

# Open Reduction and Internal Fixation of Ipsilateral Fracture of Acetabulum and Fracture Femur through One Approach

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## Abstract

*Background: Major and unstable pelvic fractures as ipsilateral fractures of the femur and acetabulum are likely to cause severe pain and shock. Poly trauma management proceeds in line with ATLS protocol and Patients may require lifesaving surgeries. The study aimed to assess outcome of open reduction and internal fixation of ipsilateral fracture of acetabulum and fracture femur through one approach as the effect way of treatment. Patients and methods: A prospective study included 18 patients were presented with posterior wall acetabular fracture with ipsilateral femoral fracture. Patients admitted Orthopedic surgery Department of Zagazig University hospitals for fracture surgical fixations. Full history, clinical examination and radiological assessment and Majeed Score were performed for all patients. Follow up X rays were done in the 1st day postoperative, after two weeks, 3months , 6 months. Results: the healing time of femoral fracture ranged from 14 weeks up to 33 weeks with mean of  $21.78 \pm 5.9$  and healing time of acetabular fracture was  $17.22 \pm 4.1$  weeks. 55.6% of studied group gave excellent Majeed score of hip function, while only 16.7% were fair. Conclusion: Ipsilateral fractures of the femur and acetabulum treated simultaneousness using Kocher-Langenbeck approach did not demonstrate an increased risk of wound complications, and not contraindicated to antegrade femoral nailing.*

*Keywords: Open Reduction, Internal Fixation, Ipsilateral Fracture, Femur Fracture.*

## INTRODUCTION

The anatomical features of the hip joint confer a high degree of stability which is why dislocations of the hip occur after high-energy trauma, such as road traffic accidents, industrial accidents, sport injuries (e.g., soccer, rugby, and wrestling) or falls from a height. There may be associated acetabular fractures or fractures of the head, neck or shaft of femur.<sup>(1)</sup>

Ipsilateral fractures of the femur and acetabulum represent a severe combination of injuries for which optimal management remains uncertain. When confronted with this constellation of fractures, most surgeons advocate stabilizing the

femur fracture first and then treating the acetabulum either in the same setting or as a delayed procedure.<sup>(2)</sup>

Various treatments have been reported for posterior acetabular injury and ipsilateral peritrochanteric and shaft fractures. For floating hip injury, **Kregor and Templeman**<sup>(3)</sup> stated that the priority of fracture fixation is the acetabular fracture fixation to prevent further damage to the hip joint. However, **Liebergall et al.**<sup>(4)</sup> stated that the priority of fracture fixation is the femur because reduction of the acetabulum is easier to perform.

In acetabular fractures, in which a Kocher-Langenbeck approach is anticipated, treatment of ipsilateral fractures femur can be done through using antegrade femoral nail.<sup>(2)</sup> Antegrade femoral nailing has several important advantages over other treatment strategies. It is a versatile technique that can be performed in the supine, lateral, or prone position through a piriformis or trochanteric entry portal. Surgical wounds are minimized and can be incorporated into the Kocher-Langenbeck incision. Cephalomedullary fixation can be used to treat complex proximal femur fractures.<sup>(1)</sup>

Few studies have reviewed results and complications of ipsilateral acetabular and femur fractures to establish treatment protocols. These studies have been limited, thus establishing current practice patterns and the incidence of complications, such as, avascular necrosis (AVN), heterotopic ossification (HO), post traumatic arthritis (PTA), deep venous thrombosis (DVT), pulmonary embolism (PE), superficial and deep infection is not well known.<sup>(5)</sup>

Therefore, the aim of the present study was to assess result (outcome) of open reduction and internal fixation of ipsilateral fracture of acetabulum and fracture femur through one approach as the effect way of treatment.

#### **PATIENTS AND METHODS:**

A prospective study that was held in Orthopedic surgery Department of Zagazig University hospitals in the period between 3/2020 to 2/ 2021. The study was included 18 patients (14 males and 4 females), their ages ranged between 19 and 69 years (average 37.7 years old) presented with posterior wall acetabular fracture with ipsilateral femoral fracture. 14 patients were injured by road traffic accidents and four patients by falling from height.

The work has been carried out in accordance World Medical Association (Declaration of Helsinki) for studies involving humans before prospective collection of patient's data and after informed consent was obtained from patients.

**Inclusion criteria:** Age of patients was more than 18 years. Presence of ipsilateral posterior wall, columnar, transverse acetabular fracture and peritrochanteric femoral fracture and shaft femoral fracture.

**Exclusion criteria:** Anterior column of acetabular fracture. Acetabular fracture associated with fracture neck or distal femur. Fractures associated with vascular injury requiring repair. Pathological fracture. Patients who refuse to participate in the study. Patients unfit for surgery.

**Preoperative Assessment**

Most of the patients were polytrauma patients, so 1<sup>st</sup> aid managements were done according to the Advanced Trauma Life Support (ATLS) protocols. All patients were enrolled for full history and clinical examination. Routine radiographic assessment included: (1) X ray whole femur :- anteroposterior & lateral views. (2) X ray pelvis :- anteroposterior, inlet & exit. (3) Obturator, Iliac hip views of the affected side and Pre-operative CT scans.

**Scoring system:**

Majeed score was done for all patients for assessment of functional outcome (preoperative and 6 months postoperative). Majeed pelvic score consists of seven subscales (pain, work, sitting, sexual intercourse, walking aids, unaided gait, and walking distance), graded from 0 to 100 (clinical grade: poor < 55, fair 55–69, good 70–84, excellent ≥85), where higher scores represent the best outcomes<sup>(6)</sup>.

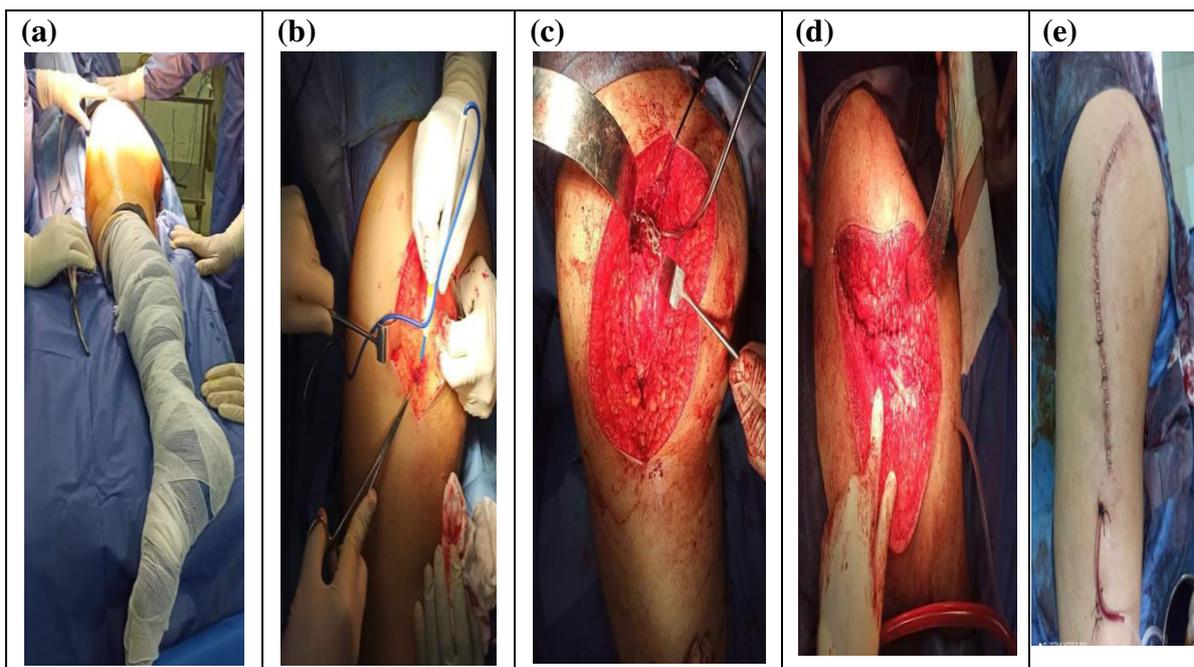
**Operative management:**

General anesthesia was applied for all patients with muscle relaxation and prophylactic antibiotic. A detailed plan about the method of reduction and fixation was carried out for each studied case. The patient was placed in a lateral decubitus position with the ipsilateral leg draped freely (**Fig.1**). The distal half of the Kocher-Langenbeck incision was done to fix the femoral fracture. The iliotibial band incised distally and the fascia covering the gluteus maximus muscle proximally with no deep dissection for acetabular fracture was done till complete fixation of femur fracture. The joint capsule is incised 0.5 cm lateral to the edge of the posterior wall to avoid damage to the limbus. Traction with knee flexion and hip extension is essential to prevent traction injury for the sciatic nerve. Reduction of the posterior wall fragment or posterior Column displacement and fixation by low profile 3.5 mm reconstruction plate (**Fig. 1**).

In patient with associated ipsilateral sub-trochanteric and shaft fracture femur: fixation of fracture femur was started by intramedullary nail (interlocking nail femur) with starting entry either from the greater trochanter or the piriformis fossa according to the design of the used system.

In patient with associated with ipsilateral peritrochanteric fracture femur: were from the stable type "2 pieces" according to Evans's classification. Fixation of these types were difficult in lateral decubitus position but it could be done. Fixation by preliminary K-wires were done.

In our study, 4 cases of our study were peritrochanteric fracture femur, and all of them were fixed by gamma nail. Reinsertion of piriformis and conjoint tendon was done. The split parts of the gluteus maximus was approximated with adaptation sutures. Suction drain was inserted and iliotibial tract was closed. Skin and subcutaneous fascia was closed (**Fig.1**)



**Figure (1):** Stages of operative Technique: (a) Lateral position of Kocher-Langenbeck approach, (b) incision of iliotibial band,(c) fixation of posterior wall by 3.5 mm reconstruction plate, (d) drain inserted and iliotibial tract and (e) fascia and skin closed.

#### **Postoperative management and Follow up:**

Parenteral broad spectrum antibiotics were continued for all patients for 5 days, then oral antibiotics for 10 days till wound healing. Hospital stay ranged from 3 to 5 days postoperative. All cases were given indomethacin as prophylaxis against heterotrophic ossification in a dose of 75 mg daily for 6 weeks.

Postoperative radiological study was done in the form of plain X-rays using an AP view of the pelvis, obturator view and an iliac view to assess accuracy of reduction, quantitate the remaining displacement and exclusion of intra articular hardware. Follow up X rays were done in the 1st day postoperative, after two weeks, 3months , 6 months.

#### **Statistical analysis**

Data were analyzed using IBM SPSS 23.0 for windows (SPSS Inc., Chicago, IL, USA) and NCSS 11for windows (NCSS LCC., Kaysville, UT, USA). Quantitative data were expressed as mean  $\pm$  standard deviation (SD). Qualitative data were expressed as frequency and percentage. The following tests were done: Independent sample t- test of significance was used when comparing between two means. Mann-whitny test was used when comparing two means of not normally distributed data. Chi-square (X<sup>2</sup>) test of significance was used in order to compare proportions between two qualitative parameters. Fisher Exact test is a test of significance that is used in the place of chi square test in 2 by 2 tables, especially in cases of small samples. Probability (P-value): P-value <0.05 was considered significant, P-value <0.001 was considered as highly significant and P-value >0.05 was considered insignificant.

**RESULTS:**

The obtained results showed shows that the healing time of femoral fracture ranged from 14 weeks up to 33 weeks with mean of  $21.78 \pm 5.9$  and healing time of acetabular fracture was  $17.22 \pm 4.1$  weeks. 55.6% of studied group gave excellent Majeed score of hip function, while only 16.7% were fair (**Table 1**).

The commonest complication presented was Heterotopic ossification among 27.%, followed by neurological injury among 16.7%, and shortening of leg and wound infection both accounted among 16.7% (**Table 2**).

Regarding Majeed score and general characters among the studied group showed an increased prevalence of hypertension among patients with fair outcome (66.7%) versus 6.7% of patients with excellent and good outcome, with statistically significant difference among them (**Table 3**).

Concerning Majeed score and fractures healing time among the studied group showed a statistically significant difference among patients with fair outcome and those with excellent and good outcome regarding healing time of both acetabula and femoral fracture, as both was higher among patients with fair outcome (**Table 4**).

**Table (1): Healing time of fractures and Majeed score of hip function among studied cases:**

	Studied group (n=18)			
	Minimum	Maximum	Mean	S.D
Heeling time of acetabular fracture (weeks)	11.00	24.00	17.22	4.1
Healing Time of femoral fracture (weeks)	14.00	33.00	21.78	5.9
Majeed score	N		%	
Excellent	10		55.6	
Good	5		27.8	
Fair	3		16.7	

**Table (2): Complications among the studied group:**

	Studied group (N=18)	
	N	%
Neurological injuries because of trauma of sciatic nerve.	3	16.7
Delay-union femoral fracture	2	11.1
Non-union acetabular fracture	0	0.0
Shortening leg	3	16.7
Wound infection (sup/deep)	3	16.7
Avascular necrosis	0	0.0
DVT	2	11.1

**Table (3): Relation between outcome score (Majeed score) and general characters among the studied group:**

	Excellent and good outcome (N=15)		fair outcome (N=3)		X <sup>2</sup>	P value
	N	%	N	%		
<b>Sex</b>						
Male	12	80	2	66.7	0.26	0.62 NS
Female	3	20	1	33.3		
<b>Hypertension</b>	1	6.7	2	66.7	6.48	0.01 S
<b>DM</b>	1	6.7	1	33.3	1.8	0.133 NS
	Mean ± SD		Mean ± SD		MW	P value
<b>Age (years)</b> Range	35.1 ± 15.2		50.7 ± 12.5 10 – 58		1.7	0.11 NS

**Table (4): Relation between outcome score (Majeed score) and fractures healing time among the studied group:**

	Excellent and good outcome (N=15)		fair outcome (N=3)		t-test	P value
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD		
<b>Healing of acetabula (weeks)</b> Range	16.3 ± 3.69 12 - 22	22 ± 2.0 20 - 24	3.73	0.01 S		
<b>Healing of femur (weeks)</b>	19.9 ± 4.43 14 - 30	31 ± 1.73 30 - 33	7.28	<0.001 HS		

**DISCUSSION:**

Fracture acetabulum with ipsilateral fractures of femur represent a severe combined of injuries which need optimal management <sup>(7)</sup>. When confronted with this constellation of fractures, most surgeons advocate stabilizing the femur fracture first and then treating the acetabulum either in the same setting or as a delayed procedure. For the femoral fracture internal fixation, both pre- and intraoperative traction of the femur is important both to reduce the fractures and to prevent further damage <sup>(8)</sup>. However, if the hip joint remains unstable due to an ipsilateral fracture of the pelvis it is difficult to achieve effective and enough traction. On the other hand, for pelvic fractures, especially for acetabular fractures, a stable femur is necessary to maintain an unstable hip in a located position and to reduce the fragments intraoperatively <sup>(9)</sup>.

In our study 18 patients with ipsilateral acetabular fractures with femoral intertrochanteric and shaft fracture were treated by one approach in the same setting under general anesthesia.

In our study the healing time of femoral fracture ranged from 14 weeks up to 33 weeks with mean of  $21.78 \pm 5.9$  and healing time of acetabular fracture was  $17.22 \pm 4.1$  weeks. 55.6% of studied group gave excellent Majeed score of hip function, while only 16.7% were fair. The results showed that healing time and restoring functions are significantly correlated with the severity of injury.

In the study of **Wu et al.**,<sup>(10)</sup> who introduced combined pelvic and femoral shaft fractures. Forty patients sustaining unstable pelvic fractures and concomitant femoral shaft fractures were treated in a 7year period. All 33 pelvic fractures (100%) healed in an average of 3.3 months (range, 1.6–8.1 months), and 34 of the 36 femoral shaft fractures (94.4%) healed in an average of 4.1 months (range, 2.5-18.2 months). There were two non-unions (5.6%) and one malunion (2.8%) in patients with femoral shaft fractures.

In study of **Cai et al.**,<sup>(11)</sup> who retrospectively analyzed 21 cases of unstable pelvic fractures with concomitant acetabular fractures, the healing time was 12–18 weeks for pelvic fractures and 12– 22 weeks for acetabular fractures.

In our study patients with sciatic nerve injury, 2 patient improve after 4 month with physiotherapy. While 1 patient showed no improvement regarding foot drop and patient is prepared for future surgical intervention .

## CONCLUSION:

Ipsilateral fractures of the femur and acetabulum treated simultaneousness using Kocher-Langenbeck approach did not demonstrate an increased risk of wound complications, and not contraindicated to antegrade femoral nailing.

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