics.  
**Khan AS:** Followup  
**Askar Z:** Operating surgeon and data analysis.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

**CONFLICT OF INTEREST:** Authors declare no conflict of interest

**GRANT SUPPORT AND FINANCIAL DISCLOSURE** NIL