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Floating Hip, Eleven Cases and Literature Review

Babak Siavashi[1,*]

[1]Tehran University of Medical Sciences, Joint Reconstruction Research Center, Sina Hospital, Tehran, Iran

[*]*Corresponding author*: Babak Siavashi, Sina Hospital, Imam Khomeini Street, Tehran, Iran. Tel: +98-2166348500, Fax: +98-2166348543, E-mail: siavashi@tums.ac.ir

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Abstract

Floating hip refers to concomitant fracture of the acetabulum, pelvis, and femur. We report the cases, our approach, as well as short-term results from 2008 to 2016. There were a total of 11 cases. The most prevalent pelvis fracture type were Tile type C and the most acetabulum fractures were both column fracture. The most femoral side fractures were per-throchantrric fractures (head, neck, intertrochanteric fracture). In most cases, fixation started from the pelvis, acetabulum, and then the femur. There were 5 complications (45%) (1 DVT, 2 nonunion, and 2 AVN). There were 3 cases, which end to THA in the follow up period. It seems this combination of fractures needs special attention.

Keywords: Floating Hip, Fracture, Acetabulum, Pelvis, Femur

1. Background

The floating hip refers to the concomitant fracture of acetabulum, pelvis, and femur (1). By definition, the femoral fracture may be in the proximal part or distal part (2). It is a rare combination of fractures and is usually seen in multiple injured patients. Optimal treatment sequence is not agreed in literature (3). Some surgeons prefer to start from the proximal side and some prefer to start from the femur. We report the cases, our approach, as well as short-term results.

2. Methods

From 2008 to 2016, every case of floating hip, which is referred to our hospital were studied. Age, sex, type of pelvis and acetabulum fracture, location of femoral side fracture, treatment and sequence of fixation, fixation device for each fracture, and interval between operations were studied. Post op complications and morbidities were mentioned. In addition, associated injuries and fractures were also studied.

3. Results

There are 11 cases in our study. Features of them can be seen in Tables 1 and 2:

There were 6 males (54%) and 5 Females (46%). The average age was 42.3 years (17 to 52).

The pelvic side injury was a pure pelvic fracture in 3 cases (27%), pure acetabular fracture in 4 cases (36%), and concomitant acetabulum and pelvis fracture in 4 cases (36%) (Figure 1). All pelvic fractures were Tile type C (100%); however, most acetabulum fractures were both column (4 cases, 36%). SIJ was the site of posterior pelvic injury in 5 cases (45%) and sacral fracture was seen in 2 cases (18%). Femoral side fractures were head fracture (2 cases, 18%), neck (3 cases, 27%), intertrochanteric fracture (2 cases, 18%), subtrochanteric fracture (1 case, 9%), shaft fracture (2 cases, 18%), and distal femur fracture 2 cases, 18 %). In 10 cases (91%), fixation starts from the most proximal fracture/dislocation like SIJ and then moves distally to the acetabulum, then the femoral fixation. One case needs primary THA for splitting of the femoral head. There were 5 associated injuries (45%). The follow up period was from 4 to 96 months (average 34.9). There were 5 complications (45%), (DVT in 1, nonunion in 2, and AVN in 2 cases).

A total of 3 cases need THA in the follow up period (2 for AVN of femoral head and 1 for femoral neck nonunion). In 7 cases (63%), both pelvic and femoral sides were fixed in 1 session. in cases that had 2 operations, it was done after 2 days in 3 cases. The second operation was the fixation of the posterior side of acetabulum in 2 cases, fixation of pelvis in 1 case, and fixation of other fractures in 1 case (tibial fracture).

4. Discussion

The sequence of fixation in most cases of this study was from the proximal to the distal. It is different from other studies (4). This means that at first, in the supine position, disruption of SIJ was reduced and fixed. Then, I try to fix the acetabulum from the anterior approaches and then fix the anterior pelvic fracture in the symphyseal area

Table 1. Demographic Character of Patient, Acetabular and Pelvic Fracture Type, Device Used for Fixation

Patient Number	Age (Year)	Sex	Pelvic Fracture Type (Tile)	Acetabulum Fracture Type	Femural Side Fracture	Associated Injury	Device for Femoral Side Fixation	Pelvic Side Fixation Method
1	52	Female	No	Both column low variety	Intertroch comminuted, A2	Chest trauma	DHS	ORIF
2	40	Male	C, SIJ, symphysis	No	Intertroch, A1	Urinary tract injury	DHS and screw	ORIF, Ext Fix
3	28	Female	C, sacrum, ramus fx	Both column, T type sacrum	Subthroc	No	DHS	ORIF, SIJ screw
4	43	Male	C, sacrum, ramus fx	No	Neck	No	DHS and screw	SIJ screw Ex fix
5	45	Male	C, SIJ, symphysis	Both column transverse SIJ	Base of neck shaft	Distal radius contralateral knee ligamentus injury	DHS and screw plate	ORIF
6	17	Male	C, SIJ, ramus fx	Both column, SIJ T type	Shaft	Tibia fibula fx	IM nail	ORIF
7	48	Male	no	Transverse	Head distal femur	No	Screw-locking Plate	ORIF
8	52	Female	C, SIJ, ramus fx	Posterior wall	Head splitting	No	THA	ORIF, SIJ screw, Ex fix
9	42	Female	No	Transverse posterior wall	Neck	No	Screw	ORIF
10	48	Male	No	Transverse posterior wall	Greater trochanter	No	Tension band wiring	ORIF
11	51	Female	C, SIJ, symphysis	No	Hoffa fx	Thigh laceration	Screw	ORIF, ORIF

and ramii. By this strategy, the majority of pelvic rings can be fixed and only the posterior column of the acetabulum may need fixation in other positions from the posterior approach. It attaches the pelvis to the core and forms the foundation for reconstructing other parts of the pelvis, acetabulum, and then femur. It is preferred to fix the pelvis at first due to these reasons: 1, It is a source of bleeding and fixation of the pelvis stabilized patient hemodynamically. 2, It forms a cancellous bone and the union speed in this part is more rapid; therefore, postponing reduction and fixation may make later surgeries more difficult. 3, It is also one of the sources of fat emboli and its fixation may reduce the chance of fat emboli syndrome.

Then femoral side fracture was fixed in the same supine position. Other studies do not agree with fixation from proximal to distal (5). They prefer to fix the tibia at first, then the femur, and final-ly the pelvis. They believe that fixation from distal to proximal make manipulation easier and facilitate reduction of proximal fractures.

In 1 case, pelvis fixation was done 14 days after fixation of the femoral side fracture. It was the case that had been accepted from another center after fixation of the femoral side in that hos-pital.

Fortunately, there was 1 DVT case, which was treated with anticoagulant and had no PTE. This is near the results of Burd TA et al. (6).

I try to use an approach for the pelvis and acetabulum to fix as much fragments as possible from 1 approach to reduce operation time.

There was no infection. The operations were planned as such that there was no need to use an approach or part of it in the other operation due to the fact that re opening a wound after 3 or 4 days can increase risk of infection. In the Muller study, there were some complications in this field (7).

One case of head splitting, which needs primary THA, had recurrent dislocations. Soft tissue in-competency and insufficiency may be an underlying reason. Therefore, it is wise to fix the ace-tabulum and pelvis at first and do THA in another session, 1 or 2 months after complete healing of the soft tissues (8).

Late AVN and DJD, which were treated with THA, had better results and although it was con-version surgery, risk of dislocation seems to be less than primary THA in acute condition. There are some differences with the Timothy A. study (6).

Table 2. Characters of First and Second Operations, Follow Up and Complications

Patient Number	First Operation	Interval to Next Operation (Day)	Next Operation	Follow Up (Month)	Complication
1	Acetabulum stoppa and DHS on standard table	2	Acetabulum kocher langenbeck	14	No
2	DHS and screw on standard table	14	ORIF SIJ Ex Fix	36	No
3	Acetabulum ilioinguinal DHS on fracture table	2	Acetabulum kocher langenbeck	96	No
4	DHS and screw on standard table	0	SIJ screw Ex fix	24	No
5	Acetabulum ilioinguinal SIJ screw DHS DCP Distal radius plate	0	-	48	DVT nonunion of shaft
6	SIJ plate acetabulum stoppa acetabulum kocher femur IM nail	2	Tibia IM nail	4	No
7	Screw for head ORIF acetabulum kocher dis-tal femur ORIF	0	-	36	AVN of head treated with THA
8	ORIF kocher-THA SIJ screw Ex fix	0	-	48	Recurrent THA dislocation
9	ORIF kocher screw	0	-	34	Nonunion of neck treated with THA
10	ORIF kocher tension band wiring	0	-	30	AVN and DJD treated with THA
11	ORIF iliac fossa ORIF pfansteil	0	-	14	no

Associated injuries were 1chest trauma, 1 urinary tract injury, 1 laceration, and 2 fractures. There were less associated injuries (9). There was no head trauma and no abdominal visceral injury.

There was also no mortality in the follow up period.

In 3 cases, the external fixators were used for pelvic fractures. One of them was in the case of a urinary tract injury, 1 in the case of symphyseal separation, and 1 in a comminuted rami fracture for a shortening operation time. Other studies use ramus screws (antegrade or retrograde) when possible (10). There was no complication from external fixators.

References

1. Agarwal A, Chadha M. Floating injuries: a review of the literature and proposal for a universal classification. *Acta Orthop Belg.* 2004;**70**(6):509–14. [PubMed: 15669448].
2. Liebergall M, Lowe J, Whitelaw GP, Wetzler MJ, Segal D. The floating hip. Ipsilateral pelvic and femoral fractures. *J Bone Joint Surg Br.* 1992;**74**(1):93–100. [PubMed: 1732275].
3. Suzuki T, Shindo M, Soma K. The floating hip injury, which should we fix first? *Eur J Orthop Surg Traumatol.* 2006;**16**(3):214–8. doi: 10.1007/s00590-006-0081-4.
4. Muller EJ, Siebenrock K, Ekkernkamp A, Ganz R, Muhr G. Ipsilateral fractures of the pelvis and the femur–floating hip? A retrospective analysis of 42 cases. *Arch Orthop Trauma Surg.* 1999;**119**(3-4):179–82. [PubMed: 10392514].
5. Pape HC, Hildebrand F, Pertschy S, Zelle B, Garapati R, Grimme K, et al. Changes in the management of femoral shaft fractures in polytrauma patients: from early total care to damage control orthopedic surgery. *J Trauma.* 2002;**53**(3):452–61. doi: 10.1097/01.TA.0000025660.37314.0F. [PubMed: 12352480].
6. Burd TA, Hughes MS, Anglen JO. The floating hip, complications and outcomes. *J Trauma.* 2008;**64**(2):442–8. doi: 10.1097/TA.0b013e31815eba69. [PubMed: 18301213].
7. Muller EJ, Siebenrock K, Ekkernkamp A, Ganz R, Muhr G. Ipsilateral fractures of the pelvis and the femur floating hip? A retrospective analysis of 42 cases. *Arch Orthop Trauma Surg.* 1999;**119**(3):179–82. [PubMed: 10392514].
8. Duygulu F, Calis M, Argun M, Guney A. Unusual combination of femoral head dislocation associated acetabular fracture with ipsilateral neck and shaft fractures, a case report. *J Trauma.* 2006;**61**(6):1545–8. doi: 10.1097/01.ta.0000224898.83708.e1. [PubMed: 17159705].
9. Liebergall M, Mosheiff R, Safran O, Peyser A, Segal D. The floating hip injury, patterns of injury. *Injury.* 2002;**33**(8):717–22. [PubMed: 12213424].
10. Wu CL, Tseng IC, Huang JW, Yu YH, Su CY, Wu CC. Unstable pelvic fractures associated with femoral shaft fractures, a retrospective analysis. *Biomed J.* 2013;**36**(2):77–83. doi: 10.4103/2319-4170.110401. [PubMed: 23644236].

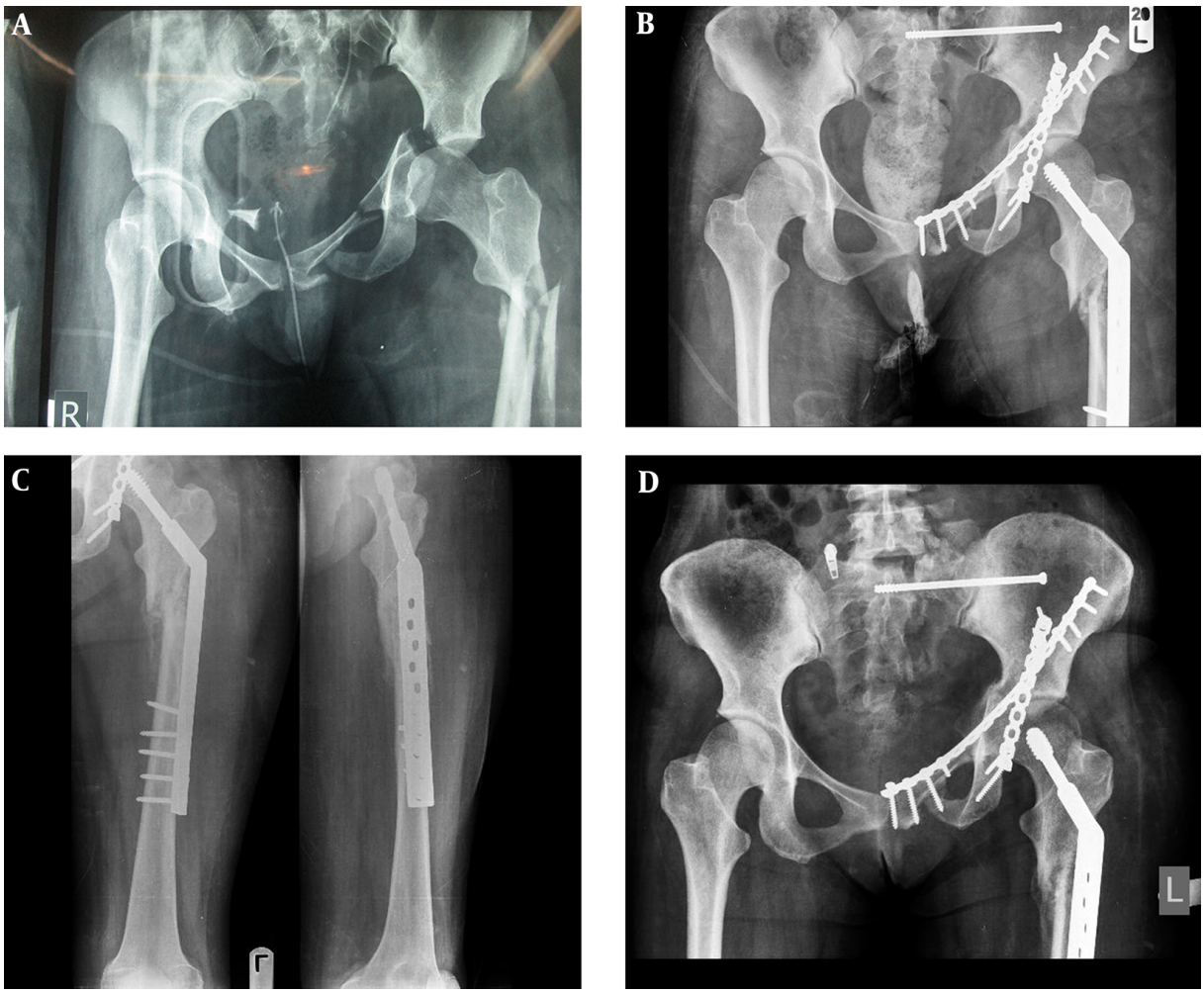

Figure 1. A, Preoperative Radiography; B, Early Post Operative Radiography; C and D, 6 Months Follow up