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Research Article

SURGICAL TREATMENT OF POSTERIOR WALL ACETABULAR FRACTURE DISLOCATION: PREDECTION OF RISK FACTORS FOR FUTURE COMPLICATIONS; PROSPECTIVE STUDY

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ABSTRACT

Acetabular fractures are generally caused by high- energy trauma and associated injuries are frequent. Treatment of the entire patient should follow accepted Advanced Trauma Life Support (ATLS) protocol, with orthopedic management of the acetabular fracture appropriately integrated into the treatment plan.

The purpose of this study was to show the results of operative fixation of posterior wall acetabular fracture dislocation and to predict the risk factors for future complications. A prospective study was done on 30 patients complaining from posterior wall acetabular fracture dislocation. Twenty eight cases were included in the study and 2 patients were excluded. The patients were treated at Al-Sadder Teaching Hospital, Orthopedic Sub department from February 2008-April 2014 with 2-5 years follow up.

Patients were also followed up clinically and radiologically, early postoperatively, every 2 weeks for first 6 weeks and thereafter every 3 months for 2-3 years. The clinical assessment was based on the clinical scoring system based on Score of Merle D'Aubigne and postel.

The mechanisms of fractures was usually due to major trauma, mainly occurred due to road traffic accident (12 cases, 42.8%), and followed by falling from height (8 cases, 21.4%). The majority of cases had associated injuries 17 cases (61.8%) and the main injuries were associated fractures (7 cases, 25%).

There was no significant correlation between the time of surgery and the appearance of future complications. Radiological criteria for postoperative reduction were evaluated by 2 radiologists and qualities of reduction were correlated with the cases of associated complications which showed significant correlation between quality of reduction and appearance of future complications ($P < 0.05$).

Keywords: Posterior Wall Acetabular Fracture

1. INTRODUCTION

The gold standard for the treatment of displaced posterior wall fracture is the surgical anatomical restoration of the articular surface and stable internal fixation [1].

The acetabular surgery has become more demanding in the last 20 years because high velocity trauma has increased the number of victims and increasing in age average in population with such fracture [2].

The Kocher-Langenbeck is the gold standard for the posterior access of the hip joint, and this will achieve better visualization and anatomical reconstruction by allowing direct view into the hip joint and to reduce access morbidity [3-6].

In acetabular fractures with posterior dislocation, the rupture of the joint capsule is integrated into the capsulotomy to preserve the attachment of the wall fragment or alternately, a Z-shaped capsulotomy is carried out and the femoral head is dislocated posterosuperiorly [3, 6-8].

Although a posterior wall fracture is easiest fracture pattern to reduce, the reported long term results after this fracture have been variable. Avascular necrosis of the femoral head as a result of associated hip dislocation, marginal impaction, and osteochondral injuries of the femoral head all adversely affect the outcome of these fractures [5, 8, 10, 11].

Intraarticular screws placement should be avoided, even if it requires leaving some of screws out of the buttress plate. Intraoperative fluoroscopy in multiple views should be used to ensure that all screws are extraarticular [2, 5].

Aims of the study were to study the results of the operative fixation of posterior wall acetabular fracture dislocation and to predict the risk factors for future complications of such fractures.

2. MATERIAL AND METHODS

A prospective study was done on 30 patients complaining posterior wall acetabular fracture dislocation. A 28 cases were included in the study and 2 patients were excluded, as the first one died before surgery and other one lost for following up. Among them 22 (78.5%) were male and 6 were (21.48%) female (mean age 34.6 years). The patients were treated at Al-Sadder Teaching Hospital, Orthopedic Sub department from February 2008-April 2014 with 2-5 years follow up.

In the standard protocol of the surgical treatment, initially it was tried to reduce the dislocation as close reduction under general anesthesia and put patients on skeletal traction with antibiotic and anticoagulant cover, and assessing fracture dislocation by clinical examination, plain radiograph and by CT- scan [5, 10, 11].

The date of surgical treatment was selected according to the clinical condition of the patient and local soft tissue. The surgical team used Kocher-langenbeck to provide direct visualization of lateral aspect of posterior column and the posterior wall and through this approach, the reduction of articular surface is performed indirectly using the femoral head as a template or in case of incarcerated bone piece inside the hip joint surgical dislocation performed first. The intact capitis femoris ligament has to be cut before dislocation with curved scissor [12-15].

Surgical reduction was performed under fluoroscopic control and also to avoid intra-articular extension of the screws after application of reconstructive plate [4, 5].

Patients were then followed up clinically and radiologically, early postoperatively, every 2 weeks for first 6 weeks and then after every 3 months for 2-3 years. The clinical assessment based on the clinical scoring system based on Score of Merle D'Aubigne and postel [10, 11] and radiological criteria to assess quality of reduction and reviewed by two radiologist to show the degree of step-off.

Table 1: Clinical scoring system according to the modified score of Merle d'Aubigné and Postel [10-12]

Clinical Notes	Points
Pain	
None	6
Slight but intermittent	5
After walking but resolve	4
Moderately severe but able to walk	3
Severe pain and prevent walking	2
Walking	
Normal	6
NO cane but slight limp	5
Long distance with cane or crutch	4
Limited even with support	3
Very limited	2
Unable to walk	1
Range of Motion *	
95-100	6
80-84	5
70-79	4
60-69	3
50-59	2
50%<	1
Clinical Grade	
Excellent	18
Good	15-16
Fair	13-14
Poor	< 13

*The range of motion is expressed as the percentage of the value for the normal hip. This is calculated by obtaining a total of the ranges, in degrees, of flexion-extension, abduction, adduction, external rotation, and internal rotation for the injured hip and dividing it by the total for the normal hip.
†The clinical score is determined by adding the points for pain, walking, and range of motion.

Regarding the radiological findings depending on the congruence of the acetabulum and the quality of reduction and presence of stepping measured by radiologist through software (Table 2).

Table 2: Radiological quality of reduction postoperative acetabular wall fractures

Measured stepping	Quality of reduction
< 1 mm	Anatomical
1-3 mm	Imperfect
> 3 mm	Poor

3. RESULTS

The study was done on 28patients, subjected to posterior wall acetabular fracture with posterior wall dislocation.

The mechanisms of fractures was usually due to major trauma, mainly occurred due to road traffic accident (12 cases, 42.8%), and followed by falling from height (8 cases, 28.5%) and also in our society there are 2 cases as victims of explosions (Table 3).

Table 3: Distribution of mechanism of injuries

Mechanism of injury	No. of Cases	Percent
Road traffic accident	12	42.8%
Fall from height	8	28.5%
Motorcycle accident	6	21.4%
Explosion	2	7.2%
Total	28	99.9%

The majority of cases had associated injuries 17 cases (61.8%) and the main injuries were associated fractures 7 cases (25%), followed by head injury 5 cases (17.8%), as shown in table 4.

Table 4: Distribution of associated injuries with posterior wall acetabular fracture dislocation

Associated injury	Frequency	Percent
Associated fractures	7	25%
Head injury	5	17.8%
Chest trauma	2	7.25%
Abdominal injury	2	7.25%
Burn	1	3.5%
Total	17	61.8%

Table 5: Distribution of correlation of postoperative clinical scoring results with the time of surgery

Time of surgery	Frequency	Excellent	Good	Fair	Poor
0-7 day	11	3 (27%)	5(45%)	2(18%)	1(9%)
8-14day	14	5 (35%)	6(42%)	1(7%)	2(14%)
> 14 day	3	0	1(33%)	1(33%)	1(33%)
Total	28	8(28.5%)	12(42.8%)	4(14.3%)	4(14.3%)

The correlation between the time of the surgery and the clinical scoring system were shown in table 5. Yates chi square=0.619; P value=0.996 which are statistically showed no significant of correlation between time of surgery and the appearance of future complications.

The radiological criteria for postoperative reduction were evaluated by two radiologists and quality of reductions were correlated with the cases of associated complications and relationship between quality of reduction and associated complications as shown in table 6.

Table 6: Distribution of postoperative radiological evaluation with correlation to the associated injuries and complications:

Quality of reduction	frequency	Percent	Associated injuries	Associated complications
Anatomical	14	50%	6/14(42%)	3/14(21.4%)
Imperfect	10	35.7%	8/10(80%)	6/10(60%)
Poor	4	14.2%	3/4(75%)	3/4(75%)
Total	28	99.9%	17(61.8%)	13(46.8%)

Chi square equal to 4.018 and P value equal to 0.045 which are statistically significant association between quality of reduction and associated complications. The main noticed postoperative complications were shown in table 7.

Table 7: Distribution of postoperative complications

Types of complications	Frequency	Percent
Secondary osteoarthritis	4	14.2%
Avascular necrosis	2	7.14%
Wound infection	2	7.14%
Deep veins thrombosis	2	7.14%
Heterotopic ossification	1	3.6%
Adult respiratory distress syndrome	1	3.6%
Sciatic nerve injury	1	3.6%
Total	13	46.8%

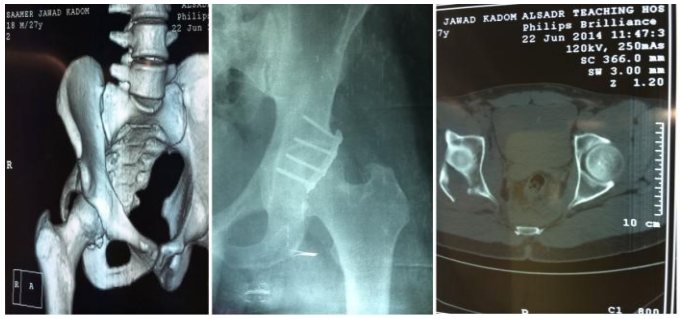


Fig.1: Case number 16; CT scan and postoperative X ray of case number 25 which showed anatomical fixation.

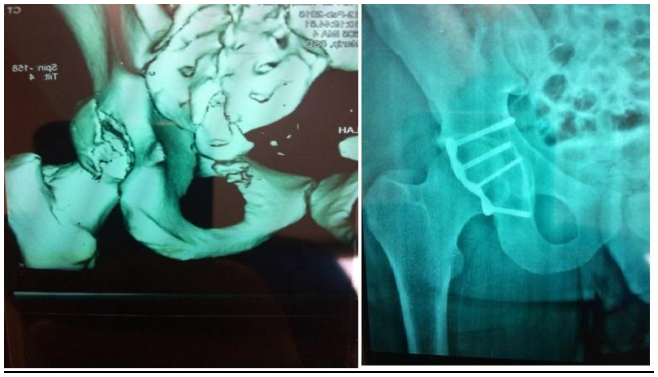
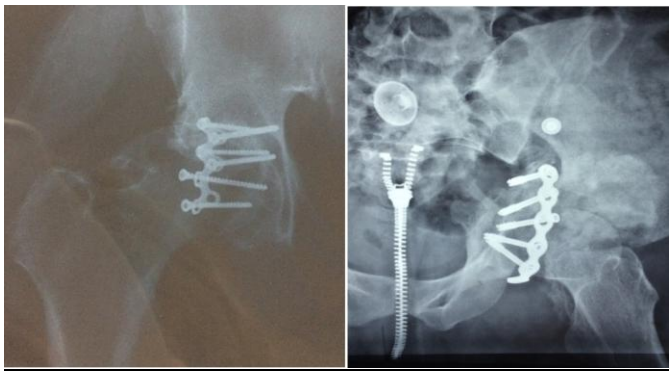


Fig. 2: Case number 21, preoperative CT scan and postoperative perfect reduction.



A **B**

Fig. 3: A-postoperative x ray with imperfect reduction and osteoarthritis, B- postoperative x ray with poor reduction and heterotopic ossification

4. DISCUSSION

Acetabular fracture treatment strategies begin in the emergency department because this type of fracture usually resulted from high velocity injuries and associated with head, chest, abdominal and other skeletal trauma.

In the study done by Matta et al, the associated injuries were 56.7% and this agreed with our study which was 61.8% [10]. The average age of our study was 38.6 years which seem to be the same as the study done by Matta et al.[10] which was 37 years.

The high percent of male in our study in comparison to the Gionnoudis et al [3], Briffa et al [14] studies, may indicate that most of hard works are done by men in our society and little chance for women in our society to have sport activity.

Regarding the etiological factors of this fracture, in our study we agreed with other studies [3, 10, 15] that, the main cause of these hip injuries were the road traffic accidents followed by fall from height, although we had unfortunate causes associated with war and terrors and that was explosion.

The clinical results were evaluated and biostatistically correlated with time of surgery and excellent results were shown to be associated with operated cases within 14 days and delayed cases showed higher percent of poor result and these findings were disagreed with the studies of Briffa et al [14] and Tannast et al [16] and agreed with study of Matta et al [10] who showed no significance of difference in time of surgery.

The postoperative radiological criteria were shown significant correlation between the poor results and the associated injuries whereas the study done by Olson et al [9] and Matta et al [10], they disagreed and they showed no significance of correlation and this may occurred due to large number of patient in the last study.

Anatomical reduction and stable fixation in the true pelvis are surgical challenges due to minimal bone stock and limited access to that surgical field, therefore most of poor radiological results had associated injuries and this significant results agreed the results of Matta et al [10] and Fassler Pr et al [17] and disagreed with Ganz R and Gill TJ [8] and this may be related to the fact that the later study done by surgical dislocation of hip joint with full access to the femoral head and acetabulum.

Regarding postoperative complications, in our study, the osteonecrosis of the femoral head which is known to result from severe trauma and delay in the reduction of dislocation can produce unsatisfactory clinical results regardless time of surgical treatment, in our study it was 7.14% and this result was comparable to Kaempffe FA et al and Wright [19, 20] which is higher than result of Ganz R et al , Ferguson et al and Siebenrock et al [18 ,22, 23] and this belong to fact that, these studies involved many types of fractures of acetabulum and they regarded fractures acetabulum as emergency and so surgical surgery done within 24-48 hours from injury.

Another goal of our study was to assess quality of reduction with the appearance of future complications and this showed significant results that agreed with many studies over the world [11, 14, 15, 20].

5. CONCLUSIONS

Treatment of the posterior wall and column acetabular fracture dislocation is of great challenge to the orthopedic surgeons, because of associated injuries and high rate of complications.

There were no significant correlation between time of surgery and clinical results, and there were significant result between qualities of postoperative radiological findings the appearance of future complications.

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