Bone trephining for osteoid osteoma excision: a case report

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ABSTRACT

Osteoid osteomas may be treated medically or surgically; both have similar long-term outcomes. Nonetheless, only surgery allows complete excision of the lesion for histological analysis. Excessive removal of surrounding bone may destabilise and weaken the bony structure and predispose it to fractures. We describe a surgical technique using a bone graft trephine to enable precise lesion removal with minimal bone excision.

Key words: osteoma, osteoid; surgical procedures, operative

INTRODUCTION

Osteoid osteoma is a benign circumscribed tumour of spongy bone occurring most commonly in the extremities and vertebrae of young adults, with a male to female ratio of 2:1. Medical or surgical management yields similar long-term outcomes; the lesion may regress after a mean period of 3 years of conservative treatment. Different surgical treatments have varying degrees of success. Osteoid osteomas are not known to have malignant potential, although change to an osteoblastoma has been documented. They can be classified as cortical, cancellous, and subperiosteal depending on the position of the lesion. The lesion consists of a small radiolucent nidus containing nerve fibres, vascular elements, and very high levels of prostaglandin which causes chronic reactive change in the surrounding bone resulting in marked surrounding periosteal sclerosis and synovitis. The excess sclerotic bone helps point to the location of the lesion during surgery. The prostaglandin is responsible for the constant, severe pain, which arises because the vasodilatory effect of the prostaglandin increases the intracortical pressure within the nidus. The prostaglandin also has a potentiating effect on bradykinin, a powerful vasodilator, adding to the pain mechanism. Non-steroidal anti-inflammatory drugs and salicylates may improve symptoms by inhibiting the production of prostaglandin. Removing the prostaglandin source may resolve symptoms and is thus an indication for
surgery. A wide en bloc excision of the nidus with surrounding bone has been the standard surgical treatment. This requires prolonged immobilisation, possible internal fixation, and/or bone grafting to prevent fracture, making it a less than ideal option. Due to its small size, usually <10 mm, precise localisation of the lesion either preoperatively or intra-operatively is essential. Newer techniques involve excision of less surrounding bone guided by imaging techniques. Computed tomography (CT) has been shown to be more accurate than magnetic resonance imaging (MRI) for demonstrating the nidus and thus making the diagnosis. Combined use of plain radiography, isotope bone scans, MRI, and CT can adequately identify the position of the nidus and intra-operative imaging can confirm localisation and/or complete excision of the lesion using tetracycline labelling and bone scintigraphy.\textsuperscript{11,12} We describe the use of a bone graft trephine to enable precise removal of a cortical osteoid osteoma with minimal bone excision.

CASE REPORT

In May 2003, a 19-year-old man presented with a 15-month history of pain in the right foot. He had been in a traffic accident during which his foot was hit by the pedals. He also had neck whiplash symptoms that gradually improved, but the pain in the right foot persisted and deteriorated, affecting his work and activities of daily living. The pain was worse over the foot dorsum just in front of the ankle. There was no swelling or stiffness. Initial radiographs of the foot were normal and he was treated with non-steroidal anti-inflammatory drugs and physiotherapy with little improvement.

The talar neck region was tender, but no swelling or skin changes were observed. The patient had a full active range of movement in the ankle, subtalar and forefoot joints, symmetrical to the other foot. An initial MRI showed an undisplaced talar neck fracture that did not accurately match the clinical symptoms. An isotope bone scan and a fine section CT scan were thus requested. The bone scan showed an increased uptake suggesting active pathology in the talar neck. The CT showed a well-defined, 6-mm lucent cortical lesion on the dorsum of the talar neck characteristic of an osteoid osteoma (Fig. 1).

Excision was performed under general anaesthesia using a thigh tourniquet via a lazy S anterior longitudinal incision centred over the lesion. The position of the nidus was localised preoperatively. Neurovascular bundles and tendons were protected. The lesion was easily located as the overlying periosteum was thickened and purplish in colour. The periosteum was excised exposing a well-circumscribed bony lesion approximately 7 to 9 mm in diameter. A 13-mm diameter bone graft trephine (Precision Bone Grafting System, Osteo Tec Ltd, Christchurch, UK; Fig. 2) was placed over
REFERENCES


Figure 3 The system is placed over the lesion and trephines to a predetermined depth of 8 mm.

Figure 4 Histology shows anastomosing irregular osteoid trabeculae with prominent osteoblastic rimming (H&E, x20).

the lesion and trephined to a predetermined depth of 8 mm (Fig. 3); a tubular piece of bone measuring 12x13x10 mm was excised. The bone sample was sent for histological analysis and the diagnosis of osteoid osteoma was confirmed (Fig. 4). Immediately after surgery, the ankle pain resolved. The patient was kept in a lightweight, non-weight-bearing cast for 4 weeks and started mobilisation and physiotherapy. He was fully weight bearing with pain-free function 3 months after surgery. At the 14-month follow-up, the patient remained free of symptoms.

DISCUSSION

Surgical excision of an osteoid osteoma may result in excessive excision of the surrounding bone such that it may predispose to fatigue fracture, especially when the lesion occurs in very small bones or in places that withstand great stress (e.g. the necks of the femur, talus, and metatarsals). Intra-operative identification of the lesion is difficult and may lead to incomplete lesion excision.

Bone trephining allowed precise excision of the lesion. It also permitted accurate localisation of the lesion preoperatively and intra-operatively. Bone grafting was not needed as the need for excision of surrounding bone was minimised and a stable bony structure maintained. If bone grafting was indeed needed, accurate acquisition and implantation of the bone graft could have been achieved. Compared to other minimally invasive techniques, this technique provides sufficient tissue for pathological analysis and confirmation of complete excision. The less invasive procedures have a less constant rate of primary cure (83% vs 100%) compared to direct intra-lesional excision of the nidus. The Precision Bone Graft System enables precise removal of a cortical osteoid osteoma with minimal bone excision.

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