Intra-articular osteoid osteoma of the hip - imaging value

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Learning objectives

To illustrate the imaging signs of intraarticular osteoid osteoma (OO) of the hip in 13 patients followed in our center.

To demonstrate the imaging usefulness, particularly MRI, in the diagnosis of this entity.

To point out the main differences between the most common form of cortical OO and intraarticular OO.
Background

Osteoid osteoma (OO) is a benign bone lesion, representing almost 10% of all benign skeletal lesions (1). It is most frequently seen in young patients in their 20s and 30s, with a peak age in the early twenties (1,2). A male predominance has already been established, with a reported male-to-female ratio of 4:1 in one large patient series (3).

OOs can involve any bone of the skeletal system, but is mostly reported in long bones of the lower extremity. The proximal femur is the most common location followed by the tibia, posterior elements of the spine, and the humerus. OO is found in the diaphysis or the metaphysis of the proximal end of the bone more often than the distal end (4). A nidus surrounded by reactive sclerotic bone is the main feature of this lesion. (figure 1)

Classically, based on radiographic localization of the nidus, OOs may be categorized through three types: cortical, medullary and subperosteal. (5)

Cortical osteoid osteoma is the paradigmatic type of this lesion consisting of a small central nidus, usually radiolucent, associated with a surrounded sclerosis. Intramedullary type is relatively rare, just few cases have been reported in the literature. This latter type shows little or no reactive bone formation surrounding the nidus thus, the sclerotic aspect does not appear. Finally, the third type of OO is the subperosteal that most frequently occurs in the intra-articular portion of the bones and may be difficult to detect. However, some authors consider that all OOs originate in a subperiosteal location, and through osseous remodeling there is a migration of the lesion into an endosteal position (6). This theory is supported by the predominantly surface location of intra-articular lesions, where there is a lack of functional periosteum (7).

Intra and juxta-articular represent approximately 13% of OOs, the commonest site being the hip.(8) In this respect, the less frequency intra-articular localization may also present a diagnostic challenge because the classical radiological and clinical findings usually present in extra-articular localization may not be present.

This pictorial review depicts the wide range of appearances of intra-articular OO in the hip with emphasis on MRI.
We retrospectively collected from 2010 until 2015, 25 cases of OO, 13 of them were intra or juxta articular hip OOs (table1). The much higher percentage of intra or juxta-articular hip OOs depicted in this series, when comparing with published radiological series, was due to the fact that our hospital is a reference centre on hip surgery. We have made the correlation between the radiological findings and the histology after surgery to validate the imaging diagnosis.

The most affected joint in OOs is the hip (4). Evaluating the topographic distribution of our series 6 out of 13 were located in the femoral neck, whereas the femoral head was the second most frequent localization. To the best of our knowledge, only one study was found in the literature evaluating the topographic distribution of OOs in the hip. According to Laredo et al., from the 11 cases evaluated, five lesions were located in the femoral neck while the other six were located in the trochanters, intertrochanteric crest and line (9).

Considering our series, the average age was 26 years old, the youngest being 7 and the oldest 55 years of age. These data is in keeping with the known bibliography that has been already referred.

*Standard radiographs* in spite of being the first radiological approach only provide subtle findings due to the lack of sclerosis or periosteal reaction that usually is present in extra-articular localizations. (4) In the present series, standard radiographs only depicted in several cases some cortical thickening, which is consider a non specific sign in the diagnosis of OOs. (figure 3 and 3)

*Computed tomography (CT)* remains for some authors the modality of choice for detecting osteoid osteoma (figure 4), providing the best characterization of both the nidus and the surrounding cortical sclerosis. On CT the nidus appears as a defined radiolucent region with varying degrees of central mineralization (10). Although there is some controversy in the use of intravenous contrast, the nidus enhances at contrast-enhanced CT on a early phase, some of them demonstrating wash-out (8). However, some OOs particularly the intra-articular ones might have little to no reactive sclerosis at all. In those, other signals such as synovitis and marrow edema are much better depicted on MRI. Furthermore, one must not forget that OO is a tumor and according to the vast majority of authors, MRI remains the modality of choice for bone tumor exploration (9).

At MRI, the signal in the nidus usually is isointense comparing with the muscle on T1-weighted images and is variable but mainly hyperintense on T2-weighted images. Precise localization of the nidus may not be easy on intra-articular lesions. Some authors state that in 21% of intra-articular OOs the nidus is not identified on MR imaging and poorly
identified in a further 29% (9). In our series 5 out of 12 cases the nidus was not well visualized, making up almost 45% of the cases (figure 5, 6 and 7).

About 80% of patients with both intra and extra articular OO of the proximal femur develop synovitis and articular effusion of the hip joint (10). No data was found reporting the percentage of synovitis specifically on intra-articular OO. Interestingly, we found synovitis in all intra articular OOs that MRI was performed. The only two cases where synovitis were not seen were the ones on juxta-articular localization.

Bone marrow edema has been reported to occur in more than 60% of patients with OO (figure 8 and 9). This edema is related by the replacement of cellular marrow elements by inflammatory cells and proteinaceous material (11). Bone marrow edema produces low signal intensity on T1-weighted images and high signal intensity on fat-suppressed T2-weighted images. We consistently depicted bone marrow edema in 10 out of 12 cases.

While cortical thickening might be useful in depicting OO on CT the results in our MRI series proved to be very heterogeneous.

We also report two cases, which initially were studied by MRI for femoro-acetabular impingement and subsequently underwent surgery (figure 10). However, persistence of symptoms after surgery led the clinicians to further investigate and seek the opinion of a multidisciplinary team, so the MRIs were repeated and an intraarticular OO were depicted in both cases. We retrospectively analysed the initial MRI of both cases and found a very small nidus that was overlooked. The initial musculoskeletal radiologist in both cases, in fact, notice bone edema and synovitis on the MRIs that were interpreted in keeping with the cam FAI.

The leading MRI signal depicted in this series was synovitis. It is well established that prolonged synovitis might cause severe hypertrophic deformation around the joint that leads to painful limitation of joint range movement and finally permanent sequelae.

Thus, a good understanding about the main radiological features of intra/juxta-articular OO may lead to shorten the usual diagnosis delay allowing to an early therapeutic intervention that may prevent potential skeletal complications.
Table 1: Series of 13 cases of intra/juxta articular osteoid osteoma. F- female; M- male; R-right; L- left; (+) present; (-) not present

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**Fig. 1:** A 19-year-old female with a long history of undiagnosed hip pain. (a) Anteroposterior radiograph shows thickening of the right medial femoral neck cortex (arrow). (b) CT coronal view, reveals a radiolocent nidus (arrow) with faint internal mineralization and mild surrounding reactive sclerosis. (c) MRI PD FS (ET 43 ms/TR 2230 ms) coronal view demonstrates cortical OO of the medial cortex of the femoral neck. Huge joint effusion and synovitis can also be seen (*). (d) MRI PD FS (ET 24 ms/TR3300 ms) radial acquisition. The OO could be better depicted and also the disproportionate synovitis (*)

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**Fig. 3:** A 17 year old girl, with left hip pain. (a) Anteroposterior X-ray: no alterations were seen. (b) MRI DP (ET 35 ms/RT 2660 ms) radial acquisition; (c) MRI coronal PD FS (ET 43 ms/RT 2000 ms) a femoral left neck isointense nidus on a subperiosteal localization was depicted. Again synovitis and effusion were seen.

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**Fig. 4:** A 18 year old man, with right hip pain. (a) Axial CT reconstruction shows a well defined nidus with interstitial calcifications on the right head hip. (b) CT guided biopsy with co-axial system 14 G was performed, and the histology confirmed the OO diagnosis. No MRI was performed.

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**Fig. 5:** A 54 old man, with left hip pain for several years. (a)- Coronal view CT (b)- axial view CT shows a cortical thickening on the medial neck of the left femur and a small intracortical OO was seen. (c, d - MRI PD FS ET 20 ms/RT 2710 ms sagittal and coronal) the small nidus is depicted. However disproportionate synovitis and articular effusion were much better depicted.

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Fig. 6: A seven year old boy, with left hip pain for several years. (a)- MRI Sagittal PD FS (ET 20 ms /RT 2150 ms): Huge synovitis (arrow) was seen on the left hip. No nidus sign was depicted. (b)- axial view CT showed classical appearances of an intracortical OO (arrow)

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Fig. 7: A twenty-three old man, with right hip pain. (a,b)- MRI axial PD FS (ET 26 ms /RT 3590 ms) Isointense nidus at the right posterior acetabular fossa (circle). Joint effusion, synovitis (*) and bone marrow edema (arrow) can also be noted.

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**Fig. 8:** A twenty-two year-old man, with right hip pain. MRI was performed to study a FAI clinical suspicion (a,b)- MRI sagittal and radial PD FS (ET 26 ms /RT 3590 ms). A small subperiosteal nidus at the femoral neck was depicted. Note the presence of moderate synovitis and effusion.

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**Fig. 9:** A nineteen year-old woman, with right hip pain. (a) CT axial view, detected a nidus at the right acetabular fossa with surrounding sclerosis. (b) MRI coronal T2 FS (ET 92 ms /RT 6860 ms) depicted bone marrow edema spread into the iliac bone.

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**Fig. 10:** A 21 year old man, with right hip pain of several months duration, which was clinically diagnosed for femoro-acetabular impingement (FAI). (a) MRI PD FS (ET 34 ms/RT 3400 ms) radial acquisition - Pré-operative MRI confirmed FAI CAM type. The nidus (arrow) on the subperiosteal lateral right femoral neck which was missed initially, is well depicted retrospectively with associated huge synovitis (*) (b). Post-operative AP X ray after femoral osteotomy shows the nidus (arrow), which was missed again. Seven months after surgery, due to persistent hip pain MRI was repeated (d)- MRI PD FS radial acquisition. An OO was depicted with synovitis and huge

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**Fig. 2:** A 19 year-old man, with right hip pain of 15-months duration. MRI was performed (a- MRI Sagittal PD FS ET 20 ms/RT 1870 ms) (b- MRI Coronal PD; (ET 35 ms/RT 2660 ms) ) and revealed a subperiosteal OO, depicted at the posterior acetabular fossa.

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Conclusion

Intraarticular osteomas, particularly on the hip are problematic lesions both in terms of being more difficult to detect and in terms of having a nonspecific appearance on imaging.
References


10- Davies M, Cassar-Pulicino VN, Davies AM. The diagnostic accuracy of MR imaging in osteoid osteoma. Skeletal Radiol 2002; 31:559-69

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