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Research Article

Surgical Management of Acetabular Fractures in Adultes: About 15 Cases

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Abstract

Introduction: Acetabular fractures are relatively rare injuries. The purpose of this study was to evaluate the functional and radiographical outcomes of surgical management of Acetabular fractures in medium term. Materials and method: This was a retrospective and descriptive study conducted on the records of patients operated on for acetabular fractures classified according to Letournel and Judet criteria between January 1, 2021, and December 31, 2024. Clinical and imaging examinations were used to establish the diagnosis and indicate surgery. Anteroposterior pelvic radiographs were used to assess joint congruity according to Duquesnoy and Senegas criteria, reduction according to Matta criteria, and bone healing. Functional assessment was based on the Postel-Merle d'Aubigne criteria. Results: The series included 15 patients (15 fractures) (13 men and 2 women). The mean age was 37.8 (23 and 55) years. The fracture was due to road traffic accident (n=13) and fall from height (n=2). The fracture involved the posterior wall (n=3), posterior column (n=3), anterior column (n=2), transverse (n=1), T-shaped (n=1), associated transverse and posterior wall (n=2), posterior column and posterior wall (n=2) and bicolumn (n=1). The mean time to surgery was 13.1 (8 and 20) days. The mean hospital stay was 24 (18 and 40) days. The mean follow-up was 2.8 years (8 months and 4 years). Head/roof congruence was perfect (n=12), good (n=2), and fair (n=1). Head/acetabulum congruence was perfect in all cases. Reduction was anatomical (n=12), satisfactory (n=2), and unsatisfactory (n=2). The Postel-Merle d'Aubigne functional score was excellent (n=8), good (n=5), and fair (n=2). Conclusion: Acetabular fractures are relatively rare injuries. They occur following high-energy trauma. Surgical management within a short timeframe, using an appropriate approach, often results in anatomic reduction and a congruent hip. The functional outcome is satisfactory in the medium term.

Keywords

Acetabular Fracture, Joint Congruity, Surgical Treatment

1. Introduction

Acetabular fractures are relatively rare injuries, accounting for 2% of all fractures [1]. They generally occur following high-energy trauma, frequently occurring within a context of polytrauma [2]. These injuries often affect young active adults [3, 4]. Their incidence is steadily increasing, due to a combination of greater longevity, a more active lifestyle, and a growing number of road accidents [5].

These fractures can be treated orthopedically or surgically;

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however, the therapeutic choice remains controversial [6]. Surgical treatment is generally indicated in cases of acetabular dome displacement of two mm or more, posterior wall fractures involving more than 33% of the posterior wall articular surface, or clinical instability with hip flexed at 90 ° [1]. The main purpose is to restore the anatomical shape of the articular surface in order to reduce the risk of developing post-traumatic osteoarthritis; to preserve bone stock for possible revision surgery; and to promote early mobilization [7, 8].

This treatment remains a major challenge for trauma surgeons, due to the complexity of the anatomy and surgical approaches, and the deep location of the acetabulum [9, 10].

Previous studies have demonstrated the superiority of surgical treatment over orthopedic treatment [3, 11, 12]. Nowadays, surgery is the treatment of choice for most displaced acetabular fractures [13-15].

Studies on medium-term outcomes are few. Therefore, this study was conducted to answer this question.

The purpose of this study was to evaluate the functional and radiographical outcomes of surgical management of acetabular fractures.

2. Materials and Methods

This was a retrospective and descriptive study conducted on the records of patients who underwent surgery for acetabular fractures classified according to Letournel and Judet criteria [16]; between January 1, 2021, and December 31, 2024. Cases of acetabular fractures treated orthopedically were not included. Clinical and imaging examinations (standard anteroposterior pelvic radiograph and computed tomography) were used to make the diagnosis and to assess the stability and initial joint congruity of the hip according to the Duquesnoy and Sánégas criteria (congruity between the femoral head and acetabular roof) [17]. Surgery was indicated in cases of joint incongruity and/or hip instability. The procedures were performed under general anesthesia on a standard operating table. Patients were operated in supine (Kocher-Langenbeck approach), prone (ilioinguinal approach), and lateral (iliofemoral approach) positions. The surgical approaches used were ilioinguinal (n=4), Kocher-Langenbeck (n=9), double approach (n=1), and iliofemoral (n=1). The fracture was fixed with an anterior plate (n=4), a posterior plate (n=7) figure (Figure 1), a double plate (n=2) (Figure 2), and an isolated screw fixation (n=2) (Figure 3).

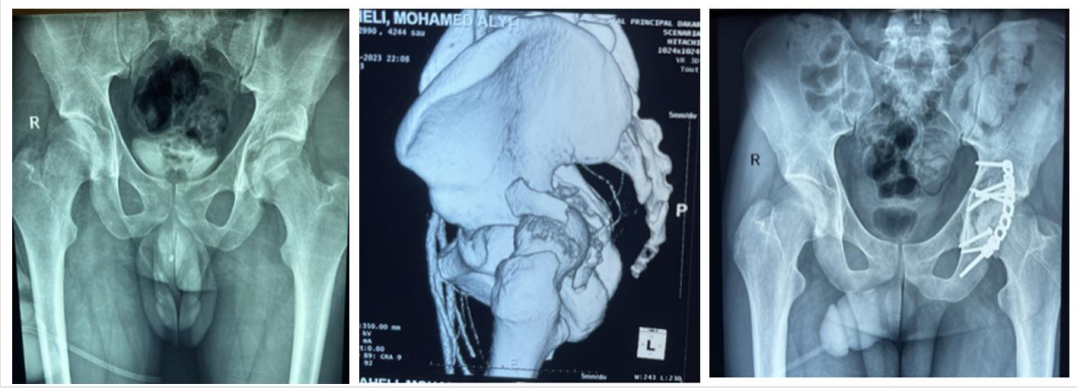

Figure 1. *Radiographical Aspect of Acetabular Posterior Wall Fracture Managed with a Posterior Plate.*

Figure 2. *Radiographical Aspect of Acetabular Bicolumnar Fracture Managed with Anterior and Posterior Plates.*

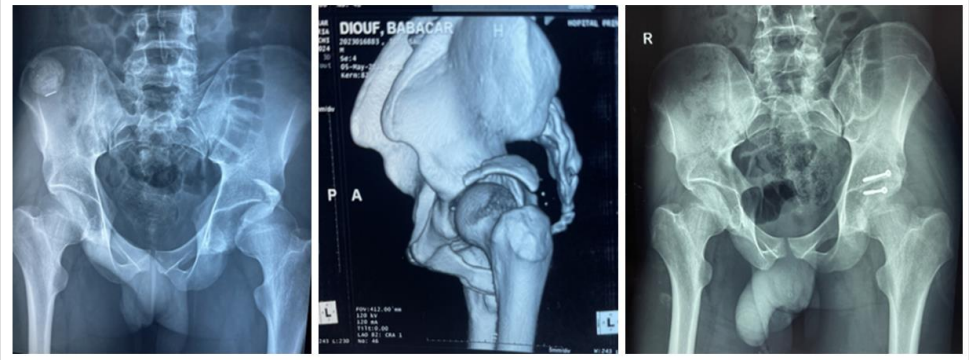

Figure 3. *Radiographical Aspect of Acetabular Posterior Wall Fracture Managed by Screw Fixation.*

Rehabilitation was initiated immediately postoperatively (active foot mobilization, isometric contractions, and learning to walk with 2 crutches, without weight-bearing for 45 days).

Standard radiographs of the pelvis (anteroposterior view) was used to assess secondary joint congruity of the hip according to Duquesnoy and Senegas criteria and reduction according to Matta criteria: anatomical reduction (interfragmentary gap < 1 mm), satisfactory (1-3 mm) and unsatisfactory (>3 mm) [13], as well as bone healing (disappearance of the fracture line, callus formation, recalcification).

Functional assessment was based on the Postel-Merle d'Aubigné (PMA) scale (pain, gait, and mobility), in accordance with the recommendations of the 1981 French society of Orthopaedic and Trauma surgery (SOFCOT) symposium [18].

Patient records, hospitalization logs, and operating room logs were used to collect data. Statistical Package for Social Sciences (SPSS) software was used to analyze the data. Patient consent was obtained prior to the evaluation.

3. Results

The series comprised 15 patients (15 fractures). There were 13 men and 2 women. The male-to-female ratio was 6.5. The mean age was 37.8 years with the range of 23 and 55. The fracture occurred following a road traffic accident (n=13) and a fall from standing height (n=2). It involved the left side (n=9) and the right side (n=6). The fracture type was: Posterior wall (n=3), posterior column (n=3), anterior column (n=2), transverse (n=1), T-shaped (n=1), combined transverse and posterior wall (n=2), posterior column and posterior wall (n=2), and double column (n=1). The fracture was associated with posterior hip dislocation (n=6), bimalleolar fracture (n=4), floating knee (n=1), femur and humerus fracture (n=3), fracture of both leg bones (n=2), obturator foramen fracture (n=7), sacral fracture (n=1), and traumatic brain injury (n=11). The mean time to surgery was 13.1 days with the range of 8 and 20 days. The mean length of hospital stay was 24 days with the range of 18 and 40 days. The mean follow-up was 2.8 years, with a range of 8 months and 4 years. The head/roof congruity gain was 80%, and the head/acetabular congruity gain was 86.67% (Tables 1 and 2).

Table 1. *Preoperative and Postoperative Head/Roof Joint Congruity.*

Head/roof congruence	Preoperative	Postoperative
Bad	5	0
Fair	7	1
Good	3	2
Perfect	0	12

Table 2. *Preoperative and Postoperative Head/Acetabulum Joint Congruity.*

congruence of head/acetabulum	Preoperative	Postoperative
Bad	5	0
Fair	3	0
God	4	0
Perfect	3	15

The reduction was anatomical (n=12), satisfactory (n=2), and unsatisfactory (n=one).

The PMA functional score was excellent (n=8), good (n=5), and fair (n=2).

The observed complications were superficial infection (n=1), hypoesthesia of the lateral thigh (n=1), and heterotopic ossification (n=1).

4. Discussion

Acetabular fractures are relatively rare injuries. They generally occur in the context of high-energy trauma [19]. Their diagnosis is based on standard radiography and primarily computed tomography [20]. in this series, these fractures were

managed by experienced surgeons. However, the sample size was very small. The patients were evaluated in the medium term, which may minimize the occurrence of certain complications such as post-traumatic coxarthrosis [21, 22].

Acetabular fractures are generally more common in young people [6, 9, 11]. They mainly affect the posterior wall of the acetabulum [9]. it is recommended that these fractures be operated on between 5 and 14 days post-trauma to minimize complications; a delay of more than 14 days increases the risk of non-anatomical reduction and early osteoarthritis [14]. Short surgical delays have been observed in other series [19]. The delay in surgery is often a consequence of the unavailability of implants at the hospital and the associated injury.

Surgical treatment is necessary when there is a loss of joint congruity between the femoral head and the acetabulum, assessed by standard radiography (anteroposterior pelvis, 3/4 alar and 3/4 obturator views) [23] and especially computed tomography [24].

The surgical approach for these fractures depends on the anatomopathological type of the fracture [16]. The Kocher-Langenbeck appraoch is often the most used [3, 6]. This is due to the frequency of posterior lesions [6], and the best exposure that this appraoch offers.

Anatomical reduction and stable fixation play a key role in the management of articular fractures, restoring joint congruity and thus reducing the risk of post-traumatic osteoarthritis [25]. Some studies report a low rate of anatomical reduction and joint congruity [19, 26]. Achieving satisfactory anatomical reduction and joint congruity is generally the result of good planning, surgical expertise, and the use of intraoperative image intensifier.

In the surgical treatment of acetabular fractures, the quality of the reduction of the articular surface is associated with a good functional outcome [27, 28], and a low risk of post-traumatic coxarthrosis [29, 30]. Modest functional results are reported [19, 23, 24]. Satisfactory function can result from anatomical reduction and joint congruity, as well as early rehabilitation. Postoperative recovery is often complicated by certain events such as infection [3, 19], nerve paralysis [19] and heterotopic ossification [24, 31]. They most often result from the surgical approach used and the hospital stay.

5. Conclusion

Acetabular fractures are relatively rare injuries. They often occur following high-energy trauma. Prompt surgical intervention, using an appropriate approach, often allows for anatomical reduction and a congruent hip. The functional outcome is satisfactory in the medium term.

Abbreviations

SOFCOT	French Society of Orthopaedic and Trauma Surgery
SPSS	Statistical Package for Social Sciences
PMA	Postel-merle d'Aubigne

Author Contributions

Diallo Mamadou Korka: Resources
Ba Papa Amadou: Conceptualization, Methodology
Conde Mamady Sekou: Writing – original draft
Niang Coumba Diouf: Validation, Supervision, Project Administration

Conflicts of Interest

The authors declare no conflicts of interest.

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