

Case Report

Intra-articular Osteoid Osteoma of Hip – A Lesson Learnt From “Half-moon Sign” in Early Diagnosis

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ABSTRACT

We emphasize the importance of “half-moon sign” which was seen on magnetic resonance imaging (MRI) done at an early stage of osteoid osteoma in a young patient with hip pain. The hip radiograph and computed tomogram (CT) obtained during his initial presentation were unremarkable. MRI showed a half-moon shaped marrow edema within the femoral neck which was misinterpreted as osteomyelitis. After a prolonged morbidity, the patient again underwent a CT study which picked the lesion as it was evident by that stage. The recent literature has shown the half-moon sign to be a highly specific sign for osteoid osteoma, a knowledge of which, if were known to us at the time of patient’s initial presentation would have significantly reduced his period of pain and disability. Confirming the patient is a not an athlete and does not have a recent history of physical overactivity is crucial, as the sign can also be seen due to stress reaction.

Keywords: Intra-articular, Osteoid osteoma, Nidus, Half-moon

INTRODUCTION

An osteoid osteoma situated near or within the joint causing articular symptoms is termed as an “intra-articular type,” which is believed to be a distinct and rare entity with the most common joint involved being the hip joint. They may be covered by capsule or very near to the capsule and not essentially be within a synovial cavity to qualify as an intra-articular lesion.^[1-3] Diagnosing this type of osteoid osteoma is challenging due to a lack of the typical clinical feature and no definitive imaging signs.^[1-5] The half-moon sign which is recently described in the literature^[5] could be a problem solver, and we believe this sign when used under a high degree of clinical suspicion will help in early diagnosis and therapy thereby significantly reducing the patient’s morbidity and further complications.

CASE REPORT

A 13-year-old non-athletic boy who was recently treated for pulmonary tuberculosis presented with complains of left hip pain for 2 months which was insidious in onset and slowly progressing. The pain was an articular type which was dull aching, intermittent in nature, non-radiating and relieved with rest and analgesics. The patient gave no history of night cries. Furthermore, there was no history of physical overactivity or trauma or fever. On examination, the patient was afebrile; there was tenderness over the anterior joint line and pain on internal rotation and terminal flexion. There was no local rise in temperature and no deformity of hip or limb length discrepancy seen. The radiograph of both hips showed no obvious abnormality

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[Figure 1]. Computed tomography (CT) of hips performed was unremarkable as well [Figure 2]. Further, on contrast-enhanced magnetic resonance imaging (MRI) of both



Figure 1: Frontal radiograph of the pelvis obtained during the patient's initial presentation shows no obvious radiographic abnormality in the left hip.

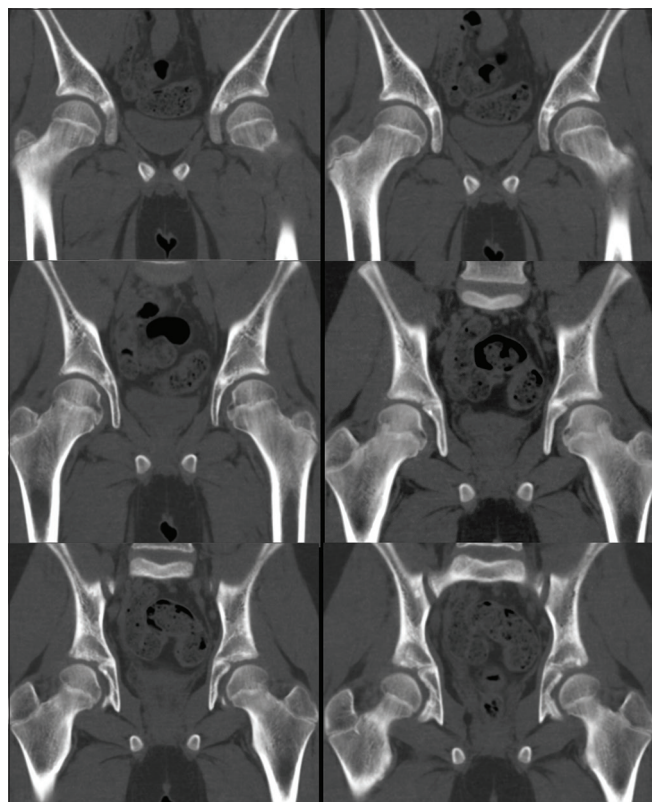


Figure 2: Sequential coronal computed tomography images in anterior to posterior direction obtained during the patient's initial presentation showing no focal lesion or abnormality in the left hip.

hips, there was an enhancing crescentic half-moon shaped marrow edema involving the inferomedial aspect of the femoral neck having a broad base toward the inner cortex [Figure 3]. There was associated mild inflammation of the adjacent soft tissue. No focal lesion could be identified in the cortex or the medulla. Based on the MRI findings, a diagnosis of osteomyelitis was made, and a bone marrow biopsy of the femoral neck was performed. Biopsy showed no evidence of osteomyelitis or granuloma. Hence, the patient was advised to continue analgesics and be on regular follow-ups. However, the patient was lost on follow-up for about 8 months following which he came with complaints of increased severity of pain and inability to bear weight on his left leg. He was unable to go to school and go about his daily activities. He was using crutches to walk as advised by a local doctor at his place. At this time, he gave a history of aggravated pain during the night. CT study of both hips revealed thickening of the medial cortex of the left femoral neck with an intracortical radiolucent nidus having a speck of density within suggestive of osteoid osteoma [Figure 4]. A retrospective examination of the previous CT using a narrow window and a sharper filter revealed a faint

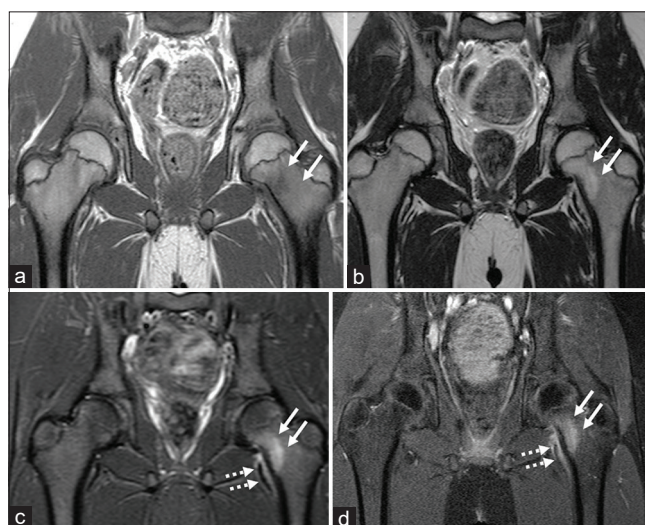


Figure 3: Coronal magnetic resonance imaging images of bilateral hips obtained during the patient's initial presentation. (a) T1-weighted image shows diffuse hypointensity in the left neck of femur (solid white arrows). (b) T2-weighted image shows half-moon shaped hyperintensity in the inferomedial portion of the neck of femur with its broad base toward the medial cortex (solid white arrows). (c) Short-tau inversion recovery image shows clear demarcation of the half-moon shaped marrow edema in the background of the suppressed bone marrow (solid white arrows). (d) Post-contrast T1-weighted image shows enhancement of the marrow edema (solid white arrows). Associated linear enhancing soft tissue inflammation is seen adjacent to the medial cortex (dashed white arrows in the image (c and d)). No focal lesion could be detected in the cortical or intramedullary regions in any of these images.

intracortical lucency exactly at the site of nidus detected in the second CT [Figure 5]. Following the imaging diagnosis, a CT guided percutaneous radiofrequency ablation of the osteoid osteoma was performed [Figure 6]. The procedure was uneventful, and the patient fully recovered from pain within 2 weeks and is presently able to walk normally.

DISCUSSION

Classic imaging feature of an osteoid osteoma includes focal thickening of the cortex containing a lucent nidus within. The nidus may or may not have a central sclerotic focus.^[4,6] Unlike the other types, an intra-articular type of osteoid osteoma is notorious to mimic the symptoms of a primary articular disease with joint tenderness, effusion, and soft tissue swelling being the predominant features.^[4] The pain may not be worse at night and may not be relieved with nonsteroidal anti-inflammatory drugs. Even the classic imaging feature is lacking, as the reactive bone thickening is absent or minimal and the nidus may be very small to be detected. The lack of bone thickening in these cases is attributed to the absence of the inner cambium layer within the joint capsule.^[1] Therefore, it is clinically perplexing to arrive at a diagnosis and the estimated period of delay in diagnosing this type of osteoid osteoma is reported to be between 9 months and 7 years.^[5] Such delay in diagnosis not only causes prolonged pain and disability but may also lead to secondary osteoarthritic changes in the form of osteophyte formation, subchondral sclerosis, and joint space narrowing. As the lesion is close to the physis, it may result in limb length discrepancies.^[4] Clearly, the half-moon sign which is well demonstrated in the short-tau inversion recovery (STIR) sequence on coronal plane, could be of paramount importance in suggesting the presence of an osteoid osteoma and should instigate the radiologist to carefully look for any occult nidus in the CT as locating the nidus is necessary for treatment purpose. The previous studies investigating MRI of the secondary changes of osteoid osteoma have mentioned about the grading of the surrounding marrow edema of non-specific pattern and associated soft tissue changes without any mention half-moon pattern.^[7,8]

We were unaware of this sign during the patient's initial presentation. However, during his second presentation, when we realized about the occult nidus being missed, we searched the literature for any other CT or MRI features that could prompt us to relook at the imaging and came across the study by Klontzas *et al.*^[5] The authors in their MRI study on patients with femoral neck osteoid osteoma consistently observed the half-moon shaped marrow edema on coronal STIR images in all the patients. They hypothesized that the half-moon sign could be due to the restriction of free diffusion of the edema by the strong principal tensile and compressive trabecular networks in a young patient and concluded that the sign is highly sensitive and specific for the diagnosis. Later, in their

reply letter to Carra *et al.*,^[9] they acknowledged that the stress reactions could closely mimic this pattern and remarked that the patients with stress reactions would ideally have a clear history of physical overactivity.^[10] Our patient was a non-athlete with no history of physical overactivity.

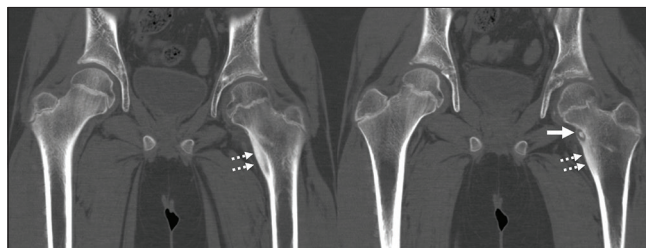


Figure 4: Coronal computed tomography images of the hip obtained after 8 months of patient's initial presentation shows thickening of the medial cortex of left femoral neck (white dashed arrows) with an intra-articular intracortical radiolucent nidus (solid white arrow) having a speck of density within suggestive of osteoid osteoma.

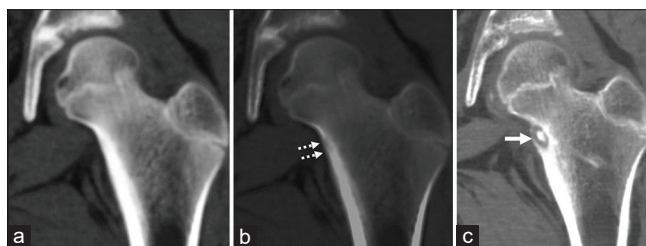


Figure 5: (a) Coronal computed tomography (CT) image of the left hip obtained during the patient's initial presentation shown at the usual bone window (window level: 400 and window width: 1800). (b) Same image shows with narrow window and a sharp filter (window level: 500, window width: 1200, and level 1 sharpness) showing a faint intracortical lucency (dashed white arrows) suggestive of an occult nidus. (c) Coronal CT image of left hip obtained 8 months after the patient's initial presentation shows well-formed nidus (solid white arrow) exactly at the site of the occult nidus.

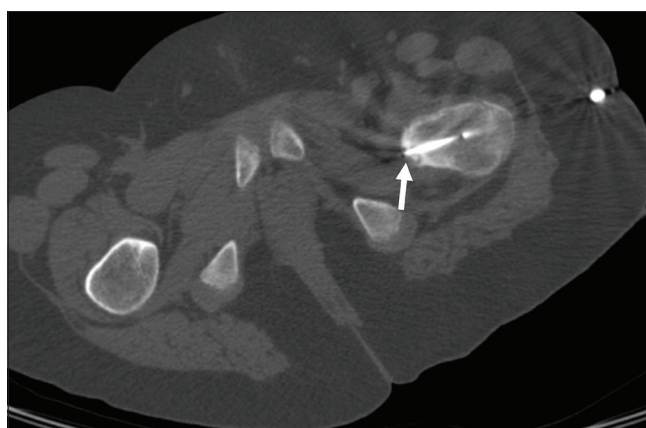


Figure 6: Axial computed tomography image at the level of the left femoral neck showing the tip of the radiofrequency ablation probe within the nidus (white arrow).

CONCLUSION

The case demonstrates the usefulness of the sign in the diagnosis of intra-articular osteoid osteoma even at a stage when the lesion is occult on CT – an information which is not stressed in the available literature. Although CT is the preferred investigation in suspected case of osteoid osteoma, we propose that MRI is of equal importance in early diagnosis. Identifying the half-moon sign as a key finding on MRI in cases having no history of physical overactivity must herald the radiologist about the possibility of an osteoid osteoma and prompt him/her to relook at the CT study for the occult nidus as in this case.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms.

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Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Chai JW, Hong SH, Choi JY, Koh YH, Lee JW, Choi JA, *et al.* Radiologic diagnosis of osteoid osteoma: From simple to

- challenging findings. *Radiographics* 2010;30:737-49.
2. Kattapuram SV, Kushner DC, Phillips WC, Rosenthal DI. Osteoid osteoma: An unusual cause of articular pain. *Radiology* 1983;147:383-7.
3. Davies M, Cassar-Pullicino VN, Davies AM, McCall IW, Tyrrell PN. The diagnostic accuracy of MR imaging in osteoid osteoma. *Skeletal Radiol* 2002;31:559-69.
4. Lee EH, Shafi M, Hui JH. Osteoid osteoma: A current review. *J Pediatr Orthop* 2006;26:695-700.
5. Klontzas ME, Zibis AH, Karantanas AH. Osteoid osteoma of the femoral neck: Use of the half-moon sign in MRI diagnosis. *AJR Am Roentgenol* 2015;205:353-7.
6. Yildiz Y, Bayrakci K, Altay M, Saglik Y. Osteoid osteoma: The results of surgical treatment. *Int Orthop* 2001;25:119-22.
7. Ehara S, Rosenthal DI, Aoki J, Fukuda K, Sugimoto H, Mizutani H, *et al.* Peritumoral edema in osteoid osteoma on magnetic resonance imaging. *Skeletal Radiol* 1999;28:265-70.
8. Woods ER, Martel W, Mandell SH, Crabbe JP. Reactive soft-tissue mass associated with osteoid osteoma: Correlation of MR imaging features with pathologic findings. *Radiology* 1993;186:221-5.
9. Carra BJ, Chen DC, Bui-Mansfield LT. The half-moon sign of the femoral neck is nonspecific for the diagnosis of osteoid osteoma. *AJR Am J Roentgenol* 2016;206:W54.
10. Klontzas ME, Zibis AH, Karantanas AH. Reply to “the half-moon sign of the femoral neck is nonspecific for the diagnosis of osteoid osteoma”. *Am J Roentgenol* 2016;206:W55-6.

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