

SURGICAL TREATMENT OF PIPKIN IV COMMINUTIVE FRACTURE ASSOCIATED WITH HAEMATOMA, SIGNIFICANT SOFT TISSUE DAMAGE, AND DEEP INFECTION – A CASE REPORT

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Femoral head fractures associated with acetabular fractures are uncommon injuries usually resulting from high-energy mechanisms. This paper is aimed to present a case with successful treatment of Pipkin IV, a comminutive fracture of the head of the femur associated with hematoma, soft tissue damage, and deep infection.

Patient D.M. 1976 was injured from some concrete blocks. The patient was a polytraumatized patient with a severe traumatic shock and Pipkin IV dislocated and comminutive fracture of the left femoral head, comminutive fracture of the left acetabulum, and big hematoma of the left femoral region with soft tissue damage of this region. There was a fracture of the pubic and ischium bone on the right side of the pelvis. He was admitted to the Intensive care unit as an urgent case.

First, we performed an open reduction and internal fixation of the left acetabulum with plate and screws. The patient after that got a serious deep infection of the hematoma in the left femoral region so we had to treat this infection for two months. We had to wait for the next three months without any symptom or sign of the infection (CRP levels were normal) and after that, we performed the application of subtotal prosthesis after removal of all bone fragments of the left femoral head.

The patient had no signs of infection after the second operation and we referred him to receive intensive physiotherapy during the next three months. He could walk without any support three months after the second operation and after continuous physiotherapy and in that time, the range of movements of his left leg was only slightly limited.

We performed x-ray control a year after the operation and the patient developed the signs of ectopic ossification, but the range of motion remained only minimally limited. The Harris Hip Score in that time was 81.

The main treatment should always be an immediate anatomic reduction of the fragments with minimal soft tissue injury and fixation with ORIF in all other Pipkin fractures, but in cases with Pipkin IV fractures associated with previously extensive soft tissue damage and deep infection we recommend waiting for the second operation for at least three months after disappearing of all symptoms and signs of the infection. *Acta Medica Medianae* 2023;62(1):79-84.

Key words: Pipkin fracture-dislocation, soft-tissue, hematoma, complications

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Introduction

These types of fractures are fractures of the femoral head associated with hip dislocation and fracture of the acetabulum. They are extremely

rare and are associated with poor functional outcomes.

Keely and Lipscomb reported that the incidence of the Pipkin fractures is two cases per one million patients per year, but the incidence of Pipkin IV fracture is much rarer than the previous. There are also very controversial treatment strategies for this type of fracture. In Pipkin II and III fractures, there is really one of few orthopedic emergencies but in Pipkin IV fractures there is no need for an emergency but there is a need to achieve good functional outcomes. Essentially, Pipkin IV fractures can be treated surgically by ORIF of the acetabular fracture and fixation or excision of the femoral head fragments and application of subtotal or total hip prosthesis.

Case presentation:

Patient D.M. 1976 was injured from some concrete blocks. The patient was polytraumatized with a severe traumatic shock and Pipkin IV dislocated and comminutive fracture of the left femoral head, comminutive fracture of the left acetabulum, and big hematoma of the left femoral region with soft tissue damage of this region. There was a fracture of pubic and ischium bone on the right side of the pelvis. He was admitted to the Intensive care unit as an emergency case (Figure 1).

This type of fracture has a very high percentage of postoperative aseptic necrosis of the femoral head and because of that we decided to perform a total hip prosthesis with screw fixation of the acetabular part and to solve the problem with one operation, but the acetabular surface was so comminutive and there was no place for fixing the acetabular cup and there was also big

hematoma with soft tissue damage of all left femoral region. Because of that, we decided to make the Kocher Langebeck approach and to proceed in two steps: first to fix acetabulum with plate and screws with checking the acetabular inner surface and removing the pieces of the femoral head and after that to perform the second operation with removal of the remaining particles of comminutive fractured femoral head and to applicate a subtotal prosthesis. We did not use a total hip prosthesis because of the risk of infection.

First, we performed an open reduction and internal fixation of the left acetabulum with plate and screws from the Kocher Langebeck approach (Figure 2). We intended to remove the fragments from the femoral head and to perform Muller subtotal prosthesis in a second step, but the patient got an intensive deep infection of the hematoma in the left femoral region so we had to treat this infection.



Figure 1: X-ray on the admission of the patient

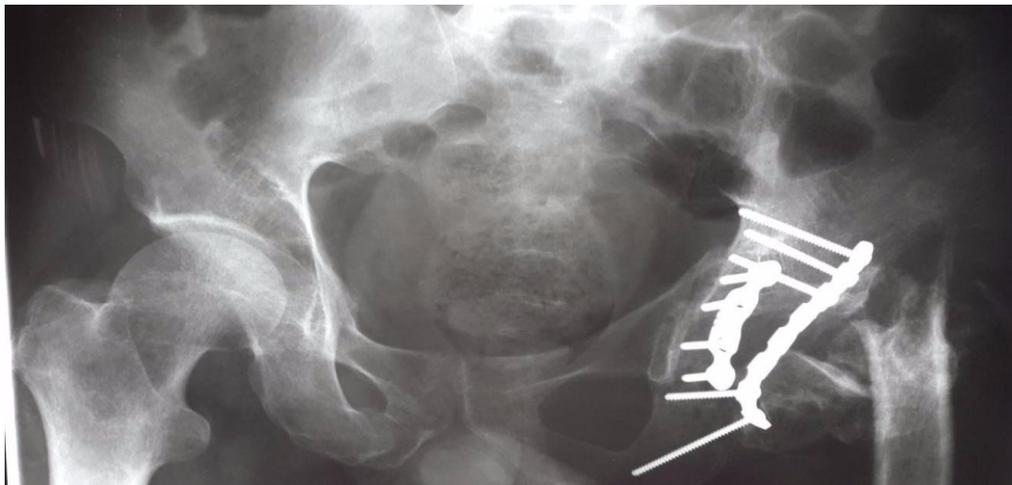


Figure 2: X-ray after the first operation

We isolated *Pseudomonas aeruginosa* et *Klebsiella pneumoniae* and had to use two antibiotics according to antibiogram: Linezolid S 2x1 and Garamycin S 2x120 during ten days in two repeated times. Local treatment of the infection was performed at the time of two months with every day special silver dressings and patches combined with local application of antibiotics according to antibiogram. When there was no more secretion produced (fistula) at the place of the operation we stopped with the local treatment, but we continued with systemic antibiotic application several days after that.

We had to wait for the next three months without any symptom or sign of the infection (the levels of CRP were normal) and after that, we

performed the application of subtotal prosthesis after removal of all bone fragments of the left femoral head (Figure 3).

The patient had no signs of the infection after the second operation and we referred him to receive intensive physiotherapy for a period of three months. He could walk without support three months after the second operation and continuous physiotherapy during three months, and at that time his left leg movement range was only slightly limited (Figure 4).

We perform RTG control a year after the operation and the patient develops signs of ectopic ossification but the range of motion remained minimally limited. The Harris Hip Score at that time was 81. (Figure5).



Figure 3: X-ray after the second operation



Figure 4: Picture with the patient, functional tests after 3 months of intensive physiotherapy

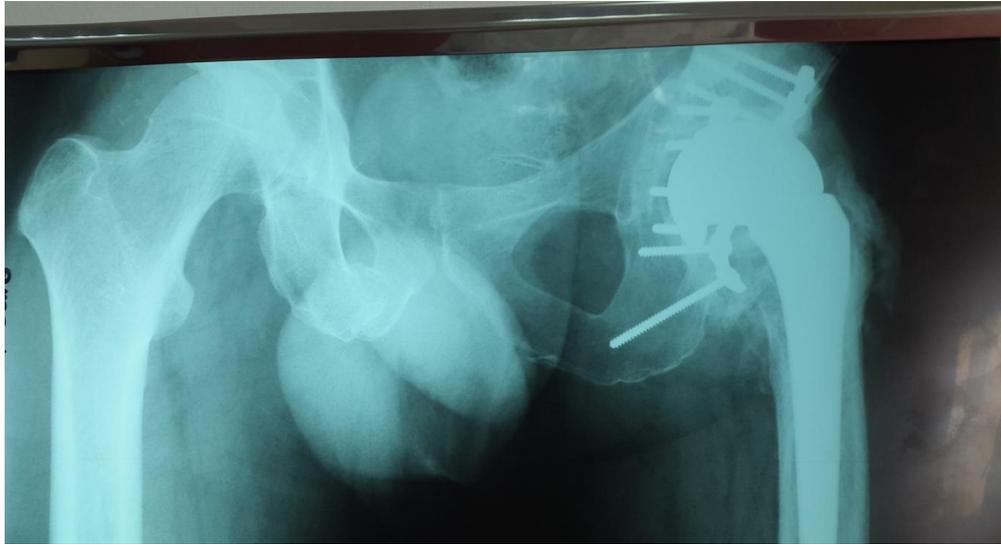


Figure 5: X-ray control one year after the first operation

Discussion

In this case of Pipkin IV fracture, we think that the time elapsed between traumatic dislocation of the hip joint and the reduction is not a key element for a good outcome because we do not hope that the reconstruction of the femoral head is possible and that the femoral head will survive. It is recommended to perform a CT scan with 3D reconstruction so that a more accurate evaluation of the fracture pattern and the comminution can be achieved. This is also helpful in deciding which treatment to pursue. We assume that anatomic reconstruction and fixation of acetabular fracture through posterior Kocher – Langebeck approach and excision of femoral head intra-articular bodies as a first operation and removal of some femoral headpieces and application of subtotal bipolar prosthesis if there is no infection can be a recommended method of treatment for this type of fracture.

In this case, we could not achieve any optimal reconstruction of the femoral head and we thus decided not to fix the femoral head. In the meantime, we had a serious infection near the femoral head so we had to wait for the definitive application of the prosthesis for more than 5 months.

We did not want to perform THR because we were afraid of the tips of the screws used to fix the plates on the acetabular posterior wall. One of the options was to remove the plates and screws from the posterior wall of the acetabulum and after that to perform THR. However, we were able to achieve ideal reconstruction of the acetabular

surface without any defect of the wall and during the second operation, five months after the first one, we checked if the acetabular dome was without any defects and that helped us to decide to perform only subtotal prosthesis. Further, in the circumstances where the tissue near the fracture was not with normal characteristics and we were not sure whether there was an infection or not, we decided to proceed without removal of osteosynthesis of the acetabular wall and with the use of minimal implants – subtotal hip prosthesis.

Conclusion

Femoral head fractures associated with acetabular fractures are uncommon injuries usually resulting from high-energy mechanisms. Outcomes of Pipkin type IV fractures have been historically poor, with high rates of osteonecrosis, post-traumatic arthritis, and heterotopic ossification.

The main treatment aim should always be anatomic reduction of the fragments with minimal soft tissue injury and fixation with ORIF in all other Pipkin fractures, but in the cases with Pipkin IV fractures associated with previously extensive soft tissue damage and deep infection, we believe that this approach has to be changed.

We can recommend this system of treatment in patients with Pipkin IV fracture combined with big soft tissue damage, large hematoma, and infection, and we recommend waiting for the second operation for a minimum of three months after disappearance of all symptoms and signs of the infection.

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Prikaz bolesnika

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TRETMAN PIPKIN TIP IV FRAKTURE-LUKSACIJE UDRUŽENE ZA HEMATOMOM, ZNAČAJNOM MEKOTKIVNOM POVREDOM I DUBOKOM INFEKCIJOM – PRIKAZ SLUCAJA

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Frakture glave femura povezane sa frakturama acetabuluma predstavljaju nesvakidašnje povrede koje su rezultat visokoenergetskog mehanizma. Ovaj rad ima za cilj da prezentuje uspešan operativni tretman Pipkin tip IV frakture, kominutivne frakture glave femura povezane sa hematomom, povredom mekih tkiva i dubokom infekcijom.

Bolesnik D.M. rođen 1976 godine povređen je betonskim blokovima. Bolesnik je politraumatizovan sa traumatskim šokom i Pipkin IV dislociranom i kominutivnom frakturom leve femoralne glave, uz kominutivnu frakturu acetabuluma i sa velikim hematomom leve femoralne regije, kao i sa mekotkivnim oštećenjem. Bolesnik je imao frakturu pubične i išijadične kosti sa desne strane karlice. Bio je odmah primljen u jedinicu intenzivne nege, kao hitan slučaj.

Prvo, izveli smo otvorenu repoziciju i unutrašnju fiksaciju levog acetabuluma sa pločom i šrafovim. Onda je bolesnik dobio ozbiljnu infekciju hematoma leve femoralne regije, zbog čega smo morali da tretiramo infekciju u naredna dva meseca. Bili smo primorani da čekamo tri meseca, kako bi utvrdili da nema bilo kakvih znakova infekcije (nivoa CRP u normali) i onda smo postavili subtotalnu protezu, nakon što smo izvadili fragmente glave femura.

Bolesnik nije imao nikakve znakove infekcije nakon drugog operativnog tretmana i odlučili smo da je vreme da započne intenzivnu fizikalnu terapiju u trajanju od tri meseca. Mogao se kretati bez bilo kakvih pomagala nakon tri meseca od završenog operativnog tretmana i završene fizikalne terapije, uz mala ograničenja u pokretima.

Uradili smo radiološku kontrolu godinu dana nakon operacije, koja je pokazala ektopičnu osifikaciju, ali bez bilo kakvih zabrinjavajućih ograničenja u pokretima. Harris hip score u tom periodu bio je 81.

Glavni tretman uvek bi trebao biti usmeren ka momentalnoj anatomskoj redukciji fragmenata sa minimalnim oštećenjem mekih tkiva i fiksaciji uz ORIF u slučajevima svih ostalih tipova Pipkin fraktura, ali u slučajevima Pipkin IV frakture povezane sa prethodno masivnim oštećenjem mekih tkiva i dubokom infekcijom mi preporučujemo da se sačeka druga po redu operativna intervencija, bar tri meseca od prestanka simptoma infekcije. *Acta Medica Medianae 2023;62(1): 79-84.*

Ključne reči: Pipkin fraktura-luksacija, hematom, meka tkiva, komplikacije

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