ISSN 2689-8268 | Volume 6

American Journal of Surgery and Clinical Case Reports

Case Report Open Access

Fatigue Fracture of the Femoral Neck and Compression Screw in the Treatment of Hip Dislocation with a Pipkin II Femoral Head Fracture

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Received: 26 Jan 2023
Accepted: 21 Mar 2023
Published: 29 Mar 2023
J Short Name: AJSCCR

Citation:

Poszepczynski J. Fatigue Fracture of the Femoral Neck and Compression Screw in the Treatment of Hip Dislocation with a Pipkin II Femoral Head Fracture. Ame J Surg Clin Case Rep. 2023; 6(9): 1-4

Keywords:

Fatigue fracture; Pipkin II; Screw fracture

1. Abstract

No description currently exists of fatigue fracture of the femoral neck complicated by breakage of the stabilizing screw.

A 55-year-old man was operated on due to a hip dislocation with a type II Pipkin femoral head fracture after a road accident. Eleven months after the initial surgery, the patient returned to the clinic with severe pain not associated with any previous trauma. The radiographs revealed a fracture of the femoral neck, and a fracture of the screw stabilizing the fracture of the femoral head.

Such complications can be successfully treated with a cementless hip prosthesis, yielding a very good functional result.

2. Introduction

Fracture of the femoral head, first described by Birkett in 1869, remains a therapeutic problem. The treatment of such Pipkin fractures, by the removal of a free head fragment and repositioning of the dislocation, was first described by Bernhard Moritz Carl Ludwig Riedel in 1885.

Femoral head fracture with traumatic posterior hip dislocation is typically caused by high-energy impacts and requires rapid surgical intervention. Although it is recommended that the dislocated hip should be to gently repositioned under general anesthesia with muscle relaxation within six hours, if the maneuver is performed incompetently or too aggressively, the procedure may lead to iatrogenic hip fracture.

In the past, manual repositing was followed by the use of a skeletal traction without head fracture repositioning, which often resulted in poor treatment results.

Much better functional results are obtained by performing a fracture repositioning procedure with internal stabilization than by removing a fragment that has not been peduncled.

The value of classic X-ray imaging in this type of injury was first described by Durant in 1904; however, in modern procedures, this should be supplemented during preoperative planning with computed tomography. Also, any damage to the labrum of the hip joint can be further visualized in preoperative diagnostics by the inclusion of MRI. Good functional results can be achieved during reinsertion with the use of a suture anchor.

Pipkin fracture is often treated using the so-called classic accesses, i.e. Kocher-Langenbeck access or lateral access with osteotomy of the greater trochanter [1]. However, some authors prefer primary hip arthroplasty in cases when dislocation and fracture do not technically allow repositioning, even in type II Pipkin fractures [2].

The most common complications of hip fracture treatment, first described by Christopher in 1924, are palsy of the sciatic nerve and osteoarthritis of the hip joint [3]. Another common complication is extra-skeletal ossification [4]. However, multicenter studies have found surgical repositioning of a femoral head fracture with internal stabilization to results in a much lower occurrence of osteoarthritis than simple manual repositioning of the dislocated joint without adjustment or stabilization [5].

Since femoral head fractures occur in the course of multi-site injuries, they may be overlooked, especially when accompanied by

fractures of another part of the femur. Their clinical manifestation, in the form of axis and limb length disturbances, may be overlooked by doctors, and postponement of treatment may have irreversible and catastrophic consequences [6].

However, newer therapeutic procedures offer great promise. Open repositioning and stabilization of a bilateral posterior dislocation of the hip joints with a Pipkin type II fracture within six hours, was found to yield very good functional results [7].

3. Case Description

A 55-year-old patient was referred to the clinic from a lower center following an unsuccessful manual repositioning of a hip dislocation caused by a traffic accident, in which he was the driver of a passenger car (Figure 1).

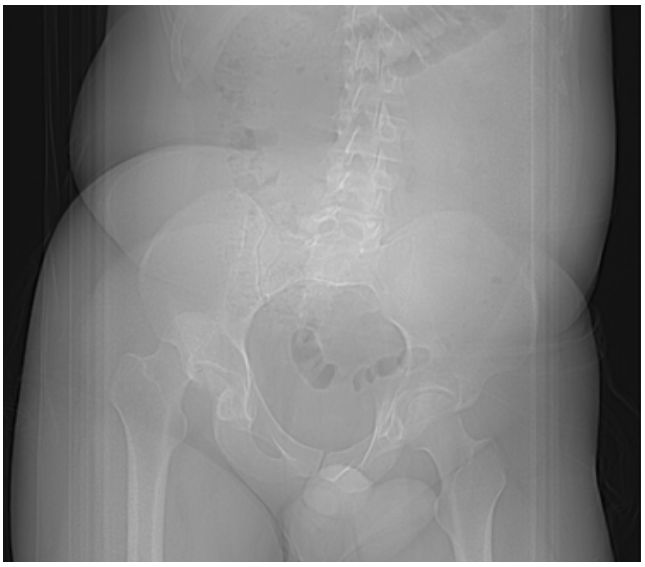

Figure 1: Anteroposterior x-ray of the pelvis with visible dislocation of the hip joint and fracture of the femoral head.

The patient was qualified for repositioning of the dislocation and stabilization of the femoral head fracture, however, due to difficulties in providing anesthetic care, the procedure was performed five days after the injury.

During the procedure, the patient was placed on his left side. A posterolateral incision was made to the fascia, after which it was cut. Dislocation to the hip joint was visible, together with damage to the posterior and upper articular capsule, at the base of the acetabulum. In addition, an unprimed bone fragment constituting about 1/4 of the front surface of the femoral head could be seen.

The fracture fragments were then repositioned and stabilized using Arthrex headless compression screws.

The hip dislocation was repositioned and the torn joint capsule and the gemellus and piriformis muscles were sutured with mattress sutures.

The sciatic nerve was not examined during the surgery. The fascia was sutured with a "Z" suture. The skin and subcutaneous tissue were then sutured with single sutures.

The anatomical positioning of the hip joint components can be seen in the postoperative radiograph (Figure 2).

Figure 2: Anterior -posterior X-ray of the hip joint after surgery.

On Day 2 after the surgery, the patient was walking on crutches, although he was asked not to put his weight on the operated limb for a period of 6 weeks. On the tenth day after surgery, treatment was started in the hyperbaric therapy center to minimize the risk of aseptic necrosis of the femoral head (30 sessions – 60 minutes, 1.5 AT) {OXYHELP INDUSTRY GmbH Germany}

The follow-up radiograph, taken after 12 weeks, did not indicate any bone fragment displacement. Therefore, the patient was advised to walk without crutches, and to gradually increase the weight born on the operated limb until full weight was achieved. As the recovery progressed, the patient felt better and did not feel any pain.

Eleven months after surgery, the patient returned to the orthopedic clinic due to pain in the groin, yet denied any injury to the operated limb. The follow-up radiographs revealed a fracture of the femoral neck together with a fracture of the screw stabilizing the femoral head. Although the cause of the fracture remains unknown, it may have been related to recent stay in the mountains during which the patient took park in long walks over a number of days, which may have led to a fatigue fracture (Figure 3).

The decision was made to perform surgery, but the procedure was postponed for six weeks due to an active urinary tract infection. Briefly, the patient was placed on his back, and the procedure was performed with a classic anterior lateral incision, i.e. a straight skin incision, 12 cm long, above the front edge of the greater trochanter. Following this, the wide fascia was incised over the front

edge of the greater trochanter and the large lateral muscle was moved posteriorly. Finally, a T-shaped incision was made in the joint capsule. Examination revealed the presence of a subcapital fracture of the femoral neck, damage to the implants fixing the fracture, and bone fusion of the broken part of the femoral head.

The femoral head and implants from the previous surgery were removed. The neck was cut about 1.5 cm above the lesser trochanter. A spherical surface without cartilage was prepared for attachment of the acetabulum using slow-speed spherical reamers. After obtaining a stable seating for the acetabular implant, an anti-rotation sponge screw was used: it was decided to use a polyethylene insert with a 15 'highwall' gradient at 10 o'clock to minimize the chance of dislocation of the joint. The seats were then prepared for the prosthesis stem, which was stably seated in the bone canal. As a number of periarticular adhesions were still present following the previous surgery, it was decided to use a long head to increase the so-called offset and minimize the risk of dislocation. Both surgical procedures were performed by the senior author (JF) (Figure 4).

After two weeks, the skin staples were removed and walking without crutches was recommended. The patient did not report any pain in the right hip joint six weeks after surgery, and a very good functional result was obtained: 96 points on the Harris Hip Scale. Twenty-four months after surgery, the patient obtained the same Harris and HOOS scores, and the only comment about the treatment result was a subjective feeling of inequality in the limbs.

Figure 3: Anterior -posterior X-ray of the hip joint 11 months after the surgery.

Figure 4: Anterior posterior X-ray after hip arthroplasty surgery.

4. Conclusions

Although the Pipkin classification has a considerable influence on preoperative planning and treatment prognosis, the final result is heavily dependent on the time from trauma to surgical treatment [8]. In the present patient, this period was 120 hours.

While the use of primary hip arthroplasty is controversial in treating seniors, it has been found to be effective in some cases [2,9].

In the present case, a prosthesis with the Bicontact S stem and the Plasmacup cup was chosen for its longevity, and to provide the chance of a "lifetime prosthesis" [10]. Following installation, the patient was able to return to normal physical activity, even after such a severe injury as joint dislocation hip fracture with femoral head fracture complicated by fatigue fracture of the femoral neck.

In patients who had been previously treated surgically for hip dislocation with a fracture of the femoral head (Pipkin II), it is possible that the occurrence of pain, without previous trauma, may indicate fatigue fracture of the femoral neck. Such complication, not previously described in the literature, can be successfully treated with a cementless hip prosthesis (Aesculap Bicontact S / Plasmacup) with a very good functional results.

5. Funding

While writing this work, no grants were used, it was created with the researchers' own funds. The authors received no financial support for the research, authorship, and/or publication of this article.

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