Case Report
Hip Knee J. Vol. 4, No. 1, 2023, pp. 28-34
p-ISSN: 2723-7818
e-ISSN: 2723-7826
http://dx.doi.org/10.46355/hipknee.v4i1.102

OPEN REDUCTION, ACETABULAR AND FEMORAL HEAD FIXATION OF PIPKIN TYPE IV FRACTURE IN AN ADOLESCENT: A CASE REPORT

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ABSTRACT

Femoral head fracture is extremely rare in adolescents. There are few studies that focus on cases treated of pipkin type IV. Case Summary a 15-year-old male adolescent suffered a serious traffic accident when he was sitting in the front seat of the car. Several hours after the accident at the local hospital, he was diagnosed with posterior dislocation of the right hip with a drop foot and treated with closed reduction immobilization with skin traction. After the first operation, he was transferred to another hospital. Pelvic radiograph computed tomography revealed a head femoral fracture and a large acetabular rim fracture. This was diagnosed as a Pipkin type IV acetabular and femoral head fracture with dislocation. An open reduction Inion Freedom bioscrew fixation of the head femur and 4.5 cortical screw fixation of acetabular fracture was performed via a Kocher Langenbeck approach. After 1-year follow-up, the patient could walk without aid and participate in physical activities. The X-ray results showed that the fractures healed well with no evidence of complications. Open reduction, fixation of both acetabular and femoral head is an available therapy to treat Pipkin type IV in adolescent

Keywords: Pipkin type IV, acetabular and femoral head fracture with dislocation, fixation of both acetabular and femoral head, bioscrew.

Article History:

Submission : July 5th, 2021
Revision : July 18th, 2021
Accepted : February 27th, 2023

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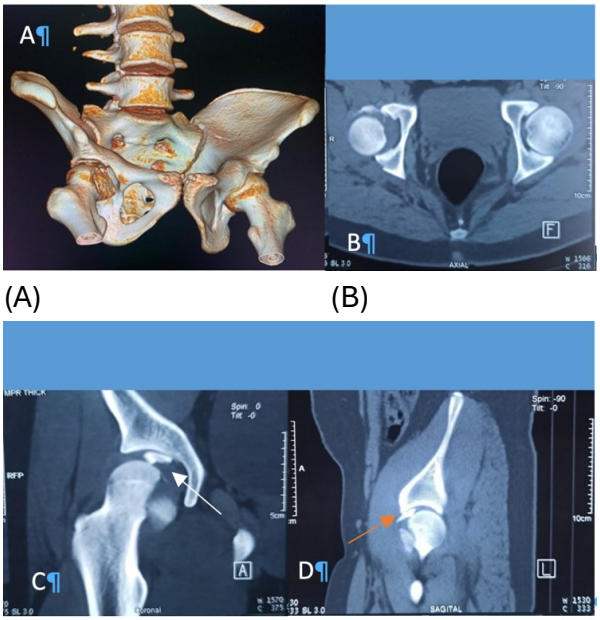
INTRODUCTION

Femoral head fractures are uncommon injuries in adults and more rarely seen in children and adolescents. With high-energy injuries increasing, especially in car accidents, hip traumas are becoming more frequent. The literature shows that about 5%-15% of hip dislocations are accompanied by proximal femoral fractures (1). The most commonly used classification described by Pipkin where the fracture line location and lesion in the femoral neck or acetabulum to define the fracture type (2). Patients with Pipkin type I or II injuries have more optimal outcomes than those with Pipkin type III or IV injuries (3). Nowadays, according to our knowledge, few articles have reported femoral head fractures in skeletally immature patients. We operated a 15-year-old female which was diagnosed with a Pipkin type IV fracture. After one year, excellent clinical function and radiographic fracture healing were observed.

PRESENTATION OF CASE

A 15-year-old Indonesian was transferred to our hospital with the chief complaints of severe hip pain and difficult thigh movement after being struck by a car when he was sitting in front of car 5 days before. History of present illness due to right hip pain and limited movement, radiographic examinations were performed in the emergency room of the local hospital. The patient was diagnosed with “posterior hip dislocation and femoral head fracture.” and closed reduction immobilization with skin traction was done After 5 days of inpatient observation patient was transported to our hospital.

History of past illness the patient had a free previous medical history. In physical examination, patients exhibited hip tenderness and limitation of motion, with drop foot was observed. Imaging examinations a three-dimensional Computed Tomography (CT) scan demonstrated a femoral head fracture. Axial and sagittal CT scan showed posterior of acetabulum with displacement slightly. A coronal CT scan showed the fracture line extending anterior-inferior to the fovea centralis (Figure 1.).



(A) (B)

(C) (D)

Figure 1. Preoperative computed tomography scans of the hip. A: Three-dimensional computed tomography scan showed femoral head fracture; B and D: Axial and sagittal computed tomography scans showed the posterior acetabulum with large displacement (orange arrow); C: Coronal computed tomography scan showed the femoral head fracture extending inferior to the fovea centralis (white arrow).

The final diagnosis was a femoral head fracture associated with posterior acetabular fracture categorized as a Pipkin type IV as sub-Classification of Epstein Thompson and drop foot was observed. Pre operative treatment with Closed reduction immobilization skin traction was done in the local hospital. The patient underwent skin traction for 7 days including 5 days in the local hospital and 2 days in our hospital After a general physical check-up and confirmation that vital signs were stable, we opted for surgical intervention on the 7th day after the injury.

Surgical procedures with Kocher Langenbeck approach were chosen to expose the operative field with the patient in a side-lying position after general anesthesia. A longitudinal skin incision was made in the middle of the shaft femur to the greater trochanter and curve to PSIS (Posterior Superior Iliac Spine). After dividing the subcutaneous tissues, sharply incise the subcutaneous tissues along gluteus maxim sand iliotibial tract. Split the gluteus maximus in line with its fibers, starting at the greater trochanter Ina proximal.

Free the layer of fat covering the short external rotators, exposing the insertion of the piriformis tendon, the gemelli, and the internal obturator muscle. The sciatic nerve lies posterior to the gemelli and internal obturator muscles and anterior to the piriformis muscle, between the greater trochanter and the ischial tuberosity. Detach the external rotator muscles and isolate the piriformis tendon. Reflect the piriformis belly laterally to expose the retro acetabular surface to the greater sciatic notch. Isolated the conjoined tendon of the obturator internus and superior and inferior gemelli muscles.

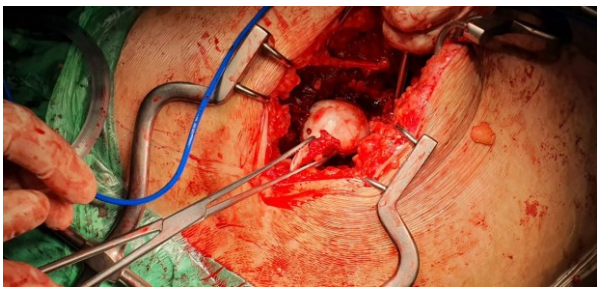


Figure 2. Intraoperative picture showing a major fragment in the inferior part of the femoral head. The patient was in a lateral position.

The capsule was exposed, and a “T”-shaped incision was made. The femoral head was dislocated posteriorly with flexion and adduction. A piece of the large fragment and some smaller articular debris was detected in the non-weight bearing area (Figure 2). The large fragment comprised 20% of the articular surface and was notably rotated and inverted. The ligamentum teres is still intact from its insertion into the acetabulum. The major fragment was manipulated carefully back into place and an anatomical reduction of the articular surface was obtained. Two Inion Freedom bio screws were used to fix the fragment with specific attention to avoiding screw protrusion.

Then the hip joint was reduced by gentle abduction and internal rotation. After that, we reduce acetabulum and fixed with two 4.5 mm cortical screws (Figure 3). We tested the range of motion and joint stability. The reduced hip demonstrated no limitation of passive activity (Figure 4.). Before the wound was closed, and a drain

was inserted, we explored the sciatic nerve from proximal to distal, and found sciatic nerve was intact. Intraoperatively, x-rays demonstrated an ideal reduction of the femoral head (Figure 5.).

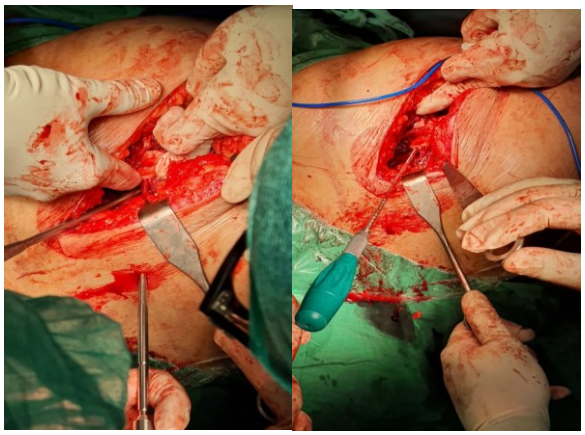


Figure 3. Two Inion Freedom bio screws fixation at the head femur fragment

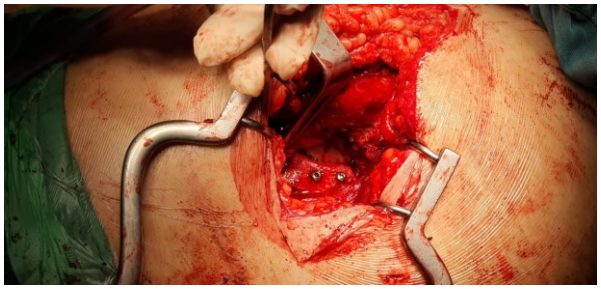


Figure 4. Two 4.5 mm cortical screw fixation at acetabulum fragment.

Figure 5. Intraoperative X-ray.

Outcome and follow-up the patient was compliant with physical exercises and partial weight-bearing with crutches after surgery. The postoperative hospitalization time was 2 weeks. Follow-up occurred at 4 and 8 weeks, 10 weeks postoperatively. 3 months after being discharged from the hospital she returned to school and could walk without crutches but still has a drop foot. One year after the surgery the patient had no left hip pain and was playing partial-contact sports without difficulty with AFO. Her left hip range of motion demonstrated hip flexion range of 0° to 100°, internal rotation to 20°, external rotation to 40°, abduction to 30° and adduction to 30°. According to Radiograph evaluation, 12 months after the injury demonstrated fracture healing with no evidence of osteonecrosis (Figure 6.).

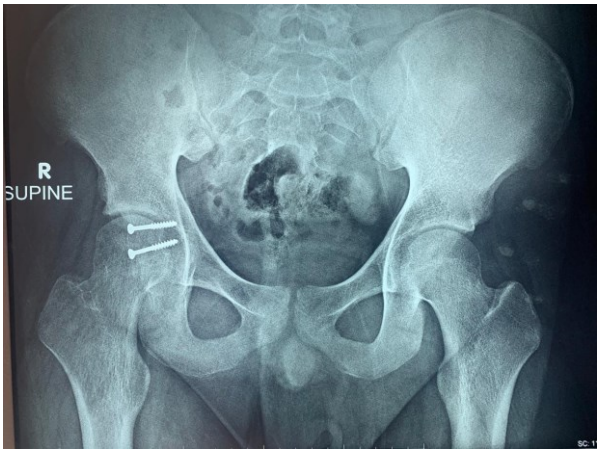


Figure 6. Pelvic radiographs 1 year after operation. Anteroposterior x-ray images showed union of the fractures with no femoral head necrosis.

DISCUSSION

Pipkin fractures are rare injuries, especially in the adolescent population. There are few papers in literature that describe femoral head fractures in skeletally immature patients. Previous literature has reported an incidence of two in a million per year (4).

With the growing incidence of traffic accidents, the occurrence of hip fracture dislocation has increased (5). The mechanism of this injury is very complicated due to the indirect force intensity to the hip caused by the impact transmitted along the femoral shaft. Compared with adults, associated fractures are more uncommon in adolescents with traumatic hip dislocation (6). Cartilaginous pliability and ligamentous laxity in adolescents provide increased elasticity, which could explain the rarity of this type of fracture in adolescents.

The Pipkin system is the typical classification for femoral head fracture dislocations (7). Type IV lesions, which are characterized by lesions of both the femoral head and acetabular rim, usually have a poor prognosis (8). Treatment options for Pipkin type IV fractures include fragment excision, internal fixation, and arthroplasty (9-11). The primary goals of open reduction are to remove loose fragments, to restore stability to the hip joint and to ensure concentric hip reduction.

The optimal timing of surgery is still controversial. Some literature indicated worse outcomes for Pipkin fractures with delayed surgery compared with those who had immediate surgery (12). However, other studies showed no statistically significant differences in outcome when comparing the time of surgery with hip reduction, definitive operative intervention or the anatomic operative approach to injury (3). Skin or skeletal traction is a temporary measure in acetabular and proximal femoral fractures when surgical intervention is delayed (13). In our case, skin traction was performed immediately in the local hospital so that a prompt concentrated hip reduction and temporary immobilization were achieved. This may be one reason for the absence of complications. In theory, treatment through

surgical hip dislocation or a posterior approach to fix both the acetabulum and femoral head is advocated in dealing with Pipkin type IV fractures (14,15).
However, we chose a Kocher Langenbeck approach for the following reasons. First, we need to expose posterior acetabulum to fix the fracture. Second, we need to explore the sciatic nerve at the posterior of the hip. Additionally, the Kocher Langenbeck was the most familiar approach for us and is widely used in the exploration of posterior hip and femoral neck fractures. Also, the literature showed there was no significant statistical difference in the therapeutic effect among anterior, posterior or trochanteric-flip approaches for repair of femoral head fractures (5). There is still disagreement over whether fragments should be fixed or removed (16). Most surgeons agree that large fracture fragments and those located in the load-bearing area should be retained and anatomically repositioned (17).

The diameter of the large fragment in this case was about three centimeters; we choose to operate using Inion Freedom bio screw fixation for head femur and 4.5 mm cortical screw for acetabular. Other small debris was removed to facilitate the reduction of hip joint. Radiographs of the pelvis were obtained after manipulation to check concentric reduction. The most common complications are nonunion,

femoral head avascular necrosis, heterotopic ossification, osteoarthritis and stiffness (5). None of these sequelae were seen after early exercise and partial weight-bearing. It is particularly important to point out that the follow-up time is relatively short. Long term clinical follow-up is needed to fully evaluate the prognosis.

CONCLUSIONS

This case report describes a rare case of Pipkin type IV fracture in a 15-year-old Male. By open reduction, fixation both acetabular and head femur via a Kocher Langenbeck approach, satisfactory patient outcomes were observed without major complications.

REFERENCES

1. Sahin V, Karakaş ES, Aksu S, Atlihan D, Turk CY, Halici M. Traumatic dislocation and fracture dislocation of the hip: a long-term follow-up study. J Trauma 2003; 54: 520-529 [PMID: 12634533 DOI: 10.1097/01.TA.0000020394.32496.52]
2. Pipkin G. Treatment of grade IV fracture dislocation of the hip. J Bone Joint Surg Am 1957; 39-A: 1027-42 passim [PMID: 13475403]
3. Marchetti ME, Steinberg GG, Coumas JM. Intermediate-term experience of Pipkin fracture dislocations of the hip. J Orthop Trauma 1996; 10: 455-461 [PMID: 8892144
4. DOI: 10.1097/00005131-199610000-00002]
5. Kelly PJ, Lipscomb PR. Primary Valliammal'd arthroplasty for posterior dislocation of the hip with fracture of the femoral head. J Bone Joint Surg Am 1958; 40-A: 675-680 [PMID: 13539093]
6. Gillespie P, Aprato A, Bircher M. Hip Dislocation and Femoral Head Fractures. In: Bentley G. (eds) European Surgical Orthopaedics and Traumatology. Springer, Berlin, Heidelberg, 2014: 2179-2202
7. Chun KA, Morcuende J, El-Khoury GY. Entrapment of the acetabular labrum following reduction of traumatic hip dislocation in a child. Skeletal Radiol 2004; 33: 728-731 [PMID: 15558278 DOI: 10.1007/s00256-004-0800-z]
8. Thompson VP, Epstein HC. Traumatic dislocation of the hip; a survey of two hundred and four cases covering a period of twenty-one years. J Bone Joint Surg Am 1951; 33-A: 746-78; passim [PMID: 14850515]
9. Giannoudis PV, Kontakis G, Christoforakis Z, Akula M, Tosounidis T, Koutras C. Management, complications and clinical results of femoral head fractures. Injury 2009; 40: 1245-1251 [PMID: 19897188 DOI: 10.1016/j.injury.2009.10.024]
10. Kurtz WJ, Vrabec GA. Fixation of femoral head fractures using the modified heuter direct anterior approach. J Orthop Trauma 2009; 23: 675-680 [PMID: 19897991 DOI: 10.1097/BOT.0b013e3181a14174]
11. Oransky M, Martinelli N, Sanzarello I, Papapietro N. Fractures of the femoral head: a long-term follow-up study. Musculoskelet Surg 2012; 96: 95-99 [PMID: 22389008 DOI: 10.1007/s12306-012-0182-7]

12. Solberg BD, Moon CN, Franco DP. Use of a trochanteric flip osteotomy improves outcomes in Pipkin IV fractures. Clin Orthop Relat Res 2009; 467: 929-933 [PMID: 18800211 DOI: 10.1007/s11999-008-0505 z]
13. Lin D, Lian K, Chen Z, Wang L, Hao J, Zhang H. Emergent surgical reduction and fixation for Pipkin type I femoral fractures. Orthopedics 2013; 36: 778-782 [PMID: 23746015 DOI: 10.3928/01477447-20130523-24]
14. Matullo KS, Gangavalli A, Nwachuku C. Review of Lower Extremity Traction in Current Orthopaedic Trauma. J Am Acad Orthop Surg 2016; 24: 600-606 [PMID: 27454023 DOI: 10.5435/JAAOS-D-14 00458]
15. Ganz R, Gill TJ, Gautier E, Ganz K, Krügel N, Berlemann U. Surgical dislocation of the adult hip a technique with full access to the femoral head and acetabulum without the risk of avascular necrosis. J Bone Joint Surg Br 2001; 83: 1119-1124 [PMID: 11764423 DOI: 10.1302/0301-620x.83b8.11964]
16. Droll KP, Broekhuyse H, O'Brien P. Fracture of the femoral head. J Am Acad Orthop Surg 2007; 15: 716-727 [PMID: 18063712 DOI: 10.5435/00124635-200712000-00005]
17. Ross JR, Gardner MJ. Femoral head fractures. Curr Rev Musculoskelet Med 2012; 5: 199-205 [PMID: 22628176 DOI: 10.1007/s12178-012-9129-8]

