

Imaging of Osteochondritis: About 7 Cases and Literature Review

S Habib Chorfa*, N Amsiguine, B Bequali, B Dghoughi, N Allali and L Chat S El Haddad

Pediatric Radiology Department, Ibn SINA University Hospital of Rabat, Morocco

***Corresponding Author:** S Habib Chorfa, Pediatric Radiology Department, Ibn SINA University Hospital of Rabat, Morocco.

Received: April 30, 2023; **Published:** May 27, 2023

Abstract

Osteochondritis is a condition of the subchondral bone and cartilage of children between three and ten years old in the majority of cases, due to aseptic cephalic necrosis of an etiology not yet elucidated. It results in intermittent pain and limitation of joint movement. Radiography is essential for the diagnosis and makes it possible to define the evolutionary phase (necrosis, revascularization, reconstruction, sequelae), as well as the severity of the cephalic attack by the Herring classification. Scintigraphy allows preradiological diagnosis, but magnetic resonance imaging represents the gold standard offering a much more precise analysis of lesions.

The age of onset, the severity of the stiffness, the progressive stage, the classification and the occurrence of progressive eccentricity are the bases of the therapeutic choice. Treatment can be orthopedic in the form of prolonged discharge, bed traction or abduction splint, which are less and less used today. In certain specific indications, surgery often modifies the natural history of the disease. In severe forms, progression can lead to relatively early osteoarthritis.

Keywords: *Osteochondritis; Necrosis; Revascularization; Reconstruction; Sequelae*

Introduction

Osteochondritis, also called osteochondrosis, is a medical term for various damage to the growth areas of cartilage and bone.

There are many types of osteochondritis. This disease can indeed affect the knee, the hip, the elbow, the foot, but also the spine. It is a necrotic attack of the bone which occurs preferentially in boys, between 4 and 8 years old. The origin of the necrosis is unknown. Genetic, environmental, terrain, mechanical factors and haemostasis disorders have been implicated without being able to be demonstrated.

The most significant progress in recent years has been in imaging. Radiography remains the basic examination, the Herring classification, simpler and above all more reproducible than the Catterall classification, is increasingly used. Scintigraphy has a diagnostic interest, but also a prognostic one thanks to the use of pinhole collimators making it possible to differentiate between two types of revascularization (by recanalization or by neovascularization). Magnetic resonance imaging (MRI) is of diagnostic but above all prognostic value by allowing analysis of the shape and coverage of the cartilaginous femoral head and by detecting lesions of the growth plate. Arthrography remains a widely used examination for the analysis of head-acetabular congruence; above all, it allows a dynamic analysis of the hip. These

imaging methods have improved the prognostic criteria of the disease. Hip stiffness, age of the child, extent of necrosis, appearance of the external pillar, growth plate abnormalities and eccentricity of the femoral head are the determining prognostic factors.

Treatments have changed. Many cases only require simple monitoring. When treatment is needed, traction is key. On the other hand, long-term orthopedic treatments seem to give less good results than surgical treatment by osteotomy.

Materials and Methods

Our study is based on the database of the mother-pediatric radiology department in collaboration with the pediatric surgery department of the HER Ibn SINA hospital in Rabat, over a period of one year (from September 2021 to September 2022), It revealed 7 patients with osteochondritis.

All these patients benefited from an MRI of the pelvis/knee/wrist in our department To analyze the lesions, we adopted Waldenstrom’s classification showing 4 stages: condensation, fragmentation, reconstruction and sequelae stage.

Results

There was a clear male predominance: 5 boys (71%) against 2 girls (29%).

4 children were under 5 years old (57%), 2 children were between 5 and 8 years old (29%), and 1 child was over 8 years old (14%). The average age at diagnosis was 6 years, with extremes ranging from 4 years to 15 years.

The average delay between the onset of clinical signs and the consultation of patients was 5 months in our series, with extreme delays ranging from 7 days to 2 years.

All of the children in our series were Caucasian.

Minimal trauma was noted in 5 patients (71% of cases).

No associated urinary malformation or hemoglobinopathy was noted in our series.

Knee and hip involvement were the majority in 3 cases each, and one case of osteochondritis of the wrist.

According to Waldenstrom’s classification: 5 cases present stage 1, 1 case stage II and one case stage IV.

No treatment was initiated in 2 cases, orthopedic treatment performed in 2 cases and 3 cases were operated.

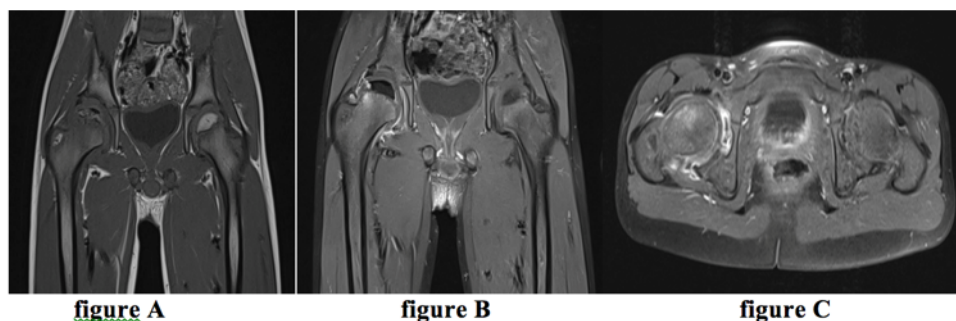


Figure 1: 7-year-old child who has been limping for 3 months in a context of apyrexia MRI of the hip in coronal T1 (Figure A), coronal T1 with injection of PDC (Figure B) and T1 FS gado (Figure C) showing irregularity and erosions of the right femoral head with subchondral geodes and transphyseal enhancement associated with thickening and reactive synovial enhancement related to osteochondritis.

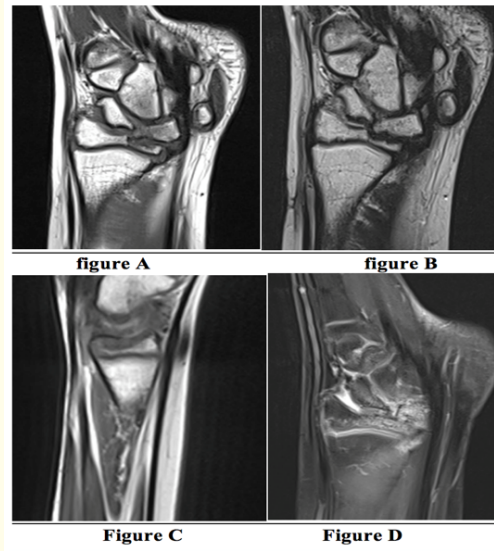


Figure 2: 13-year-old child, fracture of the bones of the forearm 1 year ago treated by osteosynthesis then rehabilitation, currently painful limitation of the mobilization of the wrist.
 MRI of the left wrist in T1 sequence and Coronal Stir (Figure A-B), T2 Sagittal blade (Figure C) showing a speckled aspect of the radial epiphysis, the semilunar bone, the large bone and the pyramidal bone in heterogeneous hyposignal T1, DP FATS SAT hypersignal with heterogeneous enhancement after injection (Figure D) and compression of the medial aspect of the distal radial epiphysis related to sequelae of osteochondritis of the distal radial epiphysis.

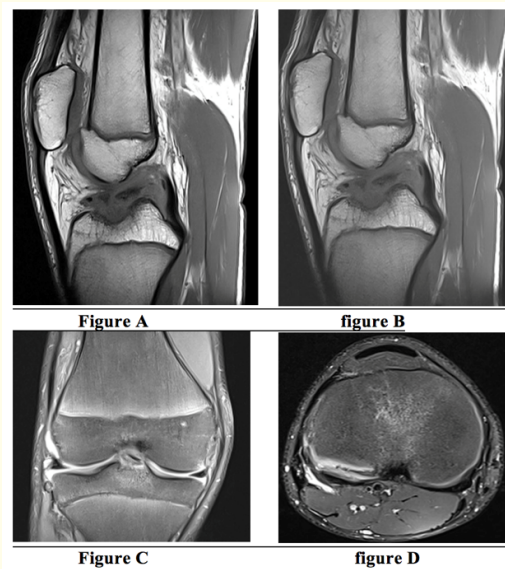


Figure 3: 15-year-old child, former trauma to the right knee, currently he presents with pain on the lateral side of the knee in which the MRI of the knee shows a complete rupture of the ACL with verticalized S-shaped aspect of the PCL.
 Stage I osteochondritis of the tibial plateau with corticalized foreign body in T2 iso signal related to secondary osteochondromatosis.

Discussion

Osteochondritis is a condition qualified as rare, according to the work of Hughston and Linden, its prevalence is between 15 and 30 per 100,000 and 70% of cases are diagnosed between 10 and 20 years with extremums in our series of 4 years and 15 years), however the incidence of this pathology is constantly increasing. The term osteochondritis is inappropriate, it is an alteration of the subchondral bone which affects the articular cartilage opposite, the ultimate evolution is the individualization of a necrotic bone fragment and its release in the 'joint. The pathophysiology of this condition is not clearly defined, the role of microtrauma is recognized, osteochondritis usually occurring in hyperactive children with a boy/girl sex ratio of 1.7.

Countless studies have evoked exposure to passive smoke, high parental age, low birth weight, retarded bone growth, association with urogenital malformations, coagulopathies, disadvantaged social backgrounds, obesity or hyperactivity syndrome as the etiology for the onset of osteochondrosis.

The clinical symptomatology varies according to the site of the attack generally grouping pain, stiff joints even immobilized, a loss of amplitude of the movements, the swelling as well as the sensitivity to the touch.

The realization of a standard X-ray confirms the diagnosis of condylar osteochondritis. The rigorous analysis of this X-ray must lead to the characterization of the lesion by its topographic situation, the evaluation of its size to establish a prognostic classification in juvenile osteochondritis and which intervenes in the choice of cartilage repair then to determine the forms which will require additional examinations to consider the most appropriate type of care. The quality of the x-ray is fundamental, thus avoiding false negatives.

The reference examination defined by the ICRS for the evaluation of osteochondritis, whatever the type, is MRI. Arthro-scan or arthro-MRI are not indicated today. Baseline MRI sequences should include a T2 gradient echo sequence or fast T2 spin echo sequence with fat saturation which have excellent performance for screening for cartilage lesions. To study the vitality of the fragment, it is necessary to use a T1 sequence without and with injection of gadolinium chelate and fat saturation to highlight the perfusion of the fragment.

Five points to be specified are the following: the appearance of the surface cartilage, the state of the epiphyseal bone-fragment interface, the vitality of the fragment, the residual growth epiphyseal cartilage and the growth plate. Indeed, they correspond to prognostic criteria which have been validated in at least two studies, the one carried out by SMET on 14 OCDs and the second by PILL in 2003 confirmed the results.

Its evolution must be separated into two main periods, child and adult, and its prognosis depends on the age of onset and its size. The smaller the lesion, and the younger the child, the higher the likelihood of healing without sequelae.

The growth period corresponds to the classic radiographic phases of densification, fragmentation and reconstruction, to which must be added the remodeling phase which continues until the end of growth which results either in a head of normal sphericity or, on the contrary, in an irregular or flattened head.

The adult period is that of the clinical impact of epiphyseal deformities. Osteoarthritis is common, however it is well tolerated for a very long time if there is good joint congruence. On the other hand, in case of incongruence, osteoarthritis is early and poorly tolerated.

There are two types of treatment: orthopedic and surgical. It should be noted that in more than half of the cases (57%), no treatment is justified, either because it is a benign localized form, or because it is an already healed form later.

Conclusion

Osteochondrosis of the hip remains the most frequent form in children, its evaluation by imaging, in particular MRI, is fundamental in order to determine the stage of osteochondritis for more appropriate treatment, thus avoiding early osteoarthritis.

Bibliography

1. De Smet AA, *et al.* "Untreated osteochondritis dissecans of the femoral condyles: prediction of patient outcome using radiographic and MR findings". *Skeletal Radiology* 26 (1997): 463-467.
2. Pill SG, *et al.* "Role of magnetic resonance imaging and clinical criteria in predicting successful nonoperative treatment of osteochondritis dissecans in children". *Journal of Pediatric Orthopaedics B* 23 (2003): 102-108.
3. Hughes JA, *et al.* "Juvenile osteochondritis dissecans: a 5-year review of the natural history using clinical and MRI evaluation". *Pediatric Radiology* 33 (2003): 410-417.
4. Luhmann SJ, *et al.* "Magnetic resonance imaging of the knee in children and adolescents. Its role in clinical decision-making". *Journal of Bone and Joint Surgery American* 87 (2005): 497-502.
5. De Smet AA, *et al.* "Osteochondritis dissecans of the knee: value of MR imaging in determining lesion stability and the presence of articular cartilage defects". *American Journal of Roentgenology* 155 (1990): 549-553.
6. Cahill BR and Berg BC. "99m-Tc-hydroxymethylene diphosphonate joint scintigraphy in the management of juvenile osteochondritis dissecans of the femoral condyles". *The American Journal of Sports Medicine* 11 (1983): 329-335.
7. Robertson W, *et al.* "Osteochondritis dissecans of the knee in children". *Current Opinion in Pediatrics* 15 (2003): 38-44.
8. Yoshida S, *et al.* "Osteochondritis dissecans of the femoral condyle in the growth stage". *Clinical Orthopaedics and Related Research* (1998): 162-170.
9. Jurgensen I, *et al.* "Arthroscopic versus conservative treatment of osteochondritis dissecans of the knee: value of magnetic resonance imaging in therapy planning and follow-up". *Arthroscopy* 18 (2002): 378-386.

Volume 12 Issue 6 June 2023

© All rights reserved by S Habib Chorfa, *et al.*