Osteoid osteoma is a common benign osteogenic bone neoplasm characterized histologically by increased osteoid tissue formation with an intracortical nidus surrounded by cortical thickening and vascular fibrous stroma and sclerosis. The clinical presentation classically includes severe nocturnal pain that is improved with nonsteroidal anti-inflammatory drugs. Younger men (second and third decades) have the highest incidence, with the most frequent sites of involvement being the long bones or axial skeleton. Osteoid osteoma may be missed due to the lesion occurring in an atypical location or due to failure to obtain advanced imaging studies such as computed tomography (CT). Intralesional or wide excision, or CT-guided radiofrequency ablation if available, leads to predictable and rapid pain relief. The authors report the case of a 24-year-old man who had a painful flexion contracture of his dominant right elbow for 1.5 years, secondary to an intra-articular osteoid osteoma. Attempted motion, passive or active, produced a marked exacerbation of pain. Previous surgeries, including an elbow synovectomy and an ulnar nerve transposition, had been unsuccessful in relieving his pain. Plain radiographs demonstrated a small area of periosteal thickening adjacent to the sublime tubercle. Fine-cut CT scan demonstrated an osteoid osteoma within the articular surface of the trochlear notch of the olecranon, adjacent to the sublime tubercle. Because of a perceived risk to the surrounding articular cartilage, CT-guided radiofrequency ablation was not performed. Wide en bloc surgical excision of the nidus was performed, with complete resolution of pain and rapid return to normal function.
Osteoid osteoma is a benign osteoblastic neoplasm composed of osteoid and woven bone that represents approximately 10% of all benign bone tumors. The first case of osteoid osteoma was reported by Heine in 1927. Histology was described by Bergstrand in 1930. In 1935, Jaffe differentiated this entity from other variants using the name osteoid osteoma. In 1966, Edeiken et al categorized 3 types of osteoid osteoma (cortical, cancellous, and subperiosteal) on the basis of the amount of associated osteosclerosis and the radiographic localization of the primary lesion (termed nidus), a 3- to 10-mm radiolucent osteoid fibrous stroma. Historically, men are more commonly affected, and osteoid osteoma is rarely seen in black patients. The greatest incidence is during the second and third decades of life. Bone pain is the most common symptom, with pain initially being vague and intermittent but eventually becoming severe and constant. Pain typically worsens at night and increases with activity but can be relieved by small doses of salicylates or nonsteroidal anti-inflammatory drugs (NSAID).

Most lesions occur in the cortices of long bones, most commonly in the lower extremity, involving the proximal femur and diaphysis of the tibia. The remaining lesions are equally distributed among the spine, hand, and foot. However, few intra-articular cases, particularly in the elbow, have been reported in the literature. Plain radiographs may show a characteristic radiolucent area (nidus) surrounded by sclerotic bone (85% of cases). Approximately 20% may be intramedullary and have less reactive sclerosis. If plain radiographs do not demonstrate the lesion, computed tomography (CT) scan or bone scan may be helpful. Intra-articular lesions often require CT to confirm and localize the lesion; CT is superior to magnetic resonance imaging (MRI) for establishing a diagnosis.

Complete surgical excision is the treatment of choice and has a low recurrence rate. However, percutaneous radiofrequency ablation, if available, is a popular and effective treatment modality.

The authors report the case of a 24-year-old man who presented with an 18-month history of severe elbow pain attributable to an intra-articular osteoid osteoma in the medial aspect of the olecranon, just adjacent to the base of the sublime tubercle.

**Case Report**

A 24-year-old healthy man presented with an 18-month history of insidious-onset, persistent, and severe pain in his dominant right elbow that had increased over time. The patient had not participated in throwing sports and had stopped playing flamenco guitar several months earlier because of severe pain with elbow motion. The pain worsened at night and caused frequent waking, but it could be partially relieved by NSAID and acetaminophen.

The patient had presented to another institution and had undergone multiple diagnostic tests (plain radiography, CT, MRI) that showed only diffuse edema of the olecranon on T2-weighted images. The patient was told he had a stress fracture of the olecranon. Rest was recommended. He subsequently underwent a submuscular ulnar nerve transposition, despite a negative finding on electromyogram, and elbow synovial biopsy and culture, all of which yielded negative results. The pain continued to progress after this procedure, forcing him to eventually quit his surgical internship.

On the authors’ initial evaluation, the patient reported no recent mechanical symptoms or instability. His upper extremity was mildly diffusely atrophic compared with his opposite side, but there were no skin or temperature changes. He had a well-healed, nontender, 12-cm mobile longitudinal surgical scar just anterior to his medial epicondyle. He had exquisite tenderness over the sublime tubercle and had pain with valgus stress of the elbow, but there was no obvious asymmetric medial laxity. The patient refused active extension of the elbow and supported the arm at rest with his opposite hand, with the elbow in 45° of flexion. Full elbow extension was possible only passively, with the ipsilateral shoulder abducted and the forearm supported by his opposite hand. He had full flexion, pronation, and supination actively and passively, without pain or crepitus. His neurovascular examination yielded normal findings, including ulnar nerve function.

Plain and stress radiographs of the elbow (including the left side for comparison) showed a mild widening of the medial aspect of the ulnotrochlear joint (2-3 mm) on the latter views, plus a small thin area of periostitis just distal to the sublime tubercle. A fine-cut CT scan revealed a 5-mm rounded lucency with central mineralization within the articular surface of the olecranon (Figures 1-2). A 3-T MRI did not identify a synovitis or effusion but confirmed an intact ulnar collateral ligament and showed a 6×3×5-mm ovoid mass with low T1 and T2 signals that corresponded to the abnormality seen on the CT scan.

Because the lesion was located in the articular surface, percutaneous radiofrequency ablation was contraindicated because of potential heat damage to the surrounding articular cartilage. Direct examination of the elbow during surgery confirmed an intact, functional ulnar collateral ligament complex. The slight widening noted on the preoperative stress radiographs was believed to be a consequence of the flexor-pronator origin lengthening performed at the time of previous submuscular ulnar nerve transposition. The surgical incision was made through the previous scar. The ulnar nerve was maintained anteriorly by the flexor-pronator origin, which had been Z-lengthened. The posterior band of the ulnar collateral ligament was incised, and the anterior band was carefully preserved and retracted superiority, allowing visualization of the lesion (Figure 3). An open en bloc wide-excision biopsy of the
visible nidus, with a small rim of normal cortical bone and articular cartilage, was performed using an osteotome. Histology confirmed an osteoid osteoma (Figure 4). The patient was allowed immediate active range of motion. Three weeks postoperatively, the patient had complete pain relief and full range of motion and had resumed normal (unrestricted) activities.

**Discussion**
Bone pain is the most important clinical finding of osteoid osteoma, and it typically increases with activity and at night. Aspirin and NSAID inhibit the extremely high levels of prostaglandin metabolites and can relieve some pain. Specifically, prostaglandin E2 is present in the nidus and exceeds its normal concentration in bone by 1000- to 10,000-fold, causing local inflammation and vasodilation. Cyclooxygenase-1 and cyclooxygenase-2 enzymes are expressed highly in osteoblasts and are also responsible for pain. The presence of nerve fibers in the nidal and perinidal tissues might also have an important role in pain perception. The site of involvement may be tender to the touch or pressure.

If the location is intracapsular, clinical and radiologic features may mimic inflammatory synovitis or osteomyelitis because the radiologic image typically lacks sclerosis and periosteal reaction. Computed tomography remains the best modality for diagnosis. Magnetic resonance imaging should not be interpreted without referring to plain radiographs and CT scans to prevent misdiagnoses such as osteomyelitis or stress fracture. The complex anatomy of the upper extremity and the tendency of patients to relate their symptoms to recent trauma are factors that may commonly mimic other entities and delay the diagnosis. Although osteoid osteoma has characteristic clinical and radiologic findings, symptoms mimic those of inflammatory arthritis, degenerative joint disease, neoplasm, or infection, all of which must be considered in a differential diagnosis. Treatment involves complete excision of the lesion with an open surgical approach, CT-guided excision, or thermal ablation.

**Conclusion**
Osteoid osteoma should be considered in the patient who initially has concerns of severe bone pain with no obvious clinical diagnosis or radiologic signs. The diagnosis may be more difficult when the lesion is intracapsular.

**References**


