



Femoral Neck Fracture after Arthroscopic Femoroplasty of the Hip Related with Early Menopause. A Case Report

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Abstract: Hip arthroscopy is a widely used surgical technique to treat several pathologies, among them, hip impingement, which is the main current indication. Major complications haven't been described thoroughly in literature. One of these major complications is the femoral neck fracture. Its frequency ranges from 0.07% to 1.9% following arthroscopic femoral neck osteochondroplasty for femoroacetabular impingement. A femoral neck fracture was reported after a hip arthroscopy procedure in a patient diagnosed with FAI, treated through osteosynthesis in situ with cannulated screws. Change due to the FAI can be corrected surgically with different techniques, however, arthroscopic treatment is the most commonly used, with lower complications rate and faster rehabilitation. Femoral neck fracture is an infrequent complication, but the risk increases with certain intrinsic patient factors and osteoporosis. Early menopause may predispose to hip fracture in patients undergoing arthroscopic femoroplasty.

Keywords: Hip Arthroscopy - FAI - complications - femoral neck fracture.

INTRODUCTION

Femoroacetabular impingement (FAI) is a condition of articular incongruity that generates an impact between the femoral head-neck junction and the acetabular rim, resulting in damage to the acetabular labrum and the adjacent articular cartilage. This pinching can be caused by an acetabular deformity (FAI type "pincer") or at a femoral level (FAI type "cam") [1]. There are several surgical options to manage these changes, however, arthroscopic treatment has the lowest rate of complications [2], varying between 1.3% and 23.3% according to different series [3]; the most frequent ones being related to transient nerve palsy, fluid extravasation, iatrogenic chondral injuries and instrument breakage. Major complications includes femoral neck fracture [4, 5]. The latter is a rare complication and has been associated to bone over resection, osteopenia, poor adherence to weight-bearing precautions and other intrinsic factors [6].

According to our review, there have been a few case series reports of femoral neck fracture after hip arthroscopy for the treatment of FAI with inconsistent and diverse data concerning frequency, gender prevalence and predisposing factors.

CASE REPORT

A 45-year-old female patient with a history of early menopause at age 39 seeks medical consultation due to a 2 year onset of bilateral hip pain that has intensified in the last month, which is associated with ambulation and relief at rest, with increasing pain when going up and down stairs and when performing non-impact sports.

Physical examination evidences body mass index BMI of 19.6 kg/m², symmetric lower limbs in length, with unaltered shafts, and pain upon deep palpation of the greater trochanter. Bilateral positive impingement test. Faber test: negative bilaterally. Symmetrical joint range of motion in flexion 120°, 10° internal rotation, 30° external rotation and 35° abduction. The Harris Hip Score (HHS) was 62.

The radiological study (Fig. 1) shows asphericity in the bilateral femoral head-neck junction with a loss of neck offset, 80% acetabular coverage, lateral center-edge angle of 31 ° (left) and 29° (right), preserved joint space without osteophytes or subchondral sclerosis with mixed features, mainly CAM type impingement and femoral-shaft offset of 47 mm (left) and 48 mm (right). The magnetic resonance imaging showed a lesion of anterior labrum and an alpha angle 69° to right and 72° to left, without associated chondral injuries or signs of avascular necrosis.

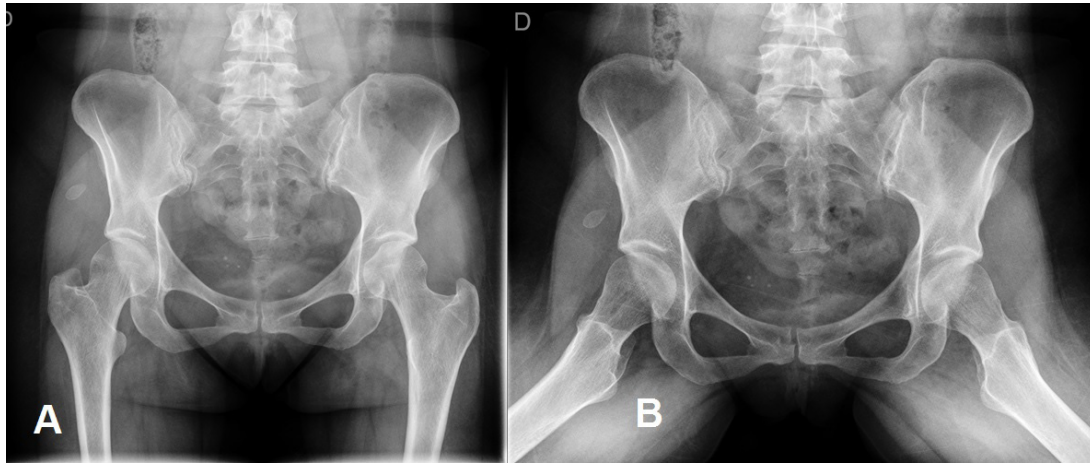


Fig1. A, B. Pelvis AP and Dunn 45° X ray showing a bilateral femoral cam deformity.

First, a medical treatment with physiotherapy was prescribed for 10 sessions and the use of non-steroidal anti-inflammatory drugs (NSAIDs). Bilateral hip arthroscopic surgery is performed due to persistence of symptoms.

After the procedure, the left hip presented a partial tear of the labrum in zone 2[7] and grade 2 [8] chondromalacia in the adjacent acetabular cartilage. Labrum fixation was performed using 2 anchors (bioraptor ® 2.3), achieving stability. Resection of the femoral CAM deformity was performed to demonstrate absence of impingement in dynamic testing.

A continuous passive motion machine was installed in the recovery unit on the operated limb between 10° and 70°. Partial load was started with 2 walking sticks on the first postoperative day and a static exercise bike on an outpatient basis.

Five days later, hip arthroscopy was performed on the right side. The intraoperative findings were similar, highlighting partial labrum tear in zone 2 and grade II chondromalacia in the adjacent acetabular cartilage, making an anchor fixation (bioraptor ® 2.3). Femoroplasty of the extra articular cam deformity was performed with an arthroscopic burr on the outer compartment to prove absence of impingement in dynamic tests in flexion and rotation with no evidence of over resection, notching or loss of joint junction seal effect. The margin of the correction of the cam deformity was extended laterally until before the retinacular vessels, and anteriorly until the femoral neck base. Gradual and progressive resection was made to avoid irregularities and generation of stress risers.

The same rehabilitation protocol was used, starting with 2 walking sticks and partial load on the first postoperative day, and static bike exercises, on an outpatient basis, without difficulties.

The patient went to the emergency service on the 24th day of evolution due to a sudden onset of right hip pain radiating to the thigh and diffuse back pain after walking with full load, after no apparent traumatic event. The skin has no ecchymosis at inspection. Upon physical examination, the patient emphasizes symmetrical lower

extremities, with no axis alterations. Right hip joint range was limited by pain with 90 ° flexion, 0° internal rotation, 10 ° external rotation, and 20° abduction. Neurological examination with no motor or sensory deficit and negative Lasegue sign. Patient has no symptoms or signs for DVT.

Patient is hospitalized for study and treatment of pain. Pelvic plain X rays didn't show abnormalities. Magnetic resonance imaging (MRI) of the hip showed a non-displaced complete femoral neck fracture and related post-surgical changes with a resection depth of 11 mm at the head-neck junction (Fig. 2). Lumbar spine MRI doesn't show signs of bone lesions, traumatic disc disorders or spinal cord and / or root compression.

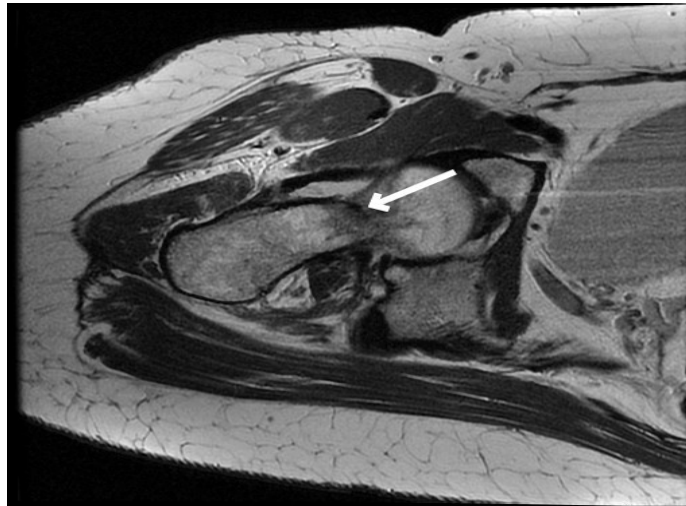


Fig 2. T1 sequence of right hip MRI showing the depth of anterior femoral resection and a non-displaced femoral neck fracture (arrow).

Surgical treatment was decided, performing osteosynthesis in situ with cannulated screws, without intraoperative incidents or complications.

Patient evolves the next day after surgery with progressive remission of pain, and starts a rehabilitation plan on partial load with 2 sticks.



Fig3. Pelvis AP X ray showing healing of femoral neck fracture after six years. Note the bilateral preservation of articular cartilage and joint space.

After six years of evolution, the patient doesn't have any pain, and has a full, symmetrical range of hip motion with a HHS value of 94. Osteosynthesis in situ is checked with radiological imaging test (Fig. 3), presenting signs of consolidation at the fracture site.

DISCUSSION

In the FAI there is an acetabular bone deformity (type "pincer") and / or femoral (type "cam") that impacts certain ranges of joint mobility especially in flexion and internal rotation. This leads to progressive damage to the acetabular labrum and / or chondral surface of the joint, which may lead to hip osteoarthritis[1]^{10,11}. These alterations can be surgically corrected with different techniques; however, arthroscopic management is more commonly used, with a lower rate of complications and faster rehabilitation[9].

Complications reported in literature, according to our review, regarding arthroscopic treatment of FAI are less than 2% [10]^{12,13}. Experienced hip arthroscopists have reported low rates of complications in large series not exceeding 6.4%[9]. Femoral neck fractures after resection of a femoral deformity have been described in a few studies. Ayeni et al[11] described the case of a 51 year old male diagnosed with FAI, which after hip arthroscopy presented a femoral neck fracture diagnosed 5 weeks after surgery and probably related with exercise against recommendations. Sariali et al [12] reported a non-displaced femoral neck fracture after a femoroplasty in a 56 year old male patient using an arthroscopically assisted mini-anterior Hueter approach. Nonoperative treatment was established with a fracture healed in slight varus malunion. A case series described by Zingg et al[13], found 7 proximal femur fractures from 376 arthroscopic femoroplasties for FAI. Fractures were associated with a resection depth ratio >18 % on cross table lateral radiographs which results of subtract the postoperative alpha angle from the preoperative one. Depth resection > 6 mm, large patient height, augmented femoral-shaft offset, male sex and older age (mean 44.1 year) also were associated with insufficiency femoral neck fracture. Those findings doesn't well correlate with the "safe" 30% resection of the femoral neck diameter in the anterolateral side of the head-neck junction proposed by Mardones et al [14] in a cadaver model femoroplasty.

Merz et al [6] designed a pilot study applying a questionnaire to hip arthroscopic surgeons. They found an incidence of 0.07% of femoral neck fracture after 14945 arthroscopic femoroplasties with a male to female ratio of 3:8. Patient mean age was 52 years. Of eleven femoral neck fractures, six patients violate the weight-bearing instructions, 3 patients had preoperative osteopenia, 3 patients were poorly selected and 1 case of over resection was identified.

Risk factors to femoral neck fracture after arthroscopic femoroplasty may be surgeon related (resection depth, width and regularity) and/or intrinsic to the patient (age, BMI, bone density, femoral-shaft offset, adherence to indications).

Early menopause is defined as premature ovarian failure before the age of 40 years[15]. Gallagher et al [16] report the association of early menopause with the risk of proximal femur fracture and future osteoporosis. A cross-sectional study including 1050 Argentinean women suggested that women who reached the menopause before age 45 had a lower bone mass density BMD than women with later menopause. In the same study, half of the 49 women who had sustained a hip fracture were in the early menopause group[17]. An observational prospective study conducted in Malmö, Sweden measured the incidence of osteoporosis and fragility fractures. Early menopause leads to a risk ratio of 1.83 and 1.68 for osteoporosis and fragility fracture, respectively[18].

This case presents a mixed FAI, predominantly "cam" which received a complete resection of the femoral bump after delimitation of the margins. The rehabilitation protocol was the standard one of our facility, and presented no traumatic postoperative events. The retrospective analysis of the patient's history shows data of early menopause. Estrogen deficiency increases bone resorption by stimulating osteoclasts, as well as inadequate bone formation[17]. This could have influenced the bone mineralization quality, predisposing to insufficient femoral neck bone.

We recommend performing a preoperative bone densitometry to patients older than 45 at risk of osteoporosis undergoing arthroscopic femoroplasty for FAI. We also remark the importance of limit the osseous resection of femoral deformity to the minimum necessary through intraoperative dynamic testing maneuvers that show an adequate joint suction seal effect. The femoral neck fracture is a potential complication after arthroscopic treatment of FAI. Poor bone quality should be suspected in female patients with a history of early menopause.

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