CASE REPORT

Osteoid osteoma as a cause of anterior ankle pain in a runner

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SUMMARY

We report the case of an osteoid osteoma in the dorsal talar neck of a healthy long-distance runner, masquerading as anterior ankle impingement syndrome. We discuss the diagnosis and successful treatment using percutaneous CT-guided laser photocoagulation. A concise review of the principles of the management of osteoid osteomas is also presented.

BACKGROUND

Osteoid osteoma is a benign bone tumour found in the talus in up to 10% of cases, commonly presenting with symptoms of pain, swelling and restriction of movement. In total, 97% of talar osteoid osteomas are found in the talar neck.¹

This report illustrates the case of an osteoid osteoma in the dorsal talar neck masquerading as anterior ankle impingement syndrome in a healthy long-distance runner. It highlights the need for a high index of suspicion when investigating an otherwise common pathophysiological process where the clinical findings are inconclusive; the need to look beyond the initial report of an investigation, when the symptomatology and clinical findings are not necessarily in agreement with it. Furthermore, it serves as a concise note on the principles of management of osteoid osteomas.

CASE PRESENTATION

A 30-year-old Caucasian woman was referred from a community musculoskeletal assessment service to a foot and ankle orthopaedic outpatient clinic with a 10-year history of left ankle pain, which she attributed to a fall while running. The pain was located over the anterolateral aspect of the ankle joint and was accompanied by occasional swelling. The clinical examination revealed tenderness on anterior ankle palpation but equivocal ankle impingement sign. Her active range of movement was from 10° dorsiflexion to 30° plantar flexion with pain-free movement. The other hind-foot joints were mobile and pain free with intact tendon function. Tests for ankle instability were negative.

The patient was otherwise healthy and overall able to maintain an active lifestyle, participating in running daily for an hour at a time. She had not received any treatment for her ankle pain, but had undergone an ankle MRI scan (figure 1) organised in the community by an extended scope physiotherapist; this had been reported suggesting a traumatic avulsion fracture from the dorsal talonavicular ligament.

Figure 1 Ankle MRI reported in the community as consistent with an avulsion fracture of the dorsum of the talus.

Based on the MRI report, the patient was advised to avoid high-impact sporting activities. In order to define the bony abnormality more clearly, a single photon emission CT/CT (SPECT/CT) scan (figure 2) was organised which showed the presence of high signal and a well-circumscribed sclerotic lesion with a central area of calcified tissue suspicious for an osteoid osteoma. A high-definition CT (figure 3) confirmed an osteoid osteoma at the dorsal aspect of the talar neck and she was referred to the regional multidisciplinary specialist team for bone and soft tissue tumours, which further confirmed the diagnosis and recommended local interventional radiology treatment.

INVESTIGATIONS

- Plain ankle radiographs (figure 4): no findings of any obvious loose body or arthropathy.
- Ankle MRI: anterior avulsion fracture of the dorsum of the talus with rupture of the dorsal talonavicular ligament and bone oedema.
- SPECT/CT: focal increased activity in relation to the ankle, on the scintigraphy aspect of the study. CT study consistent with a possible osteoid osteoma in the subcortical region of the dorsal aspect of the talar neck.
- CT: consistent with an osteoid osteoma in the dorsal aspect of the talar neck, measuring 9×8×6 mm.

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Figure 2 Single photon emission CT/CT scan revealing focal increased activity in relation to the ankle.

DIFFERENTIAL DIAGNOSIS

The differential diagnosis of anterior ankle pain in a runner includes:

- ▶ Anterior ankle impingement: bony or soft tissue;
- ▶ Stress fracture of the talus;
- ▶ Tendinopathy/synovitis of anterior ankle tendons;
- ▶ Degenerative changes of the ankle or talonavicular joint;
- ▶ Nerve entrapment at ankle or knee;

- ▶ Radicular spinal pain;
- ▶ Other causes including tumour.

TREATMENT

The patient underwent percutaneous CT-guided laser photo-coagulation of the osteoid osteoma (figure 5), under general anaesthesia, in a SOMATOM Sensation 64 helical multislice CT scanner (Siemens Medical Solutions, Erlangen, Germany) using a

Figure 3 CT scan consistent with an osteoid osteoma in the dorsal aspect of the talar neck.

Figure 4 Ankle radiograph with no obvious pathological finding.

Diomed (AngioDynamics) laser (805 nm, 25 W). The lesion was identified using a short spiral CT scan (120 kV, slice thickness 3 mm, kernel B70f, bony windows) and a 13 gauge Osteo-Site Ratchet Bone Biopsy system (Cook Medical, Bloomington, Illinois, USA) was used to breach the cortex and bore down to the nidus. The coaxial sheath was anchored into the cortex to provide stability to the fibre. The 400 micron core end-firing fibre was inserted into a hypodermic needle with the end of the fibre extending several millimetres from the tip of the needle. The needle was then passed down the hollow core of the coaxial sheath so that the bare fibre tip was centred in the nidus. The laser was then fired for 5 s at 10 W to coagulate the nidus and then turned down to 2.5 W for a further 590 s, giving nominal treatment energy of 1500 J. At the end of the exposure the fibre was removed and the coaxial sheath unscrewed from the cortex. Local anaesthesia was instilled to the skin and subcutaneous tissue, and a dry dressing was applied.

OUTCOME AND FOLLOW-UP

Following treatment, the patient made an uneventful recovery and within a few weeks she experienced complete resolution of the ankle pain and was eventually able to return to her sporting activity. At the yearly follow-up, the patient remained free of any ankle symptoms and had returned to regular long-distance running.

DISCUSSION

Osteoid osteoma is a benign osteogenic skeletal neoplasm, characterised by the formation of osteoid or mature bone directly by

the tumour cells.² It is the most common benign bone-forming lesion and accounts for 10–12% of all benign bone tumours and 3% of all primary bone tumours.³ This lesion has a predilection in men, with a male: female ratio of 2:1 and most commonly occurs in persons aged 5–25 years.⁴ In the majority of cases, the lesion occurs in the metaphysis and diaphysis of long bones, particularly the femur and the tibia, whereas tumours in the foot are unusual accounting for approximately 4% of the cases.⁵ The tumour is usually <1.5 cm in diameter and consists of a central area known as the nidus which is surrounded by dense sclerotic bone tissue.⁶

Osteoid osteoma typically presents with local pain that is most severe at night and can be relieved by salicylates and non-steroidal anti-inflammatory drugs (NSAIDs). The pain is thought to be due to local inflammation secondary to very high levels of prostaglandins expressed by the tumour. Depending on the location, patients may present with local swelling and tenderness, bony deformity, gait disturbances and muscle atrophy.⁶ Investigations to establish the diagnosis include plain radiographs, bone scan, MRI and CT; the latter is considered the gold standard investigation for identifying the anatomic position of the nidus and aiding in the differential diagnosis.⁷ A low-attenuation nidus with central mineralisation and surrounding sclerosis is the characteristic appearance of the lesion on thin-slice CT scan, whereas on MRI the appearance can be variable potentially leading to diagnostic errors.⁷

The high levels of prostaglandin in the nidus are considered to be the reason salicylates and NSAIDs are effective in the relief of the pain, the most striking patient complaint.⁸ When the pain is too severe or unresponsive to medication, invasive treatment options need to be considered. Surgical excision of the lesion, open or arthroscopic, has largely been replaced by use of percutaneous procedures under the guidance of imaging, most commonly CT-guided percutaneous excision, CT-guided radiofrequency ablation and CT-guided laser photocoagulation.^{9–12} Zouari *et al*¹³ investigated the technical specificities and outcome of percutaneous CT-guided laser photocoagulation in 15 cases of osteoid osteomas of the hands and feet. The vast majority of their patients experienced complete relief of the pain and no recurrence following a single laser application, leading the investigators to conclude that this treatment was effective and safe when used for hands and feet.

Anterior ankle impingement syndrome is characterised by anterior ankle pain, swelling after activity and occasionally reduced ankle dorsiflexion. The pain is considered to be caused by synovial tissue being caught between the talus and the ankle mortise; the local presence of spurs or osteophytes has been traditionally implicated in this process, limiting the tibiotalar arc

Figure 5 Treatment using percutaneous CT-guided laser photocoagulation.

Learning points

- ▶ The talus is a common location for an osteoid osteoma and may masquerade as a presentation of anterior ankle impingement syndrome.
- ▶ A high index of suspicion and correct use of imaging modalities can confirm the diagnosis.
- ▶ Percutaneous CT-guided techniques have largely replaced the use of open surgery, for the invasive management of these lesions.
- ▶ Laser photocoagulation is an effective and safe treatment modality for osteoid osteomas of the foot.

of motion.¹⁴ The diagnosis of anterior impingement is based on clinical examination, the main feature being local pain on palpation.¹⁵ Standard anteroposterior and lateral radiographs are commonly used to detect the presence of osteophytes, but these may remain undetected due to superposition of the more prominent anterolateral border of the distal tibia.¹⁶

In this case, the initial MRI report, along with the history of ankle trauma could have easily led to an inaccurate diagnosis. It, thus, illustrates the importance of careful correlation of clinical presentations to the radiological findings; a high index of suspicion and appropriate consideration of less common diagnoses is necessary, in order to avoid errors.

Contributors KT prepared the manuscript, RI performed the procedure, selected the figures and edited the article, CH reviewed the imaging and edited the article. MJO reviewed the patient, initiated the diagnostic process and edited the manuscript.

Competing interests None.

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REFERENCES

- 1 Capanna R, Van Horn JR, Ayala A, *et al.* Osteoid osteoma and osteoblastoma of the talus. A report of 40 cases. *Skeletal Radiol* 1986;15:360–4.
- 2 Greenspan A. Benign bone-forming lesions: osteoma, osteoid osteoma and osteoblastoma. Clinical, imaging, pathologic and differential considerations. *Skeletal Radiol* 1993;22:485–500.
- 3 Eggel Y, Theumann N, Luthi F. Intra-articular osteoid osteoma of the knee: clinical and therapeutical particularities. *Joint Bone Spine* 2007;74:379–81.
- 4 Cerase A, Priolo F. Skeletal benign bone-forming lesions. *Eur J Radiol* 1998;27(Suppl 1):S91–7.
- 5 Shereff MJ, Cullivan WT, Johnson KA. Osteoid osteoma of the foot. *J Bone Joint Surg Am* 1983;65:638–41.
- 6 Healey JH, Ghelman B. Osteoid osteoma and osteoblastoma: current concepts and recent advances. *Clin Orthop Relat Res* 1986;204:76–85.
- 7 Assoun J, Richardi G, Railhac JJ, *et al.* Osteoid osteoma: MRI imaging versus CT. *Radiology* 1994;191:217–23.
- 8 Kneisl JS, Simon MA. Medical management compared with operative treatment for osteoid osteoma. *J Bone Joint Surg Am* 1992;74:179–85.
- 9 David M, Legname M, Dupond M. Arthroscopic removal of an osteoid osteoma of the talar neck. *Orthop Traumatol Surg Res* 2009;95:454–7.
- 10 Amendola A, Vellet D, Willits K. Osteoid osteoma of the neck of the talus: percutaneous, computed tomography-guided technique for complete excision. *Foot Ankle Int* 1994;15:429–32.
- 11 Witt JD, Hall-Craggs MA, Ripley P, *et al.* Interstitial laser photocoagulation for the treatment of osteoid osteoma. *J Bone J Surg Br* 2000;82:1125–8.
- 12 Gao K, Hua Y, Chen S, *et al.* Arthroscopic excision of juxta-articular cancellous osteoid osteoma in the talar neck. *Knee Surg Sports Traumatol Arthrosc* 2013;21:1300–3.
- 13 Zouari L, Bousson V, Hamze B, *et al.* CT-guided laser photocoagulation of osteoid osteomas of the hands and feet. *Eur Radiol* 2008;18:2635–41.
- 14 Biedert R. Anterior ankle pain in sports medicine: aetiology and indications for arthroscopy. *Arch Orthop Trauma Surg* 1991;110:293–7.
- 15 Molloy S, Solan MC, Bendall SP. Synovial impingement in the ankle. A new physical sign. *J Bone Joint Surg Br* 2003;85:330–3.
- 16 Tol JL, Slim E, van Soest AJ, *et al.* The relationship of the kicking action in soccer and anterior ankle impingement syndrome. A biomechanical analysis. *Am J Sports Med* 2002;30:45–50.

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