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Case Report

Osteoid osteomas around the ankle managed with cost-effective and clinically efficient percutaneous drilling resection: a case report of two cases in the talus and distal tibial epiphysis

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ABSTRACT

Osteoid osteoma (OO) is a benign bone tumour characterised by constant pain which is worse at night and relieved by NSAIDs. On imaging, it is seen as a well demarcated rounded osteolytic lesion with a central nidus. It is rarely seen around the ankle joint, and it is easy to miss on primary plain radiographs, especially in children, leading to mid- or delayed diagnosis which is highlighted in this case report. Conservative management with NSAIDs and immobilisation is usually the first line of management. Upon failure of medical treatment, there are various surgical options ranging from open resection to minimally invasive image guided procedures. We present 2 cases of sub-periosteal OO around the ankle- one in the talus and other one in the distal tibial epiphysis. The first case is of a 17-year-old girl, was initially misdiagnosed on plain radiographs and magnetic resonance imaging (MRI) as right ankle synovitis elsewhere and treated with open synovectomy and debridement. She presented to us 4 months after the procedure with incessant right ankle pain not allowing her to perform her routine activities. The second case describes OO in the distal tibial epiphysis of the left ankle in a 12-year-old male child presenting with typical left hind foot pain. We managed both the OO with percutaneous drilling resection (PDR) under computed tomography (CT) guidance with complete resolution of symptoms and full weight bearing within 48 hours. A six-month follow-up reported birth children back to schooling and routine activities with a completely pain free ankle joint. OO around the ankle requires a high index of suspicion. Early diagnosis is often obscured by vague symptoms and complex anatomical location around the ankle. CT scan is considered to be the gold standard; effusion and peri-lesional edema masks the lesion on MRIs. PDR is a cost effective and easy surgical option producing consistent results with low rates of recurrences.

Keywords: Osteoid osteoma, Talus, Distal tibia, Nocturnal ankle pain, Percutaneous drilling resection

INTRODUCTION

Osteoid osteoma (OO) was originally described by Jaffe in 1935 as a 'benign osteoblastic proliferation of osteoid and atypical bone, generally occurring in younger adults and more common in males.[1] It is typically seen in the age group of 5-25 years, accounting for 10 to 14% of benign bone tumours.[2] OO are most commonly seen in the diaphysis and meta-diaphysis of long bones, particularly femur and tibia, but have also been scarcely reported in humerus, spine, pelvis, foot and ankle.[3]

The characteristic complaint of children with OO is constant, dull-aching pain not related to activity, which worsens at night. Most OO are small lesions which consist of a highly vascularised nidus surrounded by sclerotic bone with a narrow zone of transition composed of fibro-vascular tissue. The night pain is postulated to be due to increased production of prostaglandins namely prostaglandin E2 (PGE2) and cyclooxygenase (COX-1 and COX-2) in this nidus which in turn causes arteriolar dilatation and stimulation of the unmyelinated nerve fibres responsible for pain sensation.[4] The medical management, therefore, mainly consists of non-steroidal anti-inflammatory drugs (NSAIDs) which provides symptomatic pain relief but does not change the characteristics of the lesion.[5] On plain radiographs, OO appears as a small radiolucent central zone (<1.5 cm) and surrounding osteosclerosis. Due to its inconspicuous nature and complexity of the anatomy in peri-articular regions, it is often missed and further imaging with computed tomography (CT) or magnetic resonance imaging (MRI) is usually needed.[6] Medical management with NSAIDs constitutes the first line of management which brings about pain improvement in about 64% of cases.[7]

Immobilisation of the affected limb helps to prevent aggravation, although not very practical in children. Failure of medical management opens up surgical options like curettage, en-bloc resection with bone grafting, radio frequency ablation (RFA), percutaneous CT guided drilling (PDR) among others.

We present two cases of OO around the ankle- one in the talar neck and the other in the distal tibial epiphysis treated by CT guided percutaneous drilling with a 6.5 mm cannulated drill bit.

CASE REPORTS

Case 1

A 17-year-old female presented with a 3-month history of right ankle pain. The pain predominantly aggravated at night and was relieved partially with NSAIDs. The patient was otherwise healthy and developmental milestones appropriate for age. She did not have any other joint pain, denied any history of trauma and had no history of fever, weight loss, loss of appetite. She gave a history of similar complaints 4 months ago for which she had consulted a specialist elsewhere. Imaging with plain radiographs were inconclusive and further investigations with MRI showed synovial thickening with effusion in the joint. She was posted for synovectomy and debridement of right ankle. Her symptoms partially improved on subsequent follow-up visits, but she presented to us after 4 months with persistent pain affecting her activities of daily living (ADL). Blood reports were all within normal limits including infectious parameters (erythrocyte sedimentation rate and C-reactive protein). The patient had tenderness on antero-medial aspect of right talus with mild effusion of the ankle. The range of movement at the ankle joint was painful and restricted, with 20° of active dorsiflexion and 40° of active plantar flexion on presentation. Movements at the sub-talar joint were free and painless. A fresh plain radiograph was ordered (Figures 1A and B), computed tomography (CT) and magnetic resonance imaging (MRI) scans (Figure 2A-C and 3A and B respectively) were repeated. A diagnosis of OO of talar neck was made and she was planned for CT guided PDR.

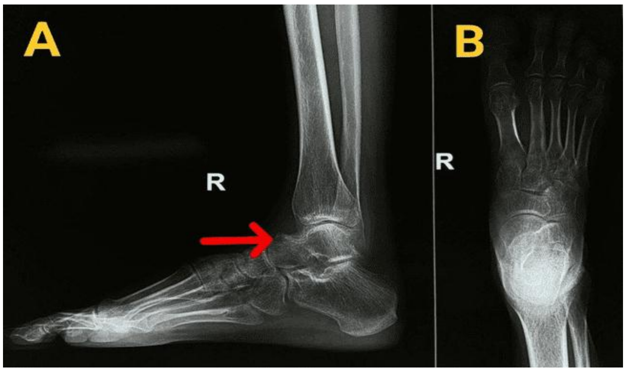

Figure 1: Plain radiograph of right ankle in (A) antero-posterior, and (b) lateral views: an ovoid circumscribed radiolucent lesion is seen in the dorsal talar neck.

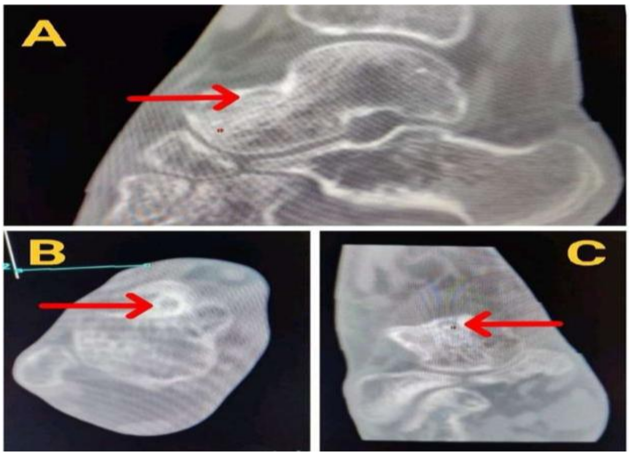

Figure 2: Computed tomography scan of the right ankle in (A) sagittal, (B) axial and (C) coronal views: it shows a well demarcated, hypodense, sub-periosteal lesion in the antero-medial part of dorsal talar neck with a sclerotic rim. The central nidus is well defined with intra-lesional calcification.

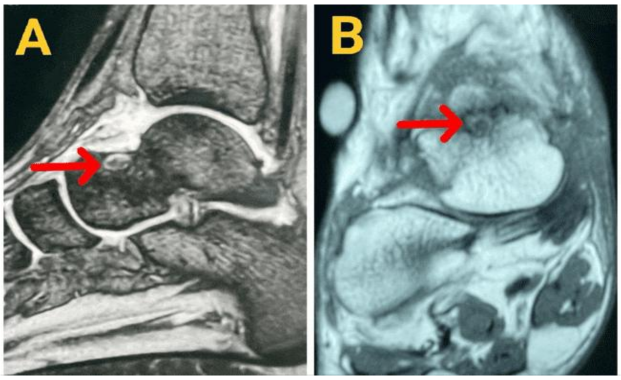

Figure 3: MRI of the right ankle with T2-weighted (A) sagittal and (B) T1 weighted axial: it shows a well-defined lesion with a narrow zone of transition with surrounding reactive bone showing marrow edema. Effusion is noted in the tibia-talar joint.

Case 2

A 12-year-old male presented similarly with left hind foot pain for 3 months. Pain was almost exclusively nocturnal. He was initially started on a course of NSAIDS for 2 weeks and given a walking boot. There was no history or trauma or any other inciting event. With physiotherapy his symptoms seemed to abate under the cover of NSAIDS, allowing him to sleep well and walk around the house pain free. On a three-week follow-up, he was back to his day 1 level of pain which was disabling not allowing him to play, especially hop, freely.

Diffuse tenderness was elicited over the posterior joint line of left ankle. Passive plantar flexion beyond 30° was painful. The foot was neurovascularly intact and had 5/5 motor strength at tibi-talar and sub-talar joints except in PF and eversion which were restricted due to pain. Plain radiographs were inconclusive (Figure 4A and B). Further imaging with MRI (Figure 5A and B) and CT (Figure 6A and B) scans revealed a well demarcated osteolytic lesion in the posterior distal tibial epiphysis.

Figure 4: Plain radiographs of left ankle in (A) antero-posterior and (B) lateral views.

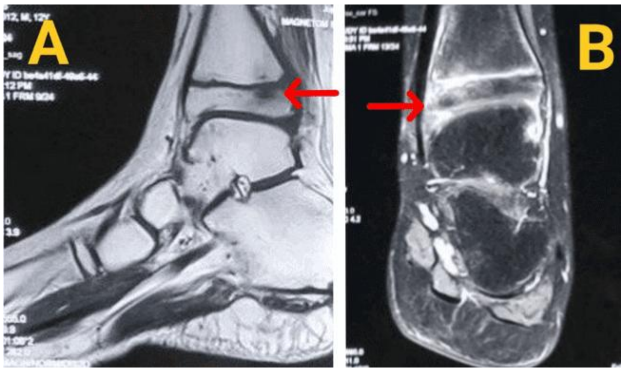

Figure 5: Magnetic resonance imaging of left ankle in (A) T1 weighted sagittal and (B) T1 weighted fat-suppressed coronal views.

Both modalities localise the OO in the posterior distal tibial epiphysis. A characteristic nidus of about 7 mm with surrounding osteosclerotic reaction is seen. CT scan shows a well demarcated lytic lesion as compared to MRI where the lesion is obscured with peri-lesional edema and effusion.

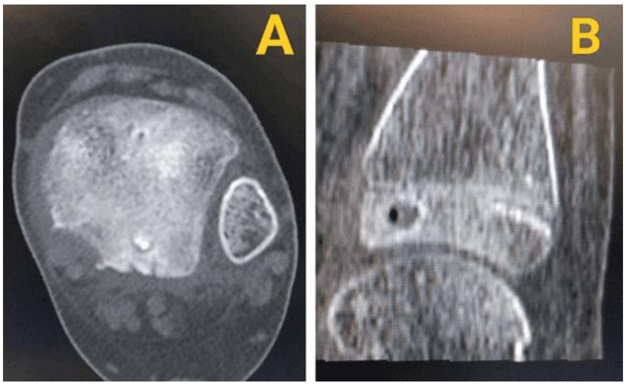

Figure 6: Computed tomography scan of left ankle in (A) axial and (B) sagittal cuts.

A CT guided PDR was planned. Both the cases were done under regional spinal anaesthesia. Under all aeseptic precautions, the ankle was scrubbed, painted and draped. The consulting anaesthetist monitored the procedure throughout in the CT console room. A 2 mm guidepin was initially inserted in the lesion under CT guidance and confirmed in all 3 planes (Figure 7A and B). Thereafter, a 6.5 mm drill-bit was used to ream out the OO. The intra-lesional material was sent for histopathological analysis which confirmed the diagnosis in both the cases. Patient had no restriction of range of motion in the ankle assessed as early as day 1 of post-operative period (Figure 8).

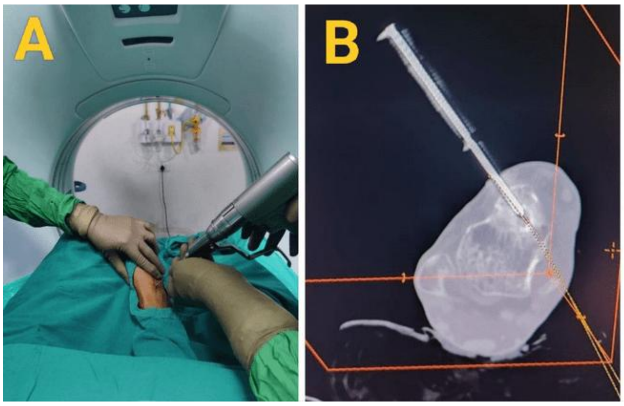

Figure 7: (A) Clinical photograph in the computed tomography scan console room and (B) axial CT cuts confirming the position of the 6.5 mm cannulated drill bit over guide-wire passed to the level of the nidus.

After surgery, both patients had immediate resolution of symptoms within 48 hours. Full weight bearing was permitted with no requirement for any orthotic and the recovery was subsequently uneventful. At a six-month followup, both of the patients were completely pain free back to their routine activities and schooling.

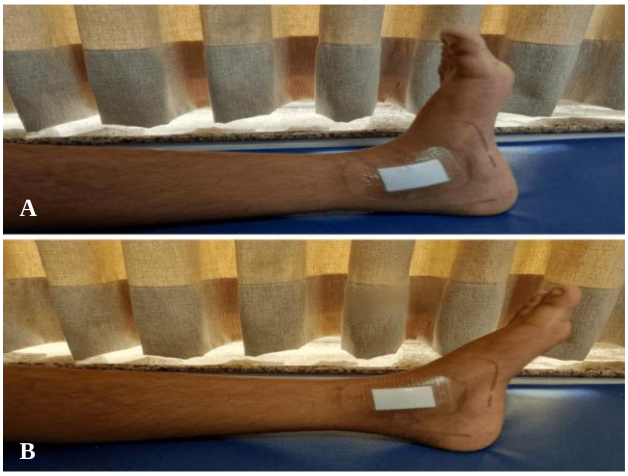

Figure 8 (A and B): Immediate post-operative clinical photograph shows good functional range of motion. The patient was ambulatory with full weight bearing within 48 hours of the PDR.

DISCUSSION

OO occur very infrequently around the foot and ankle present unique challenges due to the complex anatomy and peri-articular location of the lesion. Diagnosis can be particularly difficult with its location near the joint producing symptoms like synovitis, muscle spasms, restriction of movement mimicking trauma or arthritis.[6] Other differentials include osteoblastoma, osteomyelitis and stress fracture. Although histologically similar, osteoblastomas usually have a size >2 cm. Presence of fever and discharging sinus tract point towards osteomyelitis. Stress fractures have a typical history of repetitive low intensity trauma seen in gymnasts and athletes and can be detected on an MRI with cortical breaks and presence of marrow edema.

OO are classified according to their location as cortical (75%), cancellous (20%) and subperiosteal (5%). When around the ankle they are mostly cancellous and subperiosteal and exhibit minimal periosteal reaction. Plain radiographs are seldom helpful around the ankle, and CT scan is the investigation of choice. MRI is less accurate than CT as marrow edema masquerades the features of the tumour. CT scan can also help differentiate between Brodie's abscess, eosinophilic granuloma and Ewing's sarcoma. As seen in our first case, the child was managed surgically as MRI only showed ankle effusion with synovitis and only a CT done for unremitting pain confirmed the presence of an OO. Hosalkar et al concluded that MRI was only 3% accurate, while CT was 67% accurate in diagnosing OO.[7] Bone scintigraphy shows a central hot area surrounded by low uptake in the peri-lesional reactive bone giving it the characteristic 'double density sign' or the 'target sign'.[8]

The natural course of OO runs on for several years, and hence prolonged use of NSAIDs is discouraged due to their side-effect profile. Conventional open techniques are slowly falling out of favour due to risk of complications like iatrogenic fractures, neurovascular injury, surgical site infection and increased morbidity in case of bone grafting due to prolonged immobilisation. CT guided RFA has gained popularity with success rate as high as 90% while the recurrence rate is 10-15%. However, deterrents like high cost, risk of thermal damage to cartilage and nearby neurovascular structures especially in OO in phalanges still remain. MR-HIFU is a needle free thermal ablation procedure which is even less invasive producing better results as compared to RFA.[9] Percutaneous drilling resection (PDR) under CT guidance is a cost-effective method which can be performed with routine orthopaedic instruments and produces eradication and recurrence rates comparable to RFA. One major advantage of PDR over RFA is the ability to obtain specimen for histopathological evaluation. Mandar et al in a series of 33 patients reported complete resolution of symptoms within 3 days with an average procedure cost of ₹43,052.[10]

CONCLUSION

OO around the ankle are rare entities with a clinical presentation which can often be misleading. CT scan remains the investigation of choice. Conservative management with NSAIDs should be reviewed in failure of subsidence of pain. Surgical options are many and offer success rate close to 97%, of which PDR is a low cost, highly effective management option.

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