Case Report

A Case of Bilateral Aseptic Necrosis of the Femoral Head

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ABSTRACT: Aseptic necrosis of the femoral head is a disease whose etiology is not completely elucidated and generally affects young adults aged between 30 and 50 years. In a significant number of patients bilateral disease occurs, which makes detection in its early stages constitute an important objective. We present the case of a male patient, aged 23 years, with the following risk factors: smoking and chronic alcohol consumption, who is diagnosed with aseptic necrosis of the left femoral head, ARCO stage IV, and in just six months after the diagnosis and hip arthroplasty, he suffers an injury which leads to the same diagnosis in the contralateral hip. We want to emphasize that for all patients with a high index of suspicion there should be an MRI examination, because the plane radiographs or CT are most often not relevant in detecting early signs of this condition. Diagnosis of aseptic necrosis of the femoral head in the early stages is a necessity in order to obtain an optimal result of conservative treatment.

KEYWORDS: *aseptic necrosis, femoral head, MRI.*

Introduction

Aseptic necrosis of the femoral head is a disease whose etiology is not completely elucidated, the triggering event being the suppression of blood supply to the femoral head. [1-6].

The disease is common especially among the younger population, patients usually being between the 3rd and 5th decade of life, particularly affecting men [7, 8]. For the early diagnosis of aseptic necrosis of the femoral head the physician should have a high index of suspicion, especially in patients with risk factors.

The main risk factors of the disease are represented by trauma, chronic alcohol consumption, smoking, corticosteroid treatment [1, 7]. This is particularly important in patients where the disease is already present in one femoral joint as aseptic necrosis often occurs bilaterally [1, 3].

Case Presentation

Patient MI, aged 23, from an urban environment, construction worker, smoker (40 cigarettes per day from age 11), chronic alcohol consumption (beer, wine / daily), without significant pathological personal history, presented in June 2014 in the Medical Rehabilitation Clinic accusing pain in the left hip irradiated in the knee with functional impotence of the left lower limb with onset of about 3 months.

Physical examination of the patient revealed the following aspects- normal weight, discrete erythrose of the cheekbone, BP = 130/70 mmHg, AV = 72 bpm, scoliotic attitude, paravertebral muscle stiffness in the lumbar spine, pain when mobilizing the coxo-femoral joint, limitation of flexion, abduction and rotation in the left hip joint, positive left Faber test, positive left Patrick maneuver, intensely painful Trandelenburg positive sign on the left.

The results of laboratory tests were normal, except ESR = 24mm / 1 hour 46 mm / 2h, Fibrinogen = 423 mg / 100ml, alkaline phosphatase = 138 IU / l, Gamma glutamyltransferase = 79 U / l, GOT (glutamic oxaloacetate transferase) = 57 U / L, GPT (glutamic pyruvate transaminase) = 62 U / l total cholesterol = 231 mg / dl.

The pelvic radiography noted loss of sphericity and collapse of the left femoral head, left joint space narrowing and acetabular changes. No changes were found in the right femoral head. Imaging investigations continued with a CT scan, which surprised the following aspects: sclerosis, the presence of cysts, microfracture and changes of the trabecular bone, highlighting the femoral head collapse and degeneration of the left coxo femoral joint.



Fig.1. Coxal X-ray. It can be seen marked narrowing of the left coxal-femoral joint space, left femoral head deformation, circumscribed areas at the femoral neck, anterior-superior region and subchondral bone attachment aspect.



Fig.2. Coxal CT - left coxo-femoral articular effusion with edema and bone sclerosis aspect, the presence of cysts, microfractures in the left femoral head. The collapse of the femoral head and joint degeneration in the left coxo-femoral joint.

With imaging investigations the patient was diagnosed with aseptic necrosis of the left femoral head stage IV (ARCO classification) and obtained transfer to the Orthopaedics-Traumatology Clinic in order to undergo surgery. The patient underwent surgery for hip arthroplasty with implantation of a left prosthetic bipolar partial hip. Upon discharge the following the recommendations were made: physical therapy to recover walking and change of lifestyle: quit smoking and severely limit alcohol consumption.

After obtaining the agreement of the patient, the left femoral head taken during hip arthroplasty was fixed in 10% formalin, decalcified and sectioned in order to obtain some histological slices for inclusion in a larger study which followed the morphological changes that occur in patients diagnosed with aseptic necrosis of the femoral head. Macroscopic and microscopic images thus obtained confirmed the diagnosis and extension of the area of necrosis to the adjacent cartilage.

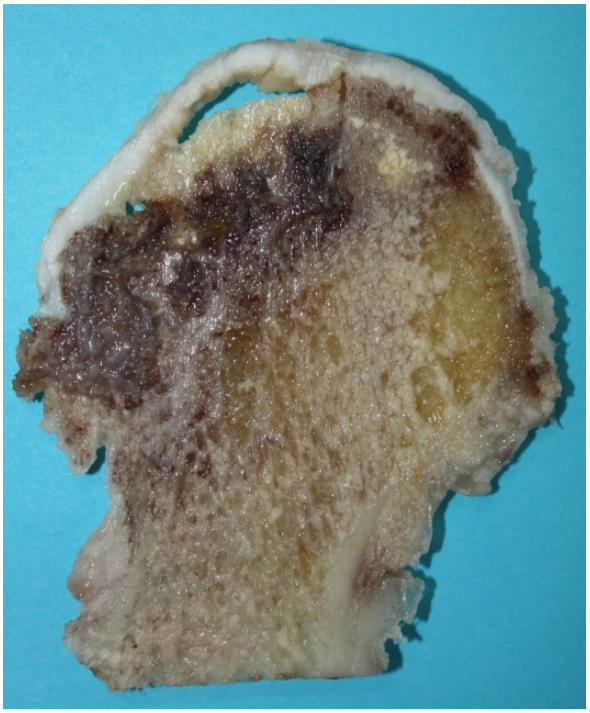


Fig.3. Appearance of aseptic necrosis of the femoral head, stage IV (2 mm section of the femoral neck). It can be seen a necrosis area and the adjacent cartilage to the take-off level.

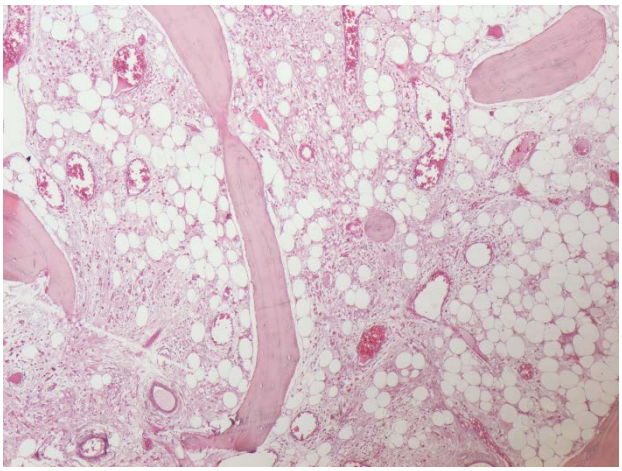


Fig.4. Overview of the area of necrosis. Isolated bays in the area of necrosis, rare blood vessels, multiple adipocytes and adipocyte hypertrophy. Staining HE x 4

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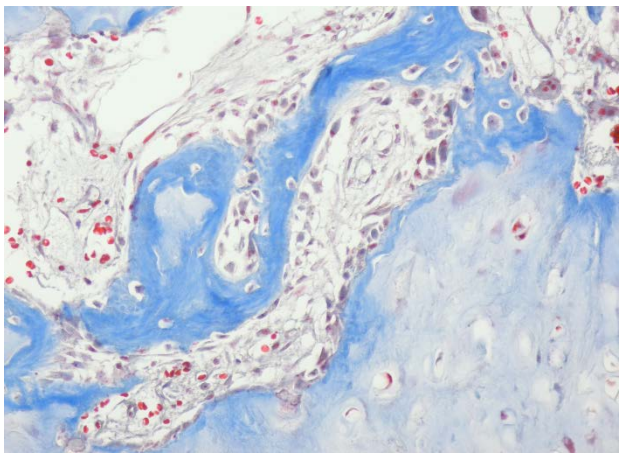


Fig.5. Overview of the area showing the inner cartilage necrosis area. Hypertrophied cartilage cells, differentiation of bone tissue - neoformation. Staining al.GS trichrome x 10

In August and October the patient has received physiotherapy, massage and electrotherapy in the Medical Rehabilitation Clinic, which led to the recovery of walking and improvement of physical status of the patient.

In November 2014 the patient experienced a trauma (falls) and accused pain in the right femoral joint. He presented in December at the Orthopaedics-Traumatology Clinic accusing mild pain in the right leg during mobilization. Physical examination revealed limitation of internal rotation, flexion and abduction in the right coxal-femoral joint. Laboratory values were the following: ESR = 19mm / 1 hour 37 mm / 2 hours, Fibrinogen = 407 mg / 100ml, GOT (glutamic oxaloacetate transferase) = 43 U / l, GPT (glutamic pyruvate transaminase) = 49 U / l.

We performed a pelvic radiography, which revealed no changes in the right coxo-femoral joint. Given the patient's diagnosis, we called for an MRI examination, following which there was emphasized an osteonecrotic lesion with characteristic signal typical for fat tissue: increased tissue signal in T1, T2 intermediate signal in the antero-superior area of the right femoral head.

After the MRI examination, the patient is diagnosed with aseptic necrosis of the femoral head in stage I (ARCO classification). He was discharged with the following recommendations: maintaining newly acquired lifestyle, changing his profession and the continuation of rehabilitation and annual specialized follow-up check-ups to assess the evolution of the disease in order to slow down the progression of the disease and to maintain the integrity of the left coxo-femoral articulation for as long as possible.

Discussions

The peculiarity of the case is the appearance of the disease at a very young age, the patient being only 23 years old and diagnosed in stage IV in the left hip and stage I in the right hip and already undergone arthroplasty of the hip.

Aseptic necrosis of femoral head mainly affects young adults, who are between the 3rd and 5th decade of life [1, 3, 8-11]. It is considered that the average age that patients are diagnosed with aseptic necrosis of the femoral head and the timing of the first hip replacement is 38 years old [4, 8].

Risk factors are represented by chronic alcohol consumption (beer, wine / daily smoking (40 cigarettes per day from age 11) trauma and is more frequent in men.

It is believed that aseptic necrosis of femoral head affects men 4 times more than women [3, 9-11]. Some authors recorded a male to female sex ratio of 8: 1, except that the condition occurs in the context of systemic lupus erythematosus [1].

We cannot predict with certainty whether aseptic necrosis of the femoral head to the right is due to suffered trauma in our patient or that the damage occurred at this level as a consequence of long alcohol consumption and smoking.

It seems appropriate to conduct an MRI exam in detriment of CT in patients with risk factors for aseptic necrosis of the femoral head, even if there are no signs on plain radiography showing the existence of the disease.

Changes in the early stages of aseptic necrosis of the femoral head are hard to detect on plane X-ray. A normal image obtained by X-ray does not necessarily translate into the absence of the disease [1, 3, 9, 12]. Between the occurrence of hip injury and detection on X-ray suggestive images a 5 year interval usually passes [9, 10, 12]. The sensitivity of the method in the diagnosis of early stages is only 41% [13].

In the early stages, the sensitivity of CT is quite low, being only 55% [10, 12], but can be detect certain alterations in bone density when X-ray images are normal [14, 15]. CT is useful in assessing the later stages for lesion extension, such as sclerosis and other events occurring in the state of repair.

MRI is a non-invasive imaging technique with the highest degree of specificity and sensitivity used in the diagnosis of aseptic necrosis of the femoral head [3, 9, 10, 12, 16]. In the early stages is more effective than simple computerized tomography (CT) or the single-

photon emission (SPECT), with a degree of increased specificity in the detection of the condition of up to 90% [12, 14].

The young age of the patient makes it very likely that they will need additional hip surgery. It is unlikely that the prosthesis used during hip arthroplasty to retain functionality for 40-45 years, as is the life expectancy of the patient. Long-term results on the use of full or partial dentures (cemented or uncemented) in the treatment of this condition is generally unsatisfactory [17-19].

Conclusions

Knowing the risk factors involved in aseptic necrosis of the femoral head it is essential for early disease detection, because in the early stages the poor or absent symptoms and laboratory imaging investigations detect no changes. A thorough investigation is particularly important for patients whose disease is already present at one of coxo-femoral joint as in 50-60% of cases bilateral aseptic necrosis occurs.

Patients at high suspicion should undergo an MRI examination, even if the plane X-ray or CT have not detected significant changes, because the diagnosis of aseptic necrosis of the femoral head in the early stages is a necessity in order to obtain an optimal result when performing conservative treatment.

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References

1. Tofferi JK, Gilliland W, Avascular necrosis, available at http://emedicine.medscape.com/article/333364, updated: Jun, 2014.
2. Davis CM, Parrish WM, Avascular necrosis, University of Pennsylvania Orthopaedic Journal, 2000,13: 22-28.
3. Levine M, Rajadhyaksha A, Hip osteonecrosis, available at http://emedicine.mdscape.com/article/1247804, updated May 1, 2012.
4. Kelly JD, SherwinSW, Femoral head avascular necrosis, available at http://emedicine.medscape.com/article/86568, updated: Feb 28, 2010.
5. Schoenstadt A, Avacsular necrosis, available at http://bones.emedtv.com/avscular necrosis/avascular-necrosis.html, last updated Nov 5, 2008.
6. Kaushik AP, Das A, Cui Q, Osteonecrosis of the femoral head: an update in year 2012, World J Orthop, 2012, 3(5): 49-57.
7. Lieberman JR, Berry DJ, Mont MA, Aaron RK, Callaghan JJ, Rajadhyaksha AD, Urbaniak JR, Osteonecrosis of the hip in the 21st century, Instr Course Lect, 2003, 52: 337-355.
8. Mont M, Hungerford DS, Non-traumatic avascular necrosis of the femoral head- current concepts review, The Journal of Bone and Joint Surgery, 1995, 77-A(3): 459-474.
9. Aiello MR, Chew FS, Imaging in avascular necrosis of the femoral head, available at http://emedicine.medscape.com/article/386808, updated: May 25, 2011.
10. Orban HB, Cristescu V, Dragușanu M, Avascular necrosis of the femoral head, Maedica- a Journal of Clinical Medicine, 2009, 4(1): 26-34.
11. Parvazi J, High yield orthopaedics, ed Elsevier Saunders, Philadelphia, 2010, 45-46.
12. Zoia S, Dumitrescu D, Popescu M, Gheonea I, Gabor M, Bogdan N, Imaging of avascular necrosis of the femoral head: familiar methods and newer trends, Current Health Sciences Journal, 2009, 35(1): 23-28.
13. Resnick D, Niwayama G, Osteonecrosis: diagnostic techniques, special situations and complications in Resnick D, Diagnosis of Bone and Joint Disorders, WB Saunders Co, Philadelphia, 1995, 34-95.
14. Mitchell MD, Kundel HL, Steinberg ME, Kressel HY, Alavi A, Axel L, Avascular necrosis of the hip: comparison of MR, CT and scintigraphy, AJR, 1986, 147: 67-71.
15. May DA, Disler DG, Screening for avascular necrosis of the hip with rapid MRI, preliminary experience, J Comput Assis Tomogr, 2000, 24(2): 284-287.
16. Malizos KN, Karantanas AH, Varitimidis SE, Dailiana ZH, Bargiotas K, Maris T, Osteonecrosis of the femoral head: etiology, imaging and treatment, Eur J Radiol, 2007, 63: 16–28.
17. Brinker MR, Rosenberg AG, Kull L, Galante JO, Primary total hip arthroplasty using noncemented porous- coated femoral componentsin patiens with osteonecrosis of the femoral head, J Arthroplasty, 1998, 9: 457- 468.
18. Cabanele ME, Bipolar versus total hip arthroplasty for avascular necrosis of the femoral head, a comparison, Clin Orthop, 1990, 261: 59-62.
19. Cornell CN, Salveti EA, Pellicci PM, Long-term follow up of total hip replacement in patiens with osteonecrosis, Orthop Clin North America, 1995, 16: 757-769.

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