Scientific Research Publishing

Open Journal of Internal Medicine, 2023, 13, 1-7
https://www.scirp.org/journal/ojim
ISSN Online: 2162-5980
ISSN Print: 2162-5972

Osteoid Osteoma of the Second Metatarsal: An Exceptional Localization and Unusual Clinical Features

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How to cite this paper: Mohammed, S., Soufiane, A., Walid, B., Jamal, K., Omar, A. and Abdelkrim, D. (2023) Osteoid Osteoma of the Second Metatarsal: An Exceptional Localization and Unusual Clinical Features. *Open Journal of Internal Medicine*, **13**, 1-7.
https://doi.org/10.4236/ojim.2023.131001

Received: November 20, 2022
Accepted: January 31, 2023
Published: February 3, 2023

Abstract

Osteoid osteoma of the foot can be difficult to diagnose, the clinical presentation may be mimicking other local pathologies leading to a considerable delay in diagnosis. We report an exceptional localization of osteoid osteoma in the second metatarsal in a 30-year-old patient, expressed for 3 years by metatarsalgia, with no clinical and radiological architecture defect of the foot. After discovering the nidus, the patient underwent surgical excision with an excellent outcome.

Keywords

Osteoid Osteoma, Forefoot, Metatarsalgia, Surgery

1. Introduction

Osteoid osteoma is a benign osteoblastic bone tumor often discovered in the 2nd and 3rd decade [1]. First described by Jaffe *et al.* in 1935 [2]. It is responsible for about 10% of benign bone neoplasia [3]. Half of the cases concern either the tibia or the femur. In the foot, it frequently occurs in the talus, the metatarsal localization is uncommon; and not exceeding 1.7% [4] [5], and only a few cases have been reported [6] [7] [8] [9].

Osteoid osteomas are divided into three subtypes: cortical, cancellous, and subperiosteal. Osteomas of the long bones are usually intracortical and associated with a significant subperiosteal reaction. In contrast, most osteomas of the foot are cancellous or subperiosteal with limited or no periosteal reaction [10].

The diagnosis is challenging for several reasons: lesions in the forefoot may present with unusual clinical features; characteristic radiographic findings may

be absent, and finally, histologic patterns may deviate from classic osteoid osteoma, occurring in long bones [11]. The diagnosis has been facilitated by the availability of new imaging techniques such as computed tomography with three-dimensional reconstruction and the use of magnetic resonance imaging (MRI) in medullary or abarticular localizations [12]. We report the case of a young patient with an osteoid osteoma located at the base of the second metatarsal, a location not yet described in the literature.

2. Observation

A 30-year-old male consulted for metatarsalgia of the second ray of the left foot, evolving for several months, radiating towards the back of the foot. The clinical examination showed a square-shaped foot, without deformity of the 1st ray, nor claw toes, the pain was felt on palpation of the base of the 2nd metatarsal, the Muder's sign was negative, there were no retractions of the sural triceps, with the absence of any inflammatory or infectious signs.

Radiographs of the forefoot were taken in the front and side views, and were initially considered normal (**Figure 1**). The patient was treated with nonsteroidal anti-inflammatory drugs (Diclofenac) with a rest period of two weeks. During this period, an improvement in the symptoms was noted, which rapidly deteriorated after the cessation of the medicine. A second radiological evaluation was performed after 3 months, using standard X-rays. This time, a lacunar image with a sclerotic border without any marked cortical thickening was observed, located at the metaphyso-diaphyseal junction of the 2nd metatarsal in the juxta-cortical aspect, which could be suggestive of a stress fracture or an osteoid osteoma (**Figure 2**). The CT scan showed a well-circumscribed lesion, round, 6 mm in diameter, and subperiosteal location, without cortical disruption (**Figure 3**). An MRI of the foot showed a nodular bone formation in T1 hyposignal, DPSF hypersignal, this abnormality of signal respects the continuity of the cortical bone, and there was no association with intramedullary or adjacent soft tissue edema (**Figure 4**).

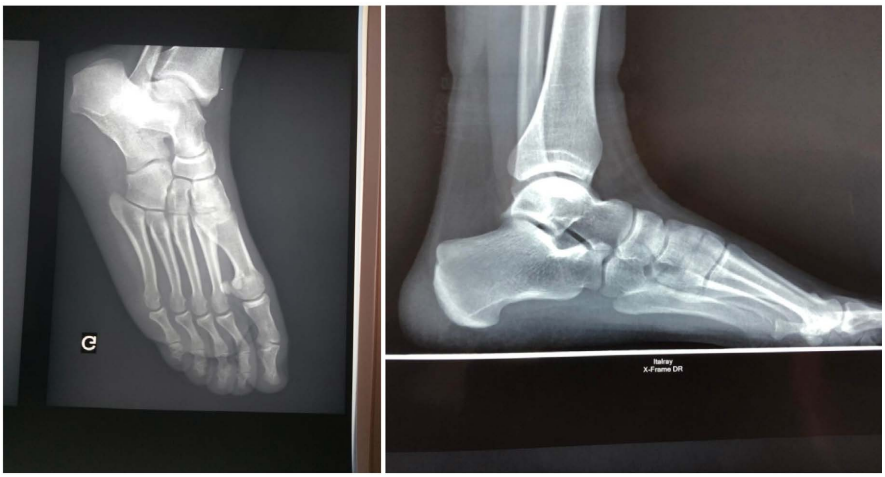

Figure 1. Anteroposterior and side X-rays of the left foot during the 1st consultation with no visible abnormalities.

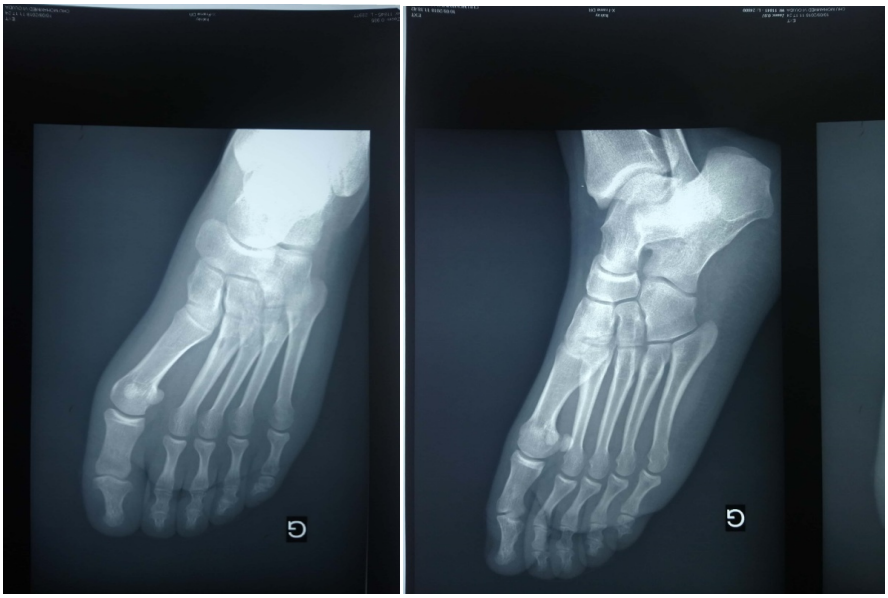

Figure 2. Radiographs of the foot showing a round-shaped clarity next to the medial cortical bone of the 2nd metatarsal base.

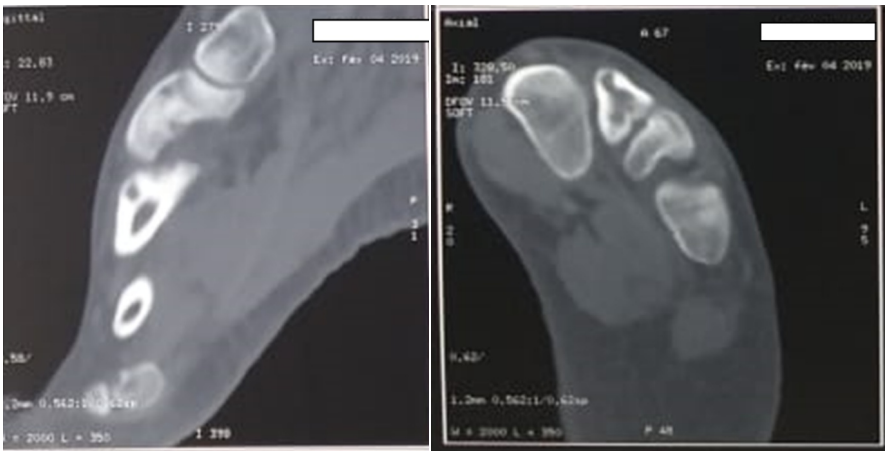

Figure 3. CT scan axial and sagittal views showing the intra-cortical nidus in the sub-periosteal location.

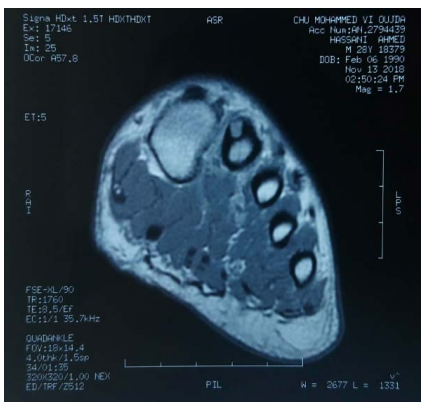

Figure 4. T1 MRI sequence in coronal view of the 2nd metatarsal showing the subperiosteal nidus, with no intramedullary cancellous bone or adjacent soft tissue changes.

Under spinal anesthesia, using fluoroscopy to help identify the lesion, by a direct dorsal approach over the base of the 2nd metatarsal, an en bloc excision of the nidus was performed using a small curette and a high-speed burr to remove the sclerosed bone within the lesion. No bone grafting was required. Histological evidence confirmed the diagnosis of osteoid osteoma (Figure 5).

The postoperative course was very simple, the weight bearing was initially secured by Forearm crutches to provide comfort, and the patient was advised to self-rehabilitate. The patient was allowed to resume work after 3 weeks, and restart sports after 3 months. At the last follow-up, 12 months after the surgical excision, he had reached the previous state of physical activity, without any discomfort when putting on his shoes, nor any limitation, and with a complete absence of nocturnal pain. We also noted a complete disappearance of the nidus on the 12-month control radiograph (Figure 6).

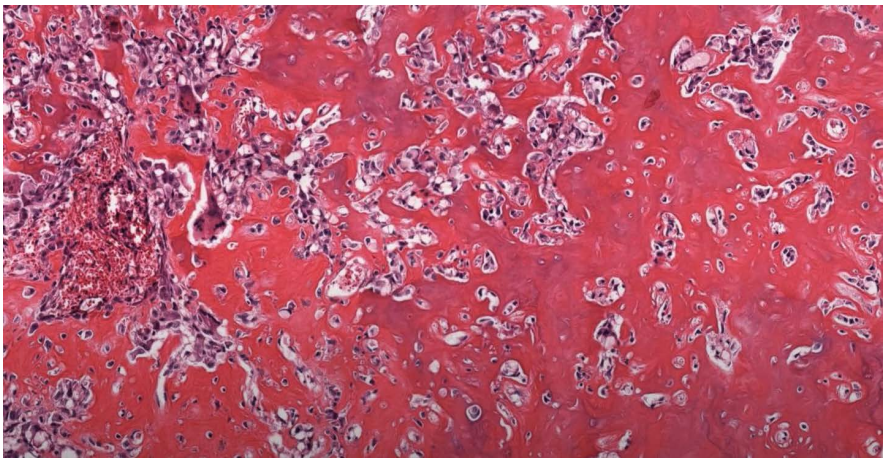

Figure 5. High power view of nidus composed of dense sheet-like deposits of osteoid with poorly formed woven bone trabeculae and variable mineralization.

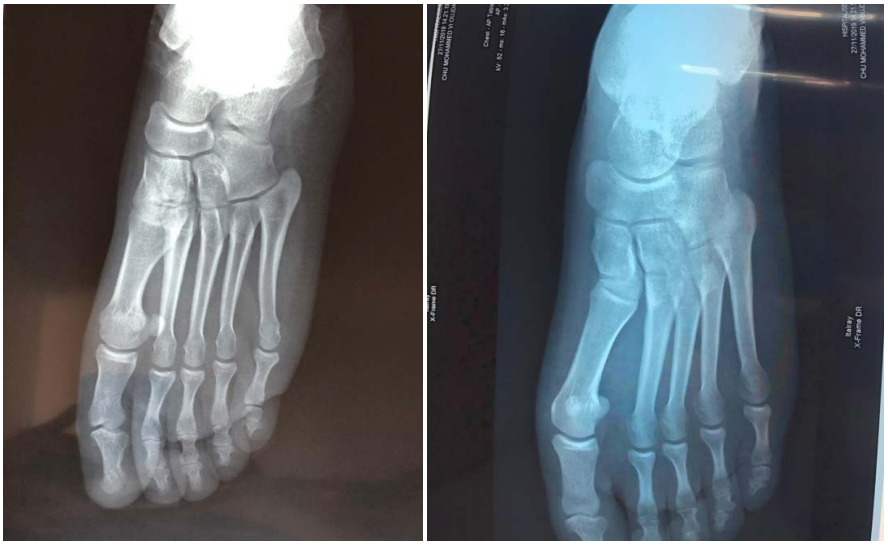

Figure 6. 12-month follow-up radiograph showing the complete disappearance of the nidus.

3. Discussion

The clinical presentation of osteoid osteoma may vary depending on the location of the lesion. In general, patients may present with tenderness, swelling or effusion, stiffness, and restriction of activity. The most common signs are nocturnal pain and relief with NSAIDs, which occurs in 64% of cases of osteoid osteoma. Men are more often affected, with reported rates of 67% - 80% [13]. Delays in obtaining a correct diagnosis take from a few months to several years.

Shereff *et al.* [14], by reviewing 10 cases of osteoid osteoma, noted that the duration of symptoms before a correct diagnosis was made ranged from 1 month to 4 years, and 80% of these patients had symptoms for over a year before diagnosis. Some other authors [15] [16] have also reported delayed diagnosis for cervical (1 year) and lateral process talus (4 years) locations. In our case, it took 36 months to make the correct diagnosis.

According to Kenzora and Abrams [17], the reason for the delayed diagnosis is that there is little or no bone reaction on X-ray for some lesions, especially cancellous ones. Furthermore, from a pathological point of view, it seems that the nidus goes through a biological maturation process, starting with an initial stage where the nidus looks basically like healthy bone, to the stage where it is easily identifiable because of its hyperemic red appearance [17].

Standard radiographs of the foot may not provide sufficient accuracy for diagnosis, which appears to have been the issue in our case. We believe this may be related to the unusual location of the lesion; or to the absence of the typical radiographic pattern, which is a round lucent spot containing a dense central nidus surrounded by sclerotic bone.

Computed tomography imaging is the most useful tool for a good analysis of the nidus, but MRI is much more sensitive for detecting cancellous localizations, as well as for searching for medullary edema or peripheral soft tissues [12] [18]. For some authors [18], scintigraphy may be useful to eliminate a stress fracture.

The condition may regress spontaneously; some records suggest that most cases resolve between two and six years [19]. However, if symptomatic, surgical excision is the gold standard of treatment, with reported success in 88% - 100% of cases [20]. Surgical removal of the nidus, either open or percutaneous with fluoroscopic guidance, are all approved treatments [4] [8] [12]. Arthroscopic resection is limited to the intra-articular form and shows good outcomes [15]. The trend is now towards minimally invasive techniques, such as percutaneous trephine or drill resection, with or without the subsequent injection of ethanol [21] radiofrequency and laser thermoablation, which is a valid indication for small lesions distant to the joints [9] [22], but it remains unavailable techniques, especially in the underdeveloped countries. In our case, we performed a complete surgical removal of the lesion, with no need for grafting, as the lesion was limited in size. We achieved a complete and durable recovery with no recurrence at the last follow-up.

4. Conclusion

The metatarsal localization of an osteoid osteoma is one of the rarest, its diagnosis represents a true challenge, considering the amount of more common local pathologies. Based on our understanding of the literature, and the case we have presented, the diagnosis of osteoid osteoma should be considered when a combination of epidemiological and clinical arguments is present. A young male presenting with foot pain, mostly at night relieved when taking aspirin, should undergo a CT scan if standard radiographs are not helpful. The treatment is proposed according to the lesion's location and the facilities available to the surgeon.

Informed Consent

Written informed consent was obtained verbally from the patient for their anonymized information to be published in this article.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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