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Chronic ankle pain in an adolescent with flat foot and undiagnosed osteoid osteoma: implications for rehabilitation assessment and management - a case report

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Case Report

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Chronic ankle pain in an adolescent with flat foot and undiagnosed osteoid osteoma: implications for rehabilitation assessment and management - a case report

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Keywords: adolescent; ankle pain; pes planovalgus; osteoid osteoma;

Abstract

Background: Chronic ankle pain in adolescents has a broad differential diagnosis. Although symptomatic pes planovalgus is common, an apparent structural deformity may not fully explain the pain. Osteoid osteoma (OO), a benign bone-forming tumor that primarily affects adolescents and young adults, can be difficult to diagnose in the foot and ankle because its clinical and imaging features may be atypical.

Case presentation: A 17-year-old male presented with progressive right ankle and lower-limb pain. Initially attributed to symptomatic pes planovalgus, the pain was treated conservatively and then with corrective foot and ankle surgery. Postoperatively, it persisted and worsened, evolving from activity-related pain to sharp, intermittent pain with marked nocturnal exacerbation. A tibial nerve block provided no relief, while diclofenac partially reduced the pain. MRI revealed an approximately 8 × 4 mm cortical nodule in the lateral distal tibia with surrounding marrow edema. Retrospective review of postoperative CT identified a subtle corresponding cortical abnormality. The lesion was excised; pathology information provided by the family was consistent with OO. At follow-up, the patient reported complete pain resolution and return to normal daily activities.

Conclusion: An obvious foot deformity may distract from a coexisting, occult osseous source of pain. Persistent or worsening pain after orthopedic treatment, particularly when its character changes, warrants diagnostic reassessment and review of prior imaging. OO should be considered in adolescents with chronic ankle pain, especially when nocturnal pain and partial NSAID response are present, though neither feature is diagnostic.

Keywords: Osteoid osteoma; Pes planovalgus; Chronic ankle pain; Adolescent;

Background

The differential diagnosis of foot and ankle pain in children and adolescents is broad and includes tendon and ligament disorders, structural deformities, tarsal coalition, inflammatory diseases, neuropathic pain, stress injuries, and benign or malignant bone lesions. Symptomatic pes planus and foot valgus deformity are relatively common in pediatric foot and ankle practice. However, an obvious structural abnormality is not necessarily the sole cause of pain in an individual patient [1, 2].

Osteoid osteoma (OO) is a benign osteogenic tumor that mainly affects adolescents and young adults. Its typical clinical presentation includes nocturnal pain and pain relief after treatment with salicylates or nonsteroidal anti-inflammatory drugs (NSAIDs). However, OO involving the foot and ankle may present with atypical clinical and imaging features, which can make diagnosis challenging. A systematic review of 223 patients with foot and ankle OO reported nocturnal pain in 69% of patients and a response to NSAIDs in 72%. The authors concluded that computed tomography (CT) was generally more useful than magnetic resonance imaging (MRI) for identifying the nidus, whereas MRI might predominantly demonstrate secondary bone marrow edema, joint effusion, or soft-tissue changes without clearly visualizing the nidus itself [3]. A multicenter cohort study similarly found that CT identified a typical nidus more frequently than MRI, with detection rates of 86.2% and 50%, respectively [4].

Previous case reports have described OO of the foot or ankle being mistaken for chronic ankle pain, synovitis, arthritis, or sports-related injury [5–8]. To the best of our knowledge, no previously reported case closely resembles the clinical course described here: an adolescent with symptomatic pes planovalgus underwent structural correction of the foot and ankle but continued to experience pain. Further evaluation was subsequently performed because the pain phenotype changed and the postoperative

recovery did not follow the expected course, ultimately leading to the diagnosis of OO of the distal tibia.

This case illustrates how an obvious foot deformity may lead to diagnostic anchoring and obscure another independent osseous source of pain. It also highlights the importance of monitoring changes in pain phenotype, reconsidering previous imaging in light of new clinical information, and reassessing the diagnosis when postoperative pain persists or worsens unexpectedly.

We report the clinical course of this patient and discuss the diagnostic challenges that may arise when a structural foot deformity coexists with a second potential source of pain. We also discuss clinical features that may indicate the need for further investigation during pain management and rehabilitation.

Case presentation

Initial orthopedic assessment and treatment

A 17-year-old male began to experience progressive pain in the right lower limb and ankle in approximately April 2019. Initially, the pain was primarily localized to the lateral aspect of the right ankle. It was mainly activity-related, worsened with increased activity, and occasionally extended proximally to the calf region above the Achilles tendon. The symptoms improved with rest. Over time, the pain became sharper and intermittent, and nocturnal exacerbation became increasingly prominent.

Because of persistent pain in the right ankle and lower limb, the patient visited a local hospital in October 2019. According to the patient, a physician at that hospital diagnosed pes planus and attributed the pain to abnormal arch function. The patient subsequently received physical therapy and orthotic treatment at that hospital for approximately 7 months. However, the outpatient records and imaging studies from that period were not available for review. Based on the patient's recollection, these treatments did not relieve his symptoms.

The patient later reported that the painful area had expanded and mainly involved the lateral aspect of the right calf, the lateral malleolus, and the sinus tarsi region. He also experienced ankle instability and repeatedly sprained the ankle while walking. The pain frequently occurred at night and interfered with sleep. He did not report burning pain, a feeling of heaviness, intermittent claudication, or a cotton-wool sensation in the feet.

In July 2023, the patient presented to the Foot and Ankle Surgery Department of another hospital. At that time, he reported a maximum visual analog scale (VAS) pain score of 5–6 out of 10. Physical examination and gait assessment showed a low medial longitudinal arch, right hindfoot valgus, and collapse of the medial arch. Tenderness

was present over the posterior and anterolateral aspects of the right ankle. Ankle dorsiflexion was 0° and plantarflexion was 30°. The Silverskiöld test was positive. The range of motion of the subtalar joint was normal. The dorsalis pedis and posterior tibial pulses were normal, and distal motor and sensory function was intact.

On July 14, 2023, preoperative foot radiographs and CT were obtained. The examinations demonstrated talonavicular subluxation, acquired foot valgus, posterior tibial tendinitis, and findings associated with ankle impingement. No lesion considered diagnostic of OO was reported. Based on the clinical examination and imaging findings, the treating clinicians considered the patient's symptoms to be primarily related to chronic mechanical dysfunction of the foot and ankle.

On July 22, 2023, under general anesthesia, the patient underwent arthroscopic excision of the right posterior ankle os trigonum, sinus tarsi debridement, excision of an anterior ankle osteophyte, medial displacement calcaneal osteotomy, and Cotton osteotomy with iliac crest bone grafting. The surgical objectives were to correct the foot valgus deformity, improve the alignment of the medial arch, and reduce further mechanical stress on the posterior tibial tendon. Excision of the os trigonum and intra-articular adhesiolysis were also intended to improve the patient's pain.

However, the patient's pain did not improve as expected after surgery and instead worsened. Within 1 week after surgery, the reported VAS score was 6–7, and daily activities were substantially affected. Postoperative anteroposterior and lateral foot radiographs obtained on July 29, 2023, showed improved arch alignment and improvement of the right flatfoot deformity compared with the preoperative findings. One month after surgery, postoperative CT showed correction of the talonavicular subluxation and improvement of the imaging features associated with ankle impingement.

Because the patient's pain persisted despite orthopedic treatment, he was referred to the Pain Management Department of our hospital.

Pain management assessment

The patient was evaluated in the Pain Management Department on November 5, 2023. He continued to experience pain in the right ankle and lower limb. Compared with the initial presentation, the pain had gradually changed from predominantly activity-related pain to sharper, intermittent pain with more prominent nocturnal exacerbation.

Skin sympathetic response testing was performed on November 8, 2023. Electrophysiological examination showed normal conduction velocities and amplitudes in the sciatic, common peroneal, and tibial nerves. The F-waves and H-reflexes were

also normal. Lumbar MRI and ultrasonography of the common peroneal nerve showed no obvious abnormalities.

Because of the sharp and intermittent nature of the pain, a neuropathic pain component was initially considered. The patient was treated with pregabalin extended-release capsules at a dose of 75 mg orally twice daily for 3 weeks. No clinically meaningful improvement was observed.

Because pregabalin is not effective for all types of neuropathic pain, the lack of response could not by itself exclude a neuropathic mechanism. Nevertheless, in combination with the normal electrophysiological findings, the likelihood of a typical peripheral nerve entrapment syndrome appeared to be reduced.

For further evaluation, a right tibial nerve block was performed on November 15, 2023. No corticosteroid was administered; 5 mL of 0.1% lidocaine was used for diagnostic and therapeutic assessment. The nerve block did not provide effective pain relief. In contrast, oral diclofenac sodium at a dose of 75 mg once daily reduced the patient's pain. Overall pain intensity decreased by approximately 50%, and the reported VAS score decreased to 3–4. In particular, the patient's nocturnal rest pain improved, and he reported better sleep.

Because of the persistent pain after orthopedic treatment, the gradual development of nocturnal pain, the lack of clear benefit from the nerve block, and the improvement after NSAID treatment, further imaging was performed to exclude an occult bone lesion, including OO.

Two radiologists with experience in musculoskeletal imaging, neither of whom had participated in the patient's initial treatment, retrospectively reviewed the imaging studies obtained before and after surgery in the Foot and Ankle Surgery Department. On the ankle CT obtained approximately 1 month after surgery, both radiologists identified focal lucency or cortical irregularity involving the lateral cortex of the distal tibia. They recommended MRI of the right ankle for further evaluation.

On November 24, 2023, MRI of the right ankle was performed. The examination showed an approximately 8 × 4 mm cortical nodule in the lateral aspect of the distal right tibia, with surrounding bone marrow edema. The imaging findings raised the possibility of OO. On December 1, 2023, the patient was discharged from our department and referred for further orthopedic evaluation and treatment of the distal tibial lesion.

Subsequent orthopedic surgery and follow-up

After discharge from our department, the patient was treated in the Orthopedics Department of another hospital. On February 11, 2024, he underwent excision of a

lesion in the distal tibia that was suspected to represent OO.

The patient's family provided a typed transcript of the formal pathology report. The report stated:

"Microscopically, irregular woven bone trabeculae were seen, lined by active osteoblasts, with vascularized connective tissue between the trabeculae. Reactive sclerotic bone was present at the periphery of the lesion. The above findings are consistent with the pathological changes of osteoid osteoma."

The hospital that performed the procedure did not provide the original histopathological images. Therefore, the pathological findings could not be independently reviewed by our research team.

During telephone follow-up on September 14, 2024, the patient's family reported that the patient's pain had completely resolved after the second surgery and that he had resumed normal daily activities. No standardized pain score, functional scale, follow-up imaging, or direct clinical examination was available at that time.

Clinical timeline

The clinical timeline is presented in Table 1.

Discussion

Coexistence of structural deformity and a second potential pain source

The initial orthopedic diagnosis was clinically understandable. The patient had collapse of the medial longitudinal arch, hindfoot valgus, talonavicular subluxation, limited ankle motion, imaging features associated with ankle impingement, and recurrent ankle sprains. These findings could cause chronic mechanical foot and ankle pain and were consistent with his early presentation, which was predominantly activity-related. Therefore, the initial consideration of symptomatic pes planovalgus as an important source of pain was not unfounded.

However, after structural correction of the foot and ankle, the patient's alignment and several imaging abnormalities improved, whereas his pain did not decrease as expected and instead worsened. This discrepancy between the postoperative structural findings and the clinical course suggested that the original structural abnormality might not have accounted for all of his symptoms.

Subsequent MRI demonstrated a small cortical lesion in the lateral aspect of the distal tibia, accompanied by surrounding bone marrow edema. In combination with the gradual development of nocturnal pain, partial improvement after diclofenac treatment,

and the family's report of complete pain relief after lesion excision, these findings suggest that symptomatic pes planovalgus may have coexisted with another osseous source of pain.

The foot deformity may have caused some of the patient's early mechanical symptoms while also drawing attention away from the distal tibial lesion. Nevertheless, the discovery of the lesion does not establish that the initial orthopedic surgery was inappropriate or unnecessary. The patient had genuine structural abnormalities that could have contributed to mechanical symptoms.

This case emphasizes that a visible structural abnormality does not necessarily represent the sole source of pain. Similarly, improvement in alignment after corrective surgery does not by itself demonstrate that all pain generators have been addressed. When pain persists, worsens, or becomes inconsistent with the expected postoperative course, the original diagnosis should be reassessed and the possibility of a second pain source should be considered.

Significance of changes in pain phenotype

The pain phenotype changed considerably during the patient's disease course. Initially, the pain was mainly induced by activity and relieved by rest, which was compatible with mechanical foot and ankle pain. Later, the pain became sharper and intermittent, with prominent nocturnal exacerbation and sleep disturbance. A transition from activity-related pain to rest pain or nocturnal pain should prompt reconsideration of whether the initial diagnosis adequately explains the entire clinical picture.

Nocturnal pain is a common feature of OO, but it is not specific. It may also occur in other bone lesions, inflammatory disorders, and chronic pain syndromes. Therefore, nocturnal pain should not be regarded as diagnostic of OO in isolation. It should be interpreted together with the pain distribution, physical examination, imaging findings, and changes over time.

In this patient, diclofenac reduced the pain, particularly the nocturnal rest pain, and improved sleep. This response provided a supportive clue that prompted further investigation of a possible osseous pain source. The pain associated with OO has been related to the nidus, surrounding nerve fibers, and increased local prostaglandin activity, among other mechanisms[9-11]. These factors may explain why some patients respond to NSAIDs.

However, the total duration and exact conditions of diclofenac treatment could not be reconstructed reliably in this case. Its effect therefore cannot be considered the result of a standardized therapeutic trial or used as an independent diagnostic test.

Likewise, the lack of sustained benefit from pregabalin and the tibial nerve block does not prove that neuropathic pain was absent. The effectiveness of pregabalin varies among different neuropathic pain conditions, and the response to a nerve block may be influenced by the block target, technical accuracy, and underlying pain mechanisms.

In this case, the normal electrophysiological findings, the absence of an obvious abnormality involving the neural structures, the lack of sustained benefit from the nerve block, the evolution of the pain phenotype, and the MRI findings should be interpreted together. None of these findings should be considered independently sufficient to exclude a particular pain mechanism.

Retrospective identification of a postoperative CT abnormality

A notable feature of this case is that retrospective review suggested that the postoperative CT obtained on August 22, 2023, might already have shown a subtle focal cortical abnormality in the lateral aspect of the distal tibia. The location was approximately consistent with the cortical lesion subsequently identified on MRI in November 2023. The CT finding may therefore have represented an early imaging correlate of the lesion later recognized.

However, this finding should not be described as definitive evidence that OO was clearly diagnosed on the earlier CT and then missed. The abnormality was recognized only after subsequent MRI had raised the possibility of OO, and the interpretation was therefore subject to hindsight bias.

In addition, the complete original CT data, scan coverage, slice thickness, reconstruction parameters, and contemporaneous radiology report were not fully available. The images were not subjected to an independent blinded review by a separate group of musculoskeletal radiologists. Consequently, it cannot be determined whether the abnormality had sufficient specificity at the time of the original examination to support a reliable diagnosis of OO.

Several factors may have contributed to the abnormality not being recognized initially. First, the primary purpose of the postoperative CT may have been to evaluate the osteotomies, postoperative alignment, bone graft, and structural correction rather than to identify a small cortical lesion in the distal tibia. Second, the lesion was small and may initially have appeared only as focal cortical lucency, cortical irregularity, or a tiny cortical defect, without a typical nidus or prominent surrounding sclerosis. Third, postoperative changes and local remodeling may have reduced the visibility and specificity of the abnormality. Finally, the presence of symptomatic pes planovalgus provided a plausible explanation for the patient's pain and may have contributed to diagnostic anchoring.

The most accurate interpretation is therefore that retrospective review of the postoperative CT identified a cortical abnormality that may have corresponded to the lesion later recognized on MRI. The clinical significance of this abnormality was not appreciated at the time, and it cannot currently be established that the lesion could have been definitively diagnosed as OO on the basis of the earlier CT alone.

Despite this limitation, the finding has educational value. When postoperative pain persists or changes over time, previous imaging should be reassessed in light of the current pain location, pain phenotype, and clinical question. Imaging re-review may reveal previously unrecognized clues, but retrospective findings must be interpreted cautiously and in the context of the original image quality, scan coverage, reconstruction parameters, and potential hindsight bias.

Imaging challenges in foot and ankle OO

The diagnosis of OO in the foot and ankle may be more difficult than the diagnosis of typical lesions in the long bones. Lesions in this region may be small, juxta-articular, intracortical, located in cancellous bone, or subperiosteal. They may also lack a prominent periosteal reaction or surrounding sclerosis.

When the lesion is close to the ankle joint, secondary bone marrow edema, joint effusion, synovial reaction, and soft-tissue abnormalities may further complicate the imaging appearance. These reactive changes may lead to an incorrect impression of arthritis, synovitis, tendinopathy, or other periarticular disorders.

In the present case, MRI demonstrated an approximately 8 × 4 mm cortical nodule in the lateral aspect of the distal tibia, surrounded by bone marrow edema. The finding increased the suspicion of OO. However, MRI cannot replace pathological assessment or comprehensive clinical and imaging interpretation. MRI may demonstrate the reactive changes surrounding the lesion more clearly than the nidus itself.

CT is generally useful for detecting small cortical nidi. Nevertheless, its diagnostic value depends on scan coverage, spatial resolution, slice thickness, reconstruction technique, lesion location, and the clinical context in which the images are interpreted. In this case, the retrospective CT abnormality was approximately consistent with the location of the lesion seen on subsequent MRI. However, because the complete original imaging data were not available and no independent blinded review was performed, the CT abnormality cannot be considered definitively diagnostic.

Accordingly, it is more appropriate to state that the previous CT may have contained an imaging clue to a lesion that was recognized later, rather than stating that OO was clearly present and definitively missed on the original examination.

Differential diagnosis of painful pes planovalgus

The differential diagnosis of painful pes planovalgus in adolescents is broad. In addition to pain caused by the structural deformity itself, possible diagnoses include tarsal coalition, posterior tibial tendon dysfunction, Achilles tendon or gastrocnemius contracture, ankle or subtalar impingement, osteochondral injury, stress injury, tendon disease, peripheral nerve entrapment, inflammatory or infectious disease, complex regional pain syndrome, and benign or malignant bone lesions.

In this patient, the subtalar joint had a normal range of motion, and the available foot imaging did not show a definite osseous, cartilaginous, or fibrous coalition between the talus and calcaneus. Therefore, no imaging evidence of talocalcaneal coalition was identified. However, based on the available data, it would be more rigorous to state that there was no imaging evidence of talocalcaneal coalition rather than that the condition was completely excluded.

This case suggests that clinicians should avoid attributing all symptoms to the appearance of the foot or to the most obvious abnormalities on foot imaging. Further diagnostic reassessment should be considered when:

- pain does not improve as expected after structural correction;
- pain changes from activity-related pain to rest pain or nocturnal pain;
- the pain distribution is not fully consistent with the anatomical distribution of the foot deformity;
- focal bony tenderness or other new clinical findings develop;
- previous imaging findings do not adequately explain the current symptoms; or
- NSAIDs substantially relieve nocturnal pain while other treatments provide little benefit.

These findings are not diagnostic of OO, but they may prompt consideration of an occult bone lesion.

Implications for clinical practice

This single case cannot establish a validated diagnostic algorithm or demonstrate that a particular approach reduces diagnostic delay. Nevertheless, it provides an educational framework for clinical reasoning.

First, pain phenotype should be documented longitudinally, including pain location, quality, timing, precipitating and relieving factors, sleep disturbance, and changes

during the disease course. Particular attention should be paid to a transition from activity-related pain to rest pain or nocturnal pain.

Second, postoperative structural outcomes and symptomatic outcomes should be assessed separately. Improved alignment or satisfactory healing of an osteotomy does not necessarily indicate that all sources of pain have been resolved.

Third, when postoperative pain persists or worsens, the original diagnosis should be reconsidered rather than immediately attributed to insufficient rehabilitation, increased weight-bearing, delayed recovery, or poor adherence.

Fourth, previous imaging should be reviewed in the context of the new clinical question. CT and MRI should be examined for focal cortical lucency, cortical irregularity, small cortical defects, local sclerosis, and secondary bone marrow edema. At the same time, true lesion-related findings should be distinguished from postoperative changes.

Fifth, pain relief after NSAID treatment may provide a supportive clinical clue but should not be considered a diagnostic test for OO. Decisions regarding further imaging should be based on the complete clinical course and the available imaging findings.

Sixth, when clinical suspicion persists, additional imaging should be selected according to the suspected lesion location and the quality of previous examinations. For a suspected small cortical lesion, targeted CT may assist in identifying the nidus, although radiation exposure and examination coverage should be considered.

Finally, when imaging findings suggest OO, referral to orthopedics, musculoskeletal radiology, or another relevant specialty with appropriate experience may facilitate further diagnostic evaluation and treatment.

Rehabilitation and patient communication

Chronic pain in adolescents may affect sleep, daily activities, school attendance, sports participation, and social interaction[12-14]. In patients who have undergone foot and ankle surgery but whose pain has not improved, repeatedly attributing the symptoms to insufficient rehabilitation or poor adherence may increase frustration for both patients and families and may delay evaluation of other pain sources.

When postoperative recovery is inconsistent with expectations, rehabilitation assessment and diagnostic reassessment should proceed in parallel. Clinicians should document pain intensity, sleep, activity tolerance, and functional changes, and should communicate the current diagnostic uncertainty clearly to the patient and family.

In this case, pain management involved more than medication and nerve block treatment. It also contributed to reassessment of the pain phenotype, recognition of

new clinical clues, and re-evaluation of previous imaging.

The postoperative outcome was assessed through telephone follow-up and reported by the patient's family. Although the family reported complete resolution of pain and recovery of normal daily activities after lesion excision, these outcomes were not verified using standardized pain scores, functional scales, quality-of-life measures, direct clinical examination, or follow-up imaging. Therefore, the outcome should be regarded as a descriptive report from the family rather than as a formally measured treatment effect.

Strengths and limitations

The main strength of this report is that it illustrates the diagnostic difficulty that may occur when an obvious structural abnormality of the foot coexists with another potential osseous source of pain. The case also highlights the importance of changes in pain phenotype, an unexpected postoperative course, and retrospective review of previous imaging during diagnostic reassessment.

This report has several limitations. First, it describes a single case and cannot determine the relative contributions of pes planovalgus and the distal tibial lesion to the patient's symptoms. It also cannot establish a generally applicable diagnostic pathway.

Second, the patient was treated at several medical institutions, and the available medical records were incomplete. Information regarding the initial conservative treatment, details of the first operation, postoperative rehabilitation, the second operation, and long-term follow-up was limited.

Third, the cortical abnormality on postoperative CT was identified retrospectively after subsequent MRI and lesion excision. Hindsight bias was therefore unavoidable. Complete original CT data, including scan coverage, slice thickness, reconstruction parameters, and the contemporaneous radiology report, could not be fully obtained. In addition, no independent blinded review by musculoskeletal radiologists was performed. It therefore remains uncertain whether the abnormality had definite diagnostic value for OO at the time of the original examination. A nonspecific cortical change or postoperative change cannot be excluded.

Fourth, the final operation and postoperative recovery were not directly observed by our research team. The follow-up information obtained on September 14, 2024, was based on a telephone interview with the patient's family. Formal postoperative pain scores, joint range of motion, gait assessment, sports participation, recurrence assessment, and follow-up imaging were not available.

Despite these limitations, this case suggests that when an adolescent has an obvious structural abnormality capable of explaining pain but continues to experience pain after

treatment, clinicians should reassess the presumed pain source. This is particularly important when the pain phenotype changes or becomes inconsistent with the expected postoperative course. Previous imaging should also be reviewed in the context of the patient's current symptoms.

Conclusions

This case demonstrates that an adolescent with an apparent structural deformity of the foot may also have a second occult source of pain. The patient's pain persisted after orthopedic correction of symptomatic pes planovalgus. During subsequent evaluation, the gradual development of nocturnal pain, reported improvement after NSAID treatment, and MRI findings together raised suspicion of a small cortical lesion in the distal tibia consistent with OO.

Retrospective review of the postoperative CT suggested that a subtle cortical abnormality might already have been present approximately 1 month after the first operation. However, the abnormality was not recognized at that time, and its diagnostic significance could not be independently confirmed. It may have been overlooked because the image interpretation primarily focused on postoperative alignment and healing, while the pre-existing foot deformity provided a plausible explanation for the patient's symptoms.

Persistent or worsening pain after orthopedic treatment should prompt reassessment of the presumed pain source, particularly when the clinical course is inconsistent with the expected postoperative recovery. Response to NSAID treatment may provide a supportive clue but is not diagnostic of OO. Retrospective imaging findings should be interpreted cautiously because of the risk of hindsight bias and incomplete information regarding the original examination.

In this case, the distal tibial lesion was considered radiologically consistent with OO, and the pathology report provided by the patient's family described findings consistent with OO. The patient's family subsequently reported complete resolution of pain after lesion excision.

Declarations

This manuscript reports a single human clinical case. The requirement for ethics approval was waived by the Ethics Committee of Beijing Tsinghua Changgung Hospital, Tsinghua University. (reference no.27316-6-01) Written informed consent for publication was obtained from the patient and his legal guardian. Clinical trial number： not applicable.

Consent for publication

Written informed consent for publication of the clinical details and accompanying images was obtained from the patient and his legal guardian. A copy of the written consent is available for review by the Editor.

Availability of data and materials

All data supporting the conclusions of this case report are included in the article and its supplementary materials.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

ZZ collected and interpreted the clinical data, performed the literature review, and drafted the manuscript. FL and FW conceived and supervised the report and critically revised the manuscript. GL contributed to clinical data interpretation and manuscript revision. All authors read and approved the final manuscript.

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Authors' information

Abbreviations

CT: computed tomography

MRI: magnetic resonance imaging

NSAIDs: nonsteroidal anti-inflammatory drugs

OO: osteoid osteoma

VAS: visual analog scale

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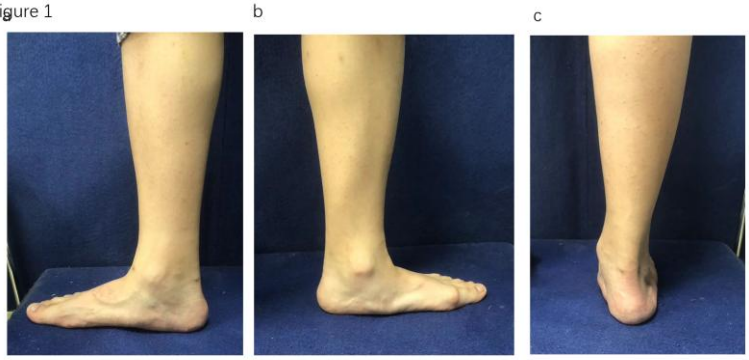
Table 1. Clinical timeline reconstructed from available records and patient-reported information.

Time point	Clinical events and available information
April 2019	Progressive right ankle and lower-limb pain began. Early symptoms were predominantly activity-related.

Before July 2023	The patient received physical therapy and orthotic treatment for approximately 7 months, with limited benefit.
July 2023	The patient was evaluated by a foot and ankle orthopedic service
	for symptomatic pes planovalgus and associated ankle and hindfoot abnormalities.
July 14, 2023	Preoperative foot radiographs and CT were obtained. No lesion was reported as diagnostic of osteoid osteoma.
July 22, 2023	Arthroscopic excision of the right posterior ankle os trigonum, sinus tarsi debridement, anterior ankle osteophyte excision,
	medializing calcaneal osteotomy, and Cotton osteotomy with iliac crest bone graft were performed under general anesthesia.
July 29, 2023	Postoperative foot anteroposterior and lateral radiographs were obtained.
August 22, 2023	Postoperative foot CT was performed.
	On retrospective review, this finding was not recognized as suspicious for osteoid osteoma at the time.
	a subtle focal cortical abnormality at the lateral distal tibia was considered potentially compatible with the later-suspected
November 5, 2023	The patient was evaluated in the pain management department because of persistent postoperative pain.
November 8, 2023	A skin sympathetic response examination was performed.
November 24, 2023	Right ankle MRI demonstrated a cortical nodule at the lateral distal tibia with surrounding bone-marrow edema.
December 1, 2023	The patient was discharged from the pain management department.
	Further orthopedic evaluation and treatment were recommended.
February 11, 2024	The patient underwent excision of the suspected distal tibial lesion at another hospital.
September 14 2024	During telephone follow-up, the patient and his family reported sustained complete pain resolution and return to normal daily activities, without known recurrence.
	The postoperative pathological report confirmed osteoid osteoma.

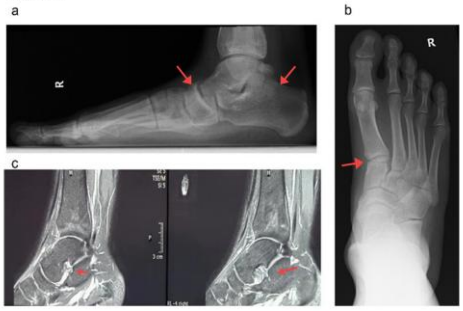
Legend

Figure 1



a. Preoperative right foot medial view; b. Preoperative right foot, lateral view
c. Preoperative hindfoot alignment view

Figure 2



a, b. Preoperative weight-bearing X-ray of the right foot
c. Preoperative MRI of the right foot (non-contrast / plain scan)

Figure 3



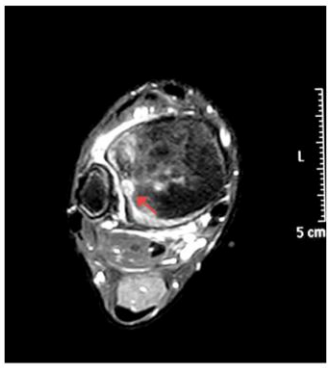
a. Postoperative 1 week, right foot lateral view (weight-bearing)
b. Postoperative 1 month, right foot lateral view (weight-bearing)
c. Postoperative 1 week, right foot lateral view (weight-bearing)
d. Postoperative 1 month, right foot lateral view (weight-bearing)

Figure 4



Postoperative 1 month, CT of the right ankle joint (non-contrast / plain scan)

Figure 5



MRI of the right ankle joint (non-contrast / plain scan)

Supplementary Files

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- Ethicsauditandapprovaldocuments.pdf