

Osteoid Osteoma: Diagnosis and Treatment

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Osteoid Osteoma is a painful osteoblastic process, usually found on the tibia or femur. Pre-operative diagnosis is usually made by roentgenogram. The Clinical indications for osteoid osteoma, as well as the disease process and the literature are reviewed in this paper.

Introduction: Osteoid osteoma is generally described as a small, painful benign tumor of bone. It is essentially composed of fibrous tissue on which varying amounts of osteoid, or poorly formed spicules of bone are found. ⁽¹⁾ Dr. Jaffe's articles refers to the osteoid osteoma as "sui generis", denoting the lesion's small, self-limiting nature. Although previously thought of as a reparative scarring following a peculiar inflammatory tissue reaction in bone, ^(2,3) it is now believed that they represent a true neoformation. ⁽⁴⁾

The disease is usually found in older children and adolescents. 90% of the cases reported are seen below the age of twenty-five; the occurrence is rare under the age of two and over the age of fifty. ⁽⁵⁾ Males are affected twice as often as females. Any bone in the body can be affected, especially the tibia and femur. Other common sites include the fibula, humerus and vertebral arch. Even the skull may be involved. ⁽⁶⁾

The clinical hallmark of this lesion is local pain that worsens at night, and is exacerbated by activity. ⁽⁵⁾ This pain is usually severe enough to interfere with the patient's sleep at night. Dramatic relief of pain is obtained in most cases with aspirin, although in some severe cases morphine has been necessary to relieve painful symptomatology. ⁽⁷⁾ The pain increases from mild to severe during the course of the disease, and may actually be referred to a nearby joint in the more progressive stages. ⁽⁵⁾ The pain is not commonly associated with a traumatic etiology. ⁽⁸⁾

Other clinical signs include regional soft tissue swelling, point tenderness and limitation of motion. When the lower extremity is involved, the patient will probably display a noticeable limp. Muscle atrophy as well as depressed deep tendon reflexes are often encountered. ⁽⁵⁾ A synovitis in an adjacent joint not involving an intracapsular lesion may be present. ⁽⁹⁾

Description of lesion: The characteristic osteoid osteoma lesion is one centimeter or less in diameter, and is called a “nidus.” The nidus is initially uncalcified; the degree of calcification ranges from small flecks to calcification of its major portion, depending on the maturity of the lesion. It usually arises at the junction of old and new cortex, although its location can be intramedullary, subperiosteal, or intacortical. ⁽⁵⁾ The lesion usually presents as a small red-brown fairly discrete area. Immediately surrounding the nidus is a zone of dense reactive sclerotic bone. Frequently, the sclerosis of bone is massive enough to deform the external outline of unaffected bone.

Microscopically, the tumor consists of osteoid and osseous tissue contained within highly vascularized fibrous tissue. The osteoid matrix located within this vascular stroma has a random orientation, producing an irregular lace-like pattern. ⁽¹⁾ The nidus is sharply demarcated from the surrounding reactive sclerosis. Giant cells are often present. ⁽⁵⁾ Mitosis, cytologic abnormalities, hemorrhage and necrosis are conspicuously absent. ⁽¹⁾

Progression of the disease: The progression of osteoid osteoma is difficult to trace. It involves reconstruction and revascularization of bone cortex. Original bone cortex is resorbed early in the sequence, and replaced by highly atypical osseous tissue. During this period, the neoplasm causes periosteal thickening. Finally, the nidus forms, with increased vascularized osteogenic connective tissue replacing the bone's normal trabecular patterns. In sum, the final result is a highly vascularized substratum of genic connective tissue, having undergone osteoid and osseous metaplasia. ⁽⁵⁾

Roentgen graphic findings: As previously stated, x-rays are the common vehicle for arriving at a pre-operative diagnosis of osteoid osteoma. The roentgen appearance of the neoplasm, however, depends upon the progression of the disease, as well as the location of the nidus. The nidus, for example, may be uncalcified, partially calcified or totally calcified, depending on the progression of the disease. ⁽⁷⁾

The classical roentgen appearance of osteoid osteoma is a small, radio lucent intracortical nidus, less than one centimeter in diameter, surrounded by a large, dense sclerotic zone of cortical thickening. Evidence of a laminated periosteal reaction is often

present. The denseness of this reaction may be obscure the nidus when conventional x-ray techniques are utilized. In such cases, over penetration of films laminography and especially bone scintigraphy may be necessary for confirmation.

An intramedullary nidus presents without appreciable cortical thickening or bone sclerosis. A Subperiosteal lesion is the least common form of osteoid osteoma reported. Roentgen graphically, a small periosteal bulge in the contour of the affected bone is present, with some cortical thickening and apposition of affected bone onto healthy bone. Joint space widening resulting from lymph follicular inflammation in the adjacent soft tissue is a consistent finding with intra-articular osteoid osteoma. ⁽⁵⁾

Radiographically, half the lesions are seen on the femur or the tibia. When the lesion appears on the femur, the lesion is often intramedullary. Corresponding osteoporosis of the head and neck with an associated lymph follicular synovitis are common findings.

The nidus need not be centrally located within the area of sclerosis. Cortical thickening at a distance from the nidus may also be seen. ⁽⁵⁾ Although rare, double and triple nidi have been reported. ⁽¹⁰⁾

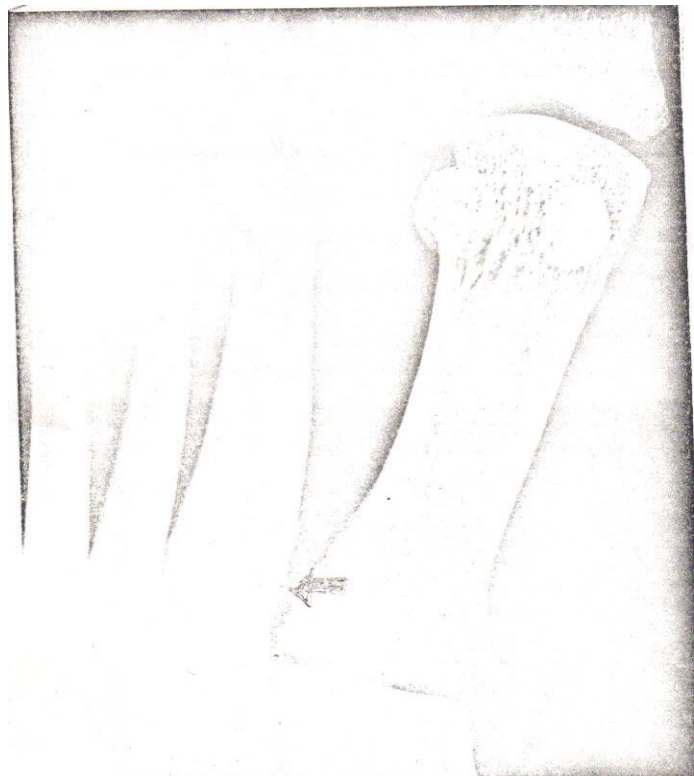


Fig. 1. Roentgenograph of osteoid osteoma at the medial base of the second metatarsal.

Recently, bone scans have become a useful adjunctive test when the lesion is not well seen on x-ray. (8) It is not uncommon for a patient to present with the clinical symptoms of osteoid osteoma, but because the disease has not progressed to the stage of classification, which occurs approximately twelve months after the first symptoms appear, roentgenographs are not diagnostic of the lesion. Using ^{18}F (11) or $^{99\text{m}}\text{Tc}$ -methylene diphosphate, (8) a single focus of increased radionuclide activity has been demonstrated in patients whose duration of symptoms was only five months. (11) Confirmation is virtually assured through the use of tomograms and biopsy. (8)



Fig. 2- Negative xerogram illustrating the nidus on the medial base of the second metatarsal.

Differential diagnosis: The hardest differential when considering osteoid osteoma is a Brodie's abscess, which presents with the same basic roentgenographic qualities. (7) A

Brodie's abscess is associated with chronic osteomyelitis, and can be differentiated from osteoid osteoma through the use of arteriography. Rheumatoid arthritis is another differential that could be identified and distinguished from osteoid osteoma with the RA test or an ANA. Finally, giant osteoid osteoma differs from osteoid osteoma by its enormous size (2.5 - 5.0 cm) and in it's being more vascular. (12) A biopsy would be required to confirm this differential. (13)

Diagnostic pitfalls: There are some problems that may arise diagnostically when interpreting the x-rays of a patient with possible osteoid osteoma. The thickened area often associated with an intracortical osteoid osteoma may obscure the nidus. A bone scan is suggested where doubt exists. Another problem occurs when the disease has not progressed to the point where the nidus becomes visible on x-ray. Once again, bone scintigraphy can be invaluable. Finally, the physician must keep in mind how similar a Brodie's abscess appears on x-ray; this must be considered before a diagnosis of osteoid osteoma is confirmed.

Treatment: Relief of pain is prompt following the removal of the tumor. (14) Malignant transformation or recurrence is virtually unknown. (15) The surgeon must try to remove the nidus intact; if the entire osteoid osteoma lesion is not removed or destroyed, the clinical complaints will either remain, or disappear and recur at a later date.

Conclusion: Osteoid osteoma is a painful benign tumor of bone. Diagnosis of the disease is usually obtained by roentgenograms, or through the use of other aids, such as bone scans, when necessary. Surgical excision of the lesion usually renders the patient a symptomatic.

FOOTNOTES

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