Juvenile Osteoid Osteoma of the Distal Phalanx of the Second Digit: A Case Report and Literature Review

Christopher R. Hood JR, DPM, AACFAS[α], Katlin A. O'Hara[β], DPM, Wesley A Jackson, DPM[μ]

[α]Associate, Premier Orthopaedics and Sports Medicine, Malvern, PA
[β]Resident, PGY-2, Phoenixville Hospital PMSR/RRA at Tower Health, Phoenixville, PA
[μ]Resident, PGY-2, Bryn Mawr Hospital PMSR/RRA, Bryn Mawr PA.
Address correspondence to Christopher R. Hood JR @ crhoodjr12@gmail.com.

Introduction

Osteoid osteoma (OO) is an uncommon benign, small, bone-forming bone tumor.[2] The core of the tumor is composed of osteoid and woven bone coined the "nidus," surrounded by a halo signifying reactive, sclerotic bone formation.[3] Often found in the cortical, diaphyseal region of long bones, they represent 3-10% of all primary bone tumors with approximately fifty-percent of cases reported in either the femur or tibia.[1,3,4] The tumor is 2.5 times more likely to be found in males over females with presentation most commonly seen in the second and third decade of life.[1,3,5] OOs of the foot are rare with the talus being the most common pedal presentation (range, 3-11%), with phalangeal presentation at a lower rate (range, 2-4%).[1,2,4,6] The typical presentation is nocturnal bone pain often relieved by nonsteroidal anti-inflammatory drugs (NSAIDs).[1] Differentials include fracture, infection, systemic, and other bone tumors, with each situation needing to be correlated to the clinical picture.[1] Treatment often ends with surgical excision of the tumor using various described techniques. Here we report a pediatric case report of OO of the second toe.

Methods

A 15-year old male presented to the office with a two-year history of pain to the right second toe with clubbing of the toenail. He stated that his toe was stepped on as the inciting event, and ever since the nail grew in a clubbing fashion and the toe had a variable, but constant level of pain. (Fig. 1) Two-years after incident, the patient sought treatment with presentation to the senior authors' office (C.R.H.). Plain film radiographs did not reveal any altered bony architecture to the second toe bones. (Fig. 2) An MRI was subsequently performed showing a 6 mm sclerotic lesion in the 2nd digit distal phalanx with distal cortical erosion, while the entire bone had altered signal intensity. (Fig. 2) Treatment options were discussed surgical excision was agreed upon. Under general anesthesia, the right second toenail was avulsed in toto. A surgical lazy-S incision was made on the dorsal aspect of the right second toe across the distal interphalangeal joint. (Fig. 3) The distal phalanx, which appeared to have an altered cortex, was removed in total and sent for pathology. The skin was primarily closed without issues.

Pathology evaluation confirmed the diagnosis of an OO. (Figs. 4). After surgical excision, the patient was weight bearing as tolerated in a CAM boot. The patient experienced resolution of pain and clubbing of the nail to the right second digit by the second post op visit, 19 days after surgery. He has been pain free with no return of deformity since surgery and has resumed all normal activities with no signs of recurrence at 12 months follow-up.

Results / Images

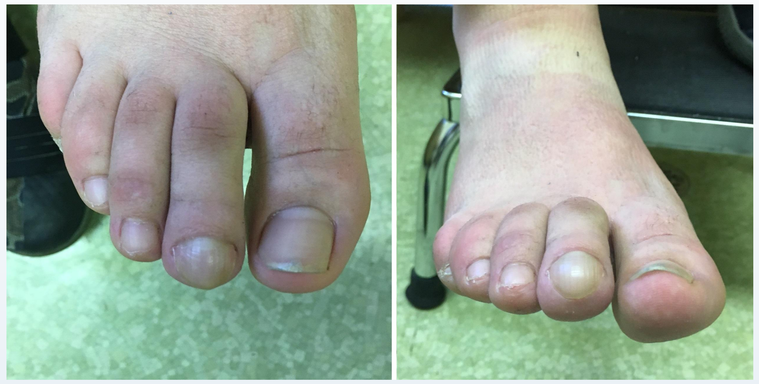

Fig 1. Clinical pre-operative imaging. Note the enlarged second digit with clubbing of the toenail. Toe size increase and nail change occurred after

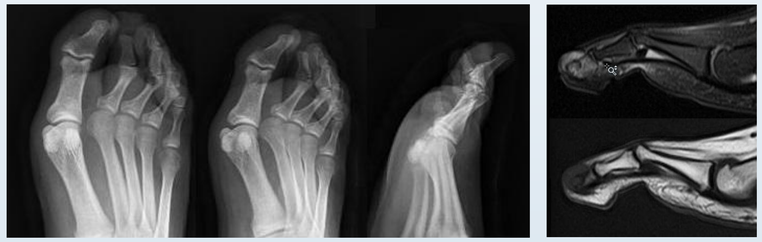

Fig 2. Pre-operative radiograph with normal appearing right second digit bony architecture. Patient MRI T1 (top) and T2 (bottom) sagittal image measuring approximately 1.3cm x 1.2cm with a sclerotic margin.

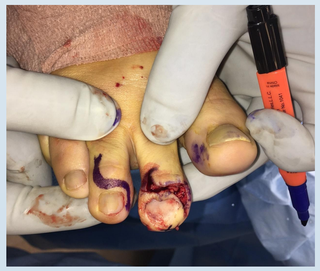

Fig 3. Intra-op clinical photo. The second toenail was first avulsed. The second digit was dissected to remove the distal phalanx with tumor in toto. Third digit with represented surgical incision lazy-S approach.

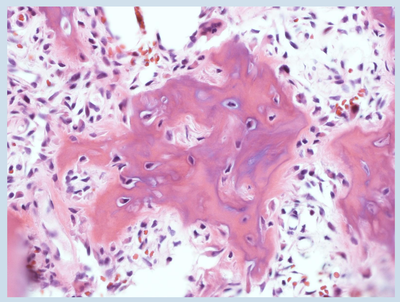

Fig 4. High power views of the nidus area. In normal bone, a thinner rim of osteocytes along the pink region should be appreciated. As seen in this figure, more cells are present indicating that there the bone is currently trying to replace the sclerotic bone with regular bone. It is noted that in healthy bone, that the sclerosis should be smaller and thinner. This abnormality is indicative of osteoid osteoma.

Discussion

This case study shows an excised medullary OO tumor of the distal phalanx. In cases of the distal phalanx, the nail may have an altered appearance such as a watch-glass deformity, hypertrophic nail bed, or digital clubbing which is seen in both the foot and hand.[5–7] OOs are classified based on location: subperiosteal, cortical, endosteal, or medullary.[8] It is suggested that cortical, medullary, and endosteal stem from the subperiosteal location.[8]

There is an increased vascularity of the OO nidus resulting in prostaglandins levels 100 to 1000 times greater in the nidus than that of normal tissue.[4] This high level induces vasodilation and increases capillary permeability in the tissues causing pain that often responds to NSAIDs as a main conservative treatment.[8] However, surgical procedures are often performed to eradicate the tumor. This can include both open excision (e.g., excision in-toto or curettage with filling by graft) and percutaneous (e.g, resection, ethanol injection, radiofrequency ablation, and laser photocoagulation) techniques.[1,5] Of these options, the gold standard is surgical excision of the nidus which typically results in termination of pain.[1,8]

When diagnosing an OO, differentials can include epidermal inclusion cyst, glomus tumor, intracortical hemangoma, chrondrablastoma, enchondroma, and osteoblastoma.[1,9] Often times, the OO is accompanied with an inflammatory process within the bone making it important to rule out infection (i.e., acute osteomyelitis) through lab testing (e.g., CBC, ESR, CRP).[9] Unilateral versus bilateral nail presentation is important to help rule out a systemic disease (i.e., inflammatory, rheumatological). Although there are many clinical exam findings, pathological evaluation of the lesion allows for a true diagnosis as shown here.

OO is most often found in the long bones of the body with approximately 50% of cases intra-articular or juxta-articular in femur and tibia.[10] Pedal incidence ranges from 3-11% with the phalanges between 2-4.8% of cases.[6] Ebrahimzahad et al (2009) reported on a similar presentation and their literature review found only 9 other instances in the literature specifically for a distal phalangeal OO.[6]

In this case, after advanced imaging suggesting a tumor process, surgery was offered to the patient/family. The decision to excise the entire phalanx was made due to wanting to remove the entire tumor. With the distal phalanx being so small, there was fear of leaving residual tumor in wanting to also save bone. Furthermore, a total nail avulsion was performed in hopes that the new nail would grow normally without the influence of the altered phalanx and tumor propagating nail deformity. Although conservative treatments may help to mask the pain, the continued presence of the nidus results in lasting pain until excision. Through clinical diagnosis and pathological examination, the diagnosis of OO with appropriate treatment can result in a pain free patient as shown here.

Citations available upon request.