CHAPTER 17

OSTEOID OSTEOMA

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Osteoid osteoma is a benign osseous tumor that occurs in adolescents, with boys being affected twice as often as girls. It most commonly occurs in the metaphysis or diaphysis of long bones (femur, tibia, fibula, and humerus). Vertebrae and tubular bones of the hands and feet are common sites as well. About 8% of osteoid osteomas occur in the feet.[1] The typical lesion consists of an oval, hyperemic, osteoblastic nidus surrounded by a layer of reactive bone. Its size is typically less than 1.5 centimeters in diameter. The tumor can occur in cortical or cancellous bone. There are three types of osteoid osteoma based on the location of the nidus: intramedullary, intracortical, and subperiosteal. There has been no report of malignant changes associated with osteoid osteoma.

DIAGNOSIS

The most common clinical symptom is localized pain that is generally worse at night and relieved with nonsteroidal anti-inflammatory drugs. The nidus is believed to have an increase in prostaglandins,[2] and this would explain the positive response to these prostaglandin-inhibiting medications. Sometimes patients may present with a limp, swelling, stiffness, or muscle atrophy if the lesion is near a joint. The pain is intermittent at first, but can develop into a chronic, persistent pain.

The typical radiograph of an osteoid osteoma shows an oval radiolucent nidus surrounded by a sclerotic rim of reactive bone formation. The nidus may be uncalcified, partially calcified, or completely calcified depending on the age of the lesion. A subperiosteal osteoid osteoma will present as a bulge on the contour of the involved bone. The radiolucent nidus will be located on the periphery of the lesion with a thin shell of margination associated with some cortical thickening. The lesion may be difficult to see on plain films.

A three-phase technetium-99m bone scan will show a superimposition of a smaller focal, more intense region of uptake on a slightly less intense uptake of a larger region of bone. Radionuclide can be injected intravenously before surgery and detected with a Geiger counter during surgery to aid in location of the lesion.[2-7] Angiography will demonstrate a hypervascular tumor with an intense uniform vascular stain on the nidus, without evidence of capillaries. Computed tomography (CT) scans and magnetic resonance imaging (MRI) will show the nidus within the sclerotic rim. These studies are excellent tools to use for localizing the lesion. Needle placement guided by CT scan has been used for preoperative identification of the exact location of the bone tumor.[3,6,8]

Differential Diagnosis

The differential diagnosis for osteoid osteoma includes osteoblastoma, Brodie's abscess, and osteosarcoma. Osteoblastomas are generally larger in size (>2 cm) and is a more aggressive lesion that does not produce an intense bony reaction. A Brodie's abscess will exhibit more persistent pain and localized increase in temperature and erythema, whereas an osteoid osteoma will not. An osteoid osteoma is oval in shape, and a Brodie's abscess is typically round. Osteosarcoma does not possess a nidus and the pain pattern differs from that of an osteoid osteoma. Juxta-articular lesions can appear clinically and radiographically similar to juvenile rheumatoid arthritis.

The treatment of osteoid osteoma is based on the symptoms. Most lesions will respond to conservative treatment with salicylates and other prostaglandin reducing anti-inflammatory drugs. A majority of cases of osteoid osteoma will symptomatically resolve with time.[8] When pain necessitates early removal of the tumor, en bloc resection[2, 5, 6] and curettage and packing with autogenous bone[1-3, 7] have been successfully performed. When curettage is employed, the entire nidus should be removed; however, the sclerotic rim of reactive bone may be left.[2, 7]

CASE STUDY

A 21-year-old young man presented with a six-year history of pain and swelling in the right ankle that was worse in the evening. The pain kept him from sleeping. He took three tablets of regular strength

aspirin and one gram of acetaminophen at bedtime, and his pain was ameliorated. He was treated four years ago by an orthopedist who placed him in inserts. He plays competitive soccer and wears a brace on the right ankle while playing. He experiences minimal discomfort with athletic activity. He reported no prior history of trauma. The patient was concerned because of how much aspirin he was taking to allow him to sleep.

Clinical examination showed a healthy appearing young man in no acute distress. Neurovascular status was intact. Pain was localized over the anterolateral aspect of the right ankle. There were no signs of edema, erythema, or increased temperature. Range of motion was unrestricted and pain-free. The patient had a cavus foot type, but exhibited no signs of anterior ankle impingement. The lateral ankle ligaments were intact without signs of laxity. Plain film radiographs showed an obscure area on the dorsal surface of the talar neck near the talar dome.(Fig. 1) Considering the high clinical suspicion for osteoid osteoma, a MRI scan (Figs. 2-4) was ordered and the patient was prescribed rofecoxib 50 mg daily with food. The patient failed to keep his initial follow-up appointment and went back to school out of state. The initial MRI result showed suspicion for avascular necrosis or stress fracture of the talus. The scans were reviewed with another

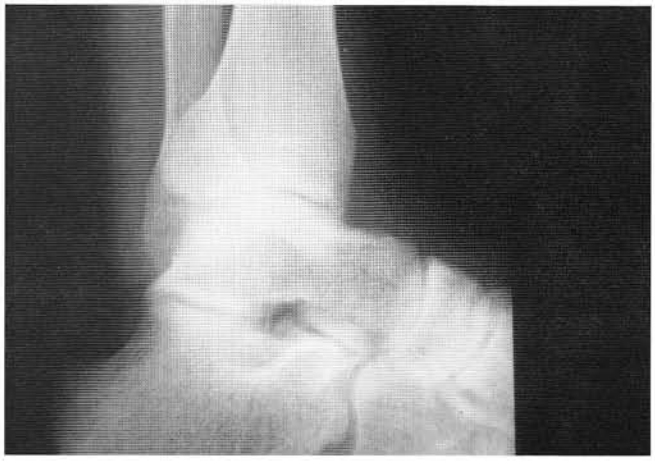
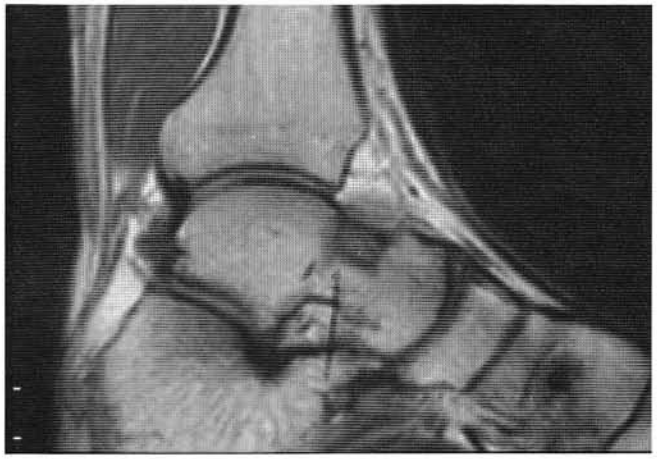


Figure 1. Initial plain film radiograph showing suspicious area in the talar neck.



Figures 2A. MRI scan showing the area of decreased signal intensity surrounded by the dense cortical rim. The surrounding soft tissue structures were observed in relationship to the lesion and later used for planning of incision placement.

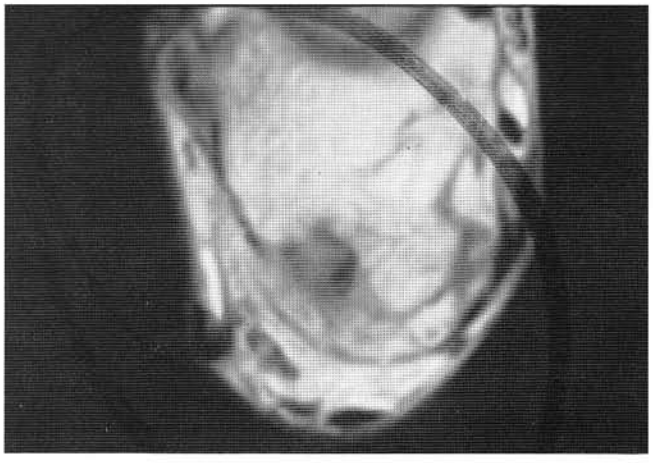


Figure 2B. Transverse plane MRI.

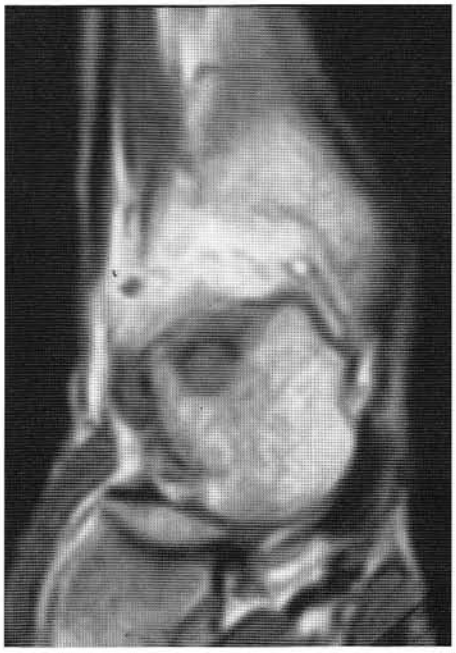


Figure 2C. Frontal plane MRI.

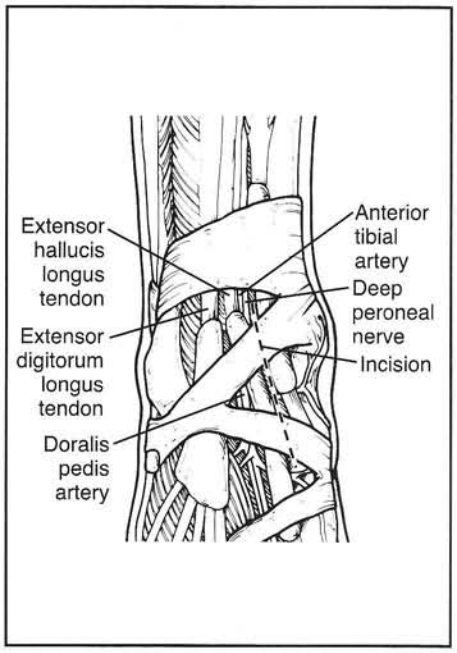


Figure 3A. The incision is planned to avoid the major neurovascular structures.

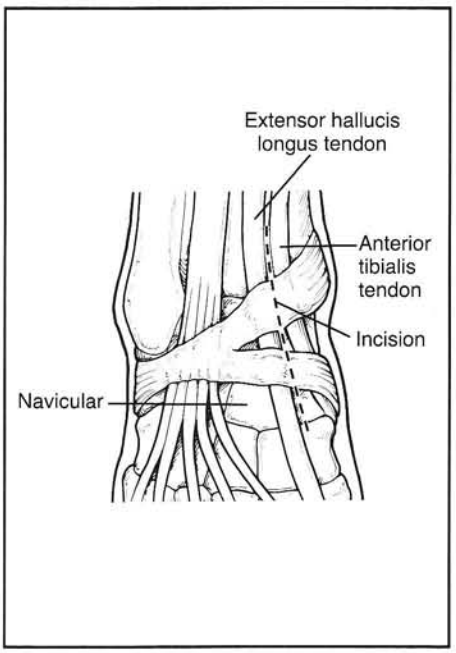


Fig. 3B. The incision is placed between the tibialis anterior tendon and extensor hallucis longus tendon.

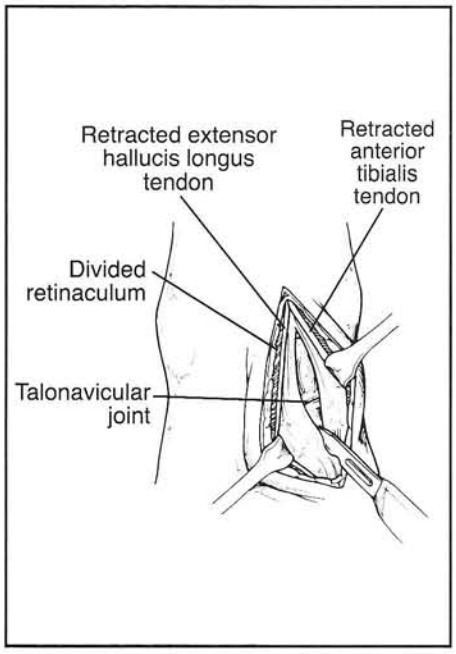


Fig. 3C. The ankle joint capsule is incised.

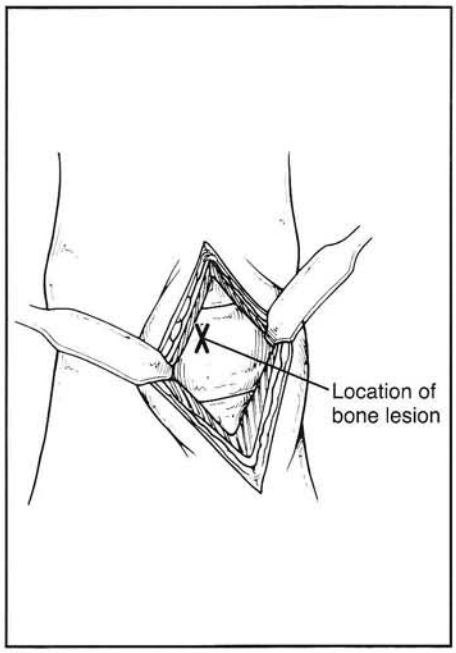


Figure 4. Diagram showing the location of the lesion as it appeared at the time of surgery.

radiologist who agreed with the diagnosis of subperiosteal osteoid osteoma. The patient was located and informed of the results. He said he did not keep his appointment because he was having no trouble. After the prescription ran out, the patient's pain promptly returned and he then decided to have the lesion surgically removed.

The incisional approach was planned using the MRI scan.(Figs. 5-7) The dissection was carried out between the tibialis anterior tendon and extensor hallucis longus tendon. All major neurovascular structures were avoided with this approach including the saphenous vein and nerve medially, the medial dorsal cutaneous nerve laterally as well as

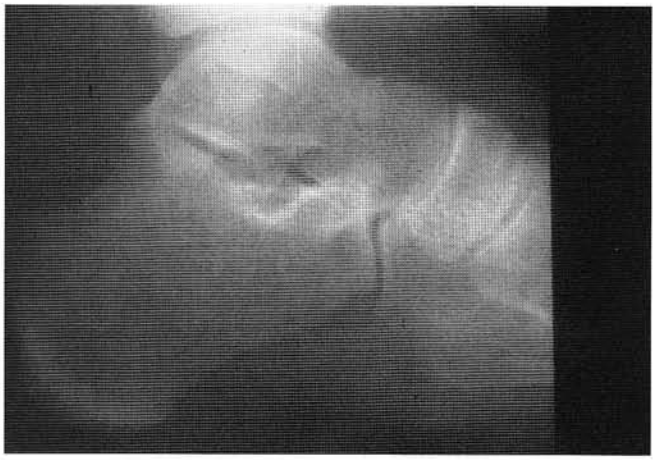


Figure 5. Postoperative radiograph showing complete removal of lesion with incorporation of graft.

the deeper neurovascular structures (dorsali pedis and deep peroneal nerve). The tendons were readily identifiable beneath the components of the extensor retinaculum. The ankle joint capsule was incised and the region of interest readily exposed.(Fig. 8) The periosteum appeared grey in color over the lesion making identification quite easy. A cortical window measuring 1 cm x 1 cm was made over the lesion. The nidus was hemorrhagic and gelatinous in consistency. The entire nidus was curetted out along with a portion of the reactive bone. The defect was packed with autogenous bone that was harvested from the distal tibial metaphysis. The cortical window was replaced, and the incisions closed in layers. No internal fixation was required to secure the window other than tight closure of the periosteum. A short-leg cast was applied. The specimen was sent to pathology for gross and microscopic examination. The patient was seen two days after surgery. His night-time pain was non-existent. He was kept non-weight bearing for six weeks and then allowed to bear weight in the cast for an additional two weeks. The surgical site and graft harvest site healed uneventfully, and radiographs showing complete incorporation.(Fig. 9) Six months after surgery, the patient was still pain-free and running five miles daily.

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