Case Report

Femoral Head Osteonecrosis Following a Hip Arthroscopy; A Case Report

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Abstract

Osteonecrosis of the femoral head is an uncommon complication following hip arthroscopy, generally due to an excessive traction of the limb and high intracapsular pressures of the hip. This complication entails catastrophic outcomes for the femoral head with collapse and degeneration, resulting in another surgical procedure. We present a case of a 21 year-old soccer player that underwent arthroscopy of the left hip for an anterolateral impingement and CAM lesion, and returned three months later complaining of hip pain. MRI reported osteonecrosis of the femoral head. Total bearing restrictions, electromagnetic field therapy, oral calcium and calcitonine were indicated. One year later there was no evidence of osteonecrosis of the femoral head by MRI and radiography, and the patient was painless and performing high level sport activities. Early diagnosis and treatment of this complication can avoid permanent damage of the femoral head.

INTRODUCTION

The progression of hip arthroscopy instrumentation and surgical techniques for the past decades has caused this surgery to currently be very common among orthopedic procedures. Hip arthroscopy has limited indications such as labral tears, ligament tears, osteochondral defects, lost bodies removal, femoral head osteonecrosis, early osteoarthritis, synovitis, chondromatosis, biopsy, dysplastic painful hips and septic arthritis [1]. These limited indications are in part due to the difficult access and the hip joint’s anatomy, although the new developments regarding hip arthroscopy instrumentation have aid to increase these indications and perform safer procedures, avoiding complications. The rate of complications described following hip arthroscopy ranges from 1.3% to 23% according to the previously reported [2]. These complications can be produced due to mechanical causes (neurovascular traction injuries, compression injuries to the perineum, fluid extravasation, traction fixation device injuries), iatrogenic (scope trauma, instrument breakage, direct trauma to neurovascular structures), heterotopic ossifications, infections and femoral head osteonecrosis [1,3]. Despite these complications, hip arthroscopy is a safe procedure and its popularity is increasing daily due to the good and excellent results achieved. We describe a case of possible femoral head osteonecrosis following hip arthroscopy. The importance of this case is that there are only three cases reported in the literature with femoral head osteonecrosis after a hip arthroscopy in a healthy patient without previous radiologic or MRI signs of osteonecrosis, summing up a 0.4% complication rate [4]. The early diagnosis of this complication can avoid progression to permanent damage of the femoral head.

CASE REPORT

A 21 year-old soccer player presented at our clinic with chief complaint of pain in his left hip. No remarkable past medical history was reported. Physical exam showed pain and internal rotation limitation, positive impingement signs, no popping or clicking. Hip X-ray was reported as normal, whereas MRI showed a Cam-type lesion in femoral neck and anterior lateral labrum tear (Figure 1). Nonsteroidal anti-inflammatory drugs and physical therapy were the proposed initial treatments. Pain did not cease and persisted for three more months. A hip arthroscopy procedure was decided in this soccer player due to refractory symptoms.

This procedure was performed under spinal anesthesia, in
supine position with a longitudinal hip traction device, left hip in abduction and under fluoroscopy to control manual traction until the hip joint had a space of 10 mm wide. Standard anterolateral and mid-distal anterior portals were performed. These portals controlled the flow pump at 60 mmHg – 80 mmHg during the procedure. During the arthroscopy there was evidence of an anterior lateral tear and degeneration of the labrum, which was debrided and the cam lesion resected. No capsulotomy was performed. The traction was removed at 60 minutes. The standard postoperative protocol was applied; non-complete bearing using crutches, physical therapy and passive articular motions of the hip. Total hip bearing was allowed at 4 weeks postoperative without crutches, when the patient only complained of slight pain in his left hip during normal activities. The patient began running at 10 weeks after surgery; however, he started complaining of pain at his left hip increasing in daily life activities. Nonsteroidal anti-inflammatory drugs did not improve the symptoms. MRI was then performed, showing an osteonecrosis zone in the femoral head without collapse or chondral lesions (Figure 2). This postoperative complication was treated with non-total bearing using crutches for 8 weeks, oral calcium, oral calcitonin and electromagnetic field therapy for 3 months. After this treatment a new MRI reported decreased osteonecrosis with osseous regeneration signs in the femoral head without collapse (Figure 3). After 1 year of the post-surgical complication there was no evidence of femoral head osteonecrosis signs by plain radiography or MRI (Figure 4), patient was painless and performing high sport level activities.

DISCUSSION

Hip arthroscopy is currently a very common procedure and has been applied for treating early hip disease as reported by McCarthy [5]. Complication’s rate ranges from 1.34% to 15% [4,6,7], being nerve injury the most frequent complication (0.3%-7%) [1,3,8]. Regarding osteonecrosis of the femoral head, Sampson reported the first case (0.4%) as a complication following hip arthroscopy [4].

Osteonecrosis of the femoral head is a devastating possible complication of hip arthroscopy. Possible etiologies include traction on the femoral vessels, direct injury during portal placement or during osteochondroplasty, as well as due to prolonged raised intra-articular pressure [9]. McCormick et al identified vascular safe zones for use during hip arthroscopy using 76 contrast-enhanced MRI scans for patients diagnosed with FAI [10].

This study defined two safe zones: a femoral neck osteoplasty safe zone on the anterior half of the femoral neck and psoas tendon release safe zone in the middle third of the medial hip capsule to avoid the medial femoral circumflex artery (MFCA) and retinacular vessels [10].

The superior and lateral intracapsular vessels are at risk during capsulotomy; the greatest risk to the MFCA is during Cam

Figure 1 Preoperative A) coronal T1 non contrast MRI B). Transverse T1 non contrast MRI. These images show the femoral head with no evidence of osteonecrosis. Pre-surgical MRI.

Figure 2 Postoperative non contrast MRI. A). Coronal T1-weighted, the arrow shows the osteonecrosis zone of the left femoral head. B). Sagittal T2- weighted fat saturation; the arrow shows the osteonecrosis zone of the left femoral head without collapse. MRI performed four months post-surgical.
reshaping laterally or during posterior capsulotomies [11].

There have been a few isolated case reports of osteonecrosis of the femoral head after hip arthroscopy; two presented at 3-month follow-up [2,9]. Scher et al concluded that osteonecrosis of the femoral head in their patient resulted from a combination of traction injury and intra-articular pressure during arthroscopy [2]. The review by Harris et al cites up to 10 cases in literature but does not reference this case [12].

Byrd has presented a theoretical concern that distraction and joint distension could compromise vascular flow to the femoral head but did not report any patients in his experience [13]. Sampson et al reported one patient with AVN that may have resulted from an epiphyseal branch of the MFCA being disturbed during the procedure [4].

Ilizaliturri et al discuss that femoral head blood supply may be at most risk during cam reshaping or a far posterior capsulotomy, however, did not report any cases of AVN with treatment of FAI [14].

The recommendations for avoiding AVN of the femoral head are as follows: taking care to avoid excessive traction and intra-articular pressure and carefully avoiding the lateral epiphyseal vessels during femoral neck osteoplasty [7].

Femoral head osteonecrosis after hip arthroscopy is a consequence of excessive hip traction with long procedures and high levels of intracapsular pressure; affecting the femoral head’s blood supply and developing osteonecrosis [15-17]. In our case the patient was in supine position with the left hip on a traction device without a measured traction control. During the procedure a manual distraction of 10mm of the hip joint was performed under fluoroscopy, approximately 300N to 400N is required like reported Eriksson et al [18]. The traction was discontinued after 60 minutes, being under the two hours of traction that can cause complications. The flow pump had a controlled pressure of 60 – 80 mmHg, far below the 200 mmHg that the intracapsular pressure could make changes of necrosis in the trabecular bone. Standard anterolateral and mid anterior portals were performed, these portals are safe and no vascular structure can be affected.
During the procedure a bone resection of the anterolateral CAM lesion with shaver and BURR was carried out. In our case we can assume that a non-controlled traction force device and the bone resection of the CAM lesion caused the necrosis in the femoral head after hip arthroscopy. The importance of the case is that, 3 months after the arthroscopy the patient had persistent hip pain and an early diagnosis was possible thanks to a MRI. In this case we made an early diagnosis and ordered a total weight-bearing restriction, as well as electromagnetic field therapy. The electromagnetic field therapy accelerates bone healing as previously reported [19,20]. The electromagnetic field was performed during 16 weeks, after this the MRI control reported a diminution of the size of the osteonecrosis zone in the femoral head without collapse. The 1-year MRI control reported no evidence of osteonecrosis zone or collapse of the femoral head. In contrast with the other cases reported with osteonecrosis of the femoral head after a hip arthroscopy, our case did not have a femoral head collapse and did not require a further arthroscopy. Possibly, the main doubt within differential diagnosis could have been with transient osteoporosis, although the femoral head and neck are usually more affected in this case, as well as associating some osteoporosis [21].

In conclusion, osteonecrosis of the femoral is a rare but possible complication of hip arthroscopy, and early diagnosis can avoid permanent damage to the femoral by starting an early treatment.

REFERENCES