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Osteoid Osteoma of the Proximal Humerus Presenting as Persistent Shoulder Pain in an Adolescent: A Rare Case Report and Review of Literature

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Abstract

Background: Osteoid osteoma is a benign osteoblastic neoplasm accounting for approximately 10–12% of benign bone tumors. It commonly affects the femur and tibia in adolescents and young adults. Proximal humeral involvement is uncommon and may mimic more prevalent causes of shoulder pain, resulting in delayed diagnosis.

Case Presentation: A 17-year-old male presented with a six-month history of persistent right upper arm pain that was more pronounced at night and consistently relieved by non-steroidal anti-inflammatory drugs (NSAIDs). Physical examination revealed localized tenderness over the proximal humerus with mild restriction of shoulder movement secondary to pain. Plain radiographs demonstrated a small intracortical radiolucent lesion surrounded by reactive sclerosis. Computed tomography (CT) confirmed a characteristic nidus with central mineralization and surrounding cortical thickening. The patient underwent open excision and extended curettage. Histopathological examination demonstrated interlacing trabeculae of woven bone lined by osteoblasts within a highly vascular stroma, confirming osteoid osteoma. Complete pain relief was achieved immediately after surgery, and no recurrence was observed at six months follow-up.

Conclusion: Although uncommon, osteoid osteoma of the proximal humerus should be considered in adolescents presenting with persistent nocturnal shoulder or upper arm pain relieved by NSAIDs. CT remains the imaging modality of choice for diagnosis. Complete surgical excision continues to provide excellent outcomes, particularly in centres where percutaneous ablation techniques are unavailable.

Keywords: Osteoid Osteoma; Proximal Humerus; Benign Bone Tumour; Shoulder Pain; Curettage; Adolescent

Introduction

Osteoid osteoma is a benign osteoblastic neoplasm first described by Jaffe in 1935 and accounts for approximately 10–12% of all benign bone tumors and 2–3% of primary bone neoplasms [1, 2]. It predominantly affects children, adolescents, and young adults, with a peak incidence between the second and third decades of life and a male predominance of approximately 2–3:1 [2, 3].

Histologically, the lesion is characterized by a small nidus, typically measuring less than 1.5 cm in diameter, composed of osteoid and woven bone surrounded by a highly vascular stroma and varying degrees of reactive sclerosis [2, 4]. The exact pathogenesis remains uncertain; however, elevated concentrations of prostaglandins and cyclooxygenase enzymes within the nidus are believed to be responsible for the characteristic pain pattern associated with the tumor [5]. Consequently, patients classically present with localized pain that is more severe at night and demonstrates dramatic relief following administration of non-steroidal anti-inflammatory drugs (NSAIDs).

The femur and tibia account for more than 50% of reported cases, whereas involvement of the upper extremity is considerably less common [2, 6]. Osteoid osteoma arising in the proximal humerus is particularly rare and may present as persistent shoulder pain, often mimicking rotator

cuff pathology, adhesive capsulitis, subacromial impingement, inflammatory arthropathy, or infection [7, 8]. Such atypical presentations frequently result in delayed diagnosis and prolonged patient morbidity.

Imaging plays a pivotal role in establishing the diagnosis. Conventional radiographs may demonstrate a radiolucent nidus surrounded by reactive sclerosis; however, computed tomography (CT) remains the gold standard for accurately identifying and localizing the nidus [9]. Magnetic resonance imaging (MRI) may reveal extensive marrow and soft-tissue edema but can occasionally obscure the nidus and lead to diagnostic uncertainty [10].

Although minimally invasive techniques such as CT-guided radiofrequency ablation have emerged as the preferred treatment in many centres, open excision remains a reliable and effective treatment modality, particularly in resource-constrained settings where advanced ablative techniques may not be readily available [11].

We report a rare case of osteoid osteoma involving the proximal humeral diaphysis in a 17-year-old male who presented with persistent nocturnal arm pain. The case highlights the diagnostic challenges associated with this unusual location and demonstrates the successful outcome achieved following surgical excision and curettage.

Case Presentation

A 17-year-old right-hand-dominant male presented to our outpatient clinic with complaints of persistent pain in the right upper arm for six months. The pain had an insidious onset and gradually increased in intensity. It was localized to the proximal arm, non-radiating, and particularly troublesome during the night, often disturbing sleep. The patient reported significant symptomatic relief following administration of NSAIDs.

There was no history of antecedent trauma, fever, weight loss, constitutional symptoms, or previous musculoskeletal disorders.

Clinical Examination

General physical examination was unremarkable. Local examination revealed mild tenderness over the anteromedial aspect of the proximal humerus. No swelling, erythema, deformity, or muscle wasting was observed. Shoulder range of motion was mildly restricted due to pain, particularly during terminal abduction. Neurovascular examination of the limb was normal (Figure 1).

Investigations

Routine laboratory investigations including complete blood count, erythrocyte sedimentation rate, and C-reactive protein were within normal limits.

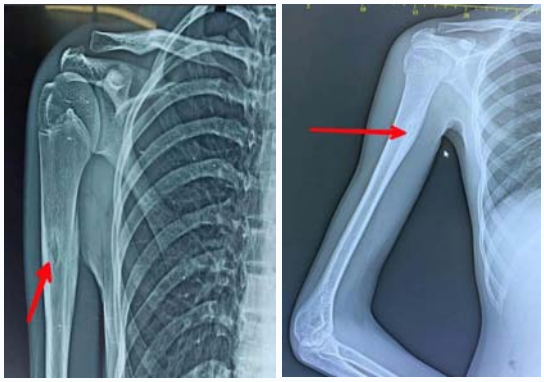

Figure 2: Showing Anteroposterior and lateral radiographs of the humerus demonstrated a small intracortical radiolucent focus.

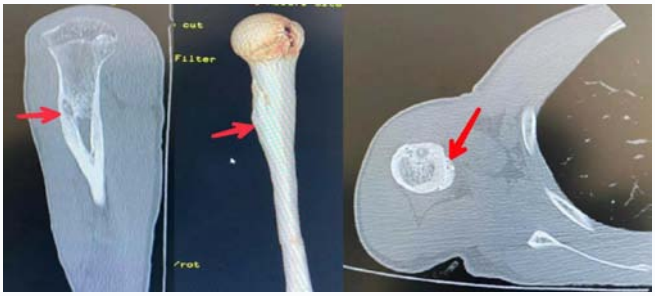

Figure 3: Showing CT imaging revealed a well-defined cortical nidus.

Radiographs

Anteroposterior and lateral radiographs of the humerus demonstrated a small intracortical radiolucent focus within the proximal humeral diaphysis surrounded by dense reactive cortical sclerosis (Figure 2).

Computed Tomography

CT imaging revealed a well-defined cortical nidus measuring approximately 8 mm in diameter with central mineralization and surrounding cortical thickening. These findings were highly suggestive of osteoid osteoma (Figure 3).

Differential Diagnosis

The differential diagnosis included:

- Brodie abscess
- Osteoblastoma

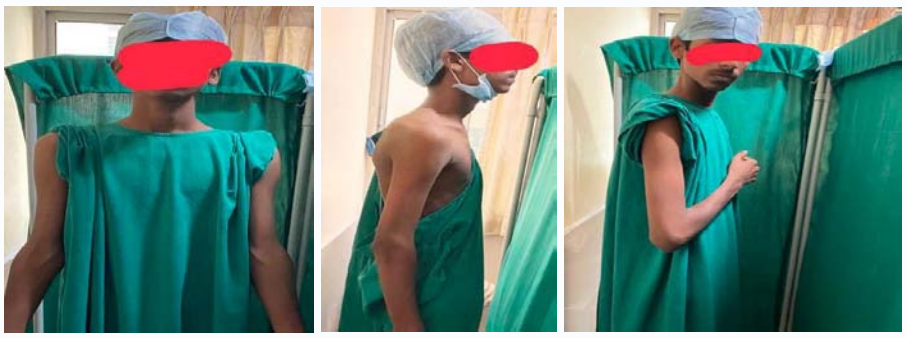

Figure 1: Clinical Pictures of the patient.

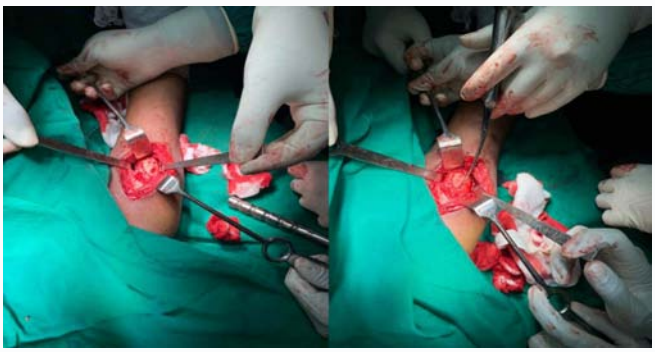

Figure 4: Showing intra op Osteoid osteoma margin marked.

- Stress fracture
- Chronic osteomyelitis
- Eosinophilic granuloma

Based on the characteristic clinical and radiological findings, osteoid osteoma was considered the most likely diagnosis.

Surgical Technique

Following informed consent, the patient underwent surgery under general anaesthesia. Through an anterolateral approach to the proximal humerus, a cortical window was created directly over the lesion under fluoroscopic guidance. The nidus was identified and completely excised along with surrounding reactive bone (Figure 4).

Extended curettage of the cavity was performed to ensure complete removal of the lesion. The cavity was irrigated thoroughly with normal saline before layered wound closure (Figure 5).

Histopathological Findings

Microscopic examination demonstrated irregular trabeculae of woven osteoid and immature bone lined by prominent osteoblasts within a richly vascular connective tissue stroma. Reactive sclerotic bone surrounded the lesion. No evidence of atypia or malignancy was observed (Figure 6).

These findings confirmed the diagnosis of osteoid osteoma.

Outcome and Follow-up

The patient's nocturnal pain resolved immediately after surgery. Analgesic requirements ceased within 48 hours postoperatively.

Gentle shoulder mobilization was initiated after wound healing. At six weeks, the patient had regained a full painless range of shoulder motion and returned to routine activities.

At six months follow-up, the patient remained asymptomatic with no radiological evidence of recurrence.

Discussion

Osteoid osteoma is a relatively common benign osteoblastic tumor; however, its occurrence in the proximal humerus is distinctly uncommon and may create a significant diagnostic challenge. The rarity of this anatomical location often leads clinicians to initially attribute symptoms to more common shoulder pathologies, resulting in delayed diagnosis and treatment [7, 8].

The hallmark clinical feature of osteoid osteoma is localized pain that worsens at night and responds dramatically to NSAIDs. This characteristic symptom is attributed to markedly elevated levels of prostaglandin E2 and prostacyclin within the nidus, which may exceed normal concentrations by several hundred-fold [5]. In the present case, the patient's nocturnal pain pattern and excellent response to NSAIDs were highly suggestive of the diagnosis and provided an important clinical clue.

Radiological evaluation remains essential for diagnosis. Conventional radiographs may demonstrate a central radiolucent nidus surrounded by cortical thickening and reactive sclerosis; however, these findings can be subtle, particularly in atypical locations [9]. CT is widely regarded as the most sensitive imaging modality because it clearly delineates the nidus and facilitates preoperative planning [9, 12]. Although MRI is frequently performed in patients presenting with shoulder pain, extensive surrounding edema may obscure the nidus and occasionally lead to misinterpretation as infection, stress injury, or malignant pathology [10]. In our patient, CT successfully identified the characteristic nidus and confirmed the diagnosis.

The differential diagnosis of proximal humeral osteoid osteoma includes Brodie abscess, chronic osteomyelitis, stress fracture, osteoblastoma, eosinophilic granuloma, and other benign cortical lesions [3, 9]. Distinguishing osteoid osteoma from osteoblastoma is particularly important because osteoblastomas are generally larger than 2 cm, exhibit more aggressive growth characteristics, and require different therapeutic considerations [3].

Recent advances in treatment have shifted management toward minimally invasive techniques such as CT-guided radiofrequency ablation (RFA), which has reported success rates exceeding 90% and is associated with shorter hospital stays and rapid recovery [11, 13]. Nevertheless, open surgical excision remains a valuable option, especially when image-guided ablation facilities are unavailable or when histopathological confirmation is required [14]. Complete removal of the nidus remains the critical determinant of successful

Figure 5: A: Showing intraop excised part of humerus shaft; **B:** Showing intra op C-arm images.

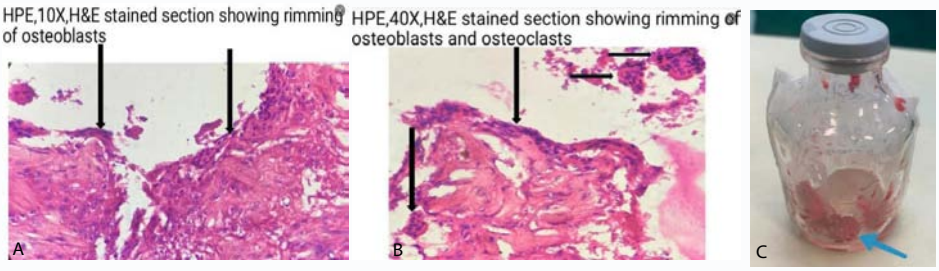

Figure 6: A&B: Showing H7E stained section in 10x and 40x respectively and **C:** Showing Gross sample of excised part of Osteoid Osteoma.

treatment, irrespective of the chosen technique.

Several authors have reported unusual presentations of proximal humeral osteoid osteoma. Mitsui et al. described a patient presenting with chronic shoulder pain initially diagnosed as impingement syndrome, emphasizing the propensity of this lesion to mimic common shoulder disorders [7]. Similarly, Mitrousias et al. reported an intra-articular osteoid osteoma of the proximal humerus that presented with prolonged shoulder dysfunction and was successfully treated arthroscopically [8]. These reports underscore the importance of maintaining a high index of suspicion in young patients with unexplained shoulder pain.

In the present case, open excision and extended curettage resulted in immediate postoperative pain relief and restoration of full shoulder function without recurrence at six months follow-up. The outcome is consistent with previous reports demonstrating excellent long-term results following complete nidus excision [11, 14].

Given the rarity of proximal humeral involvement, this case contributes to the growing body of literature highlighting atypical presentations of osteoid osteoma and reinforces the importance of careful clinical evaluation, appropriate imaging, and definitive treatment.

Learning Points

1. Osteoid osteoma should be considered in adolescents presenting with persistent nocturnal shoulder or upper arm pain.
2. Dramatic relief with NSAIDs remains an important diagnostic clue.
3. CT scan is the most reliable modality for identifying the nidus.
4. Proximal humeral lesions may mimic common shoulder disorders and delay diagnosis.
5. Complete excision of the nidus provides excellent long-term outcomes.

Conclusion

Proximal humeral osteoid osteoma is an uncommon cause of shoulder and upper arm pain in adolescents. Recognition of the characteristic clinical pattern, coupled with appropriate imaging, is essential for timely diagnosis. Although minimally invasive ablative techniques are increasingly utilized, open excision with curettage remains a reliable and curative treatment option. Early intervention results in rapid pain relief, restoration of function, and excellent long-term prognosis.

Patient Consent

Written informed consent was obtained from the patient and guardian for publication of this case report and accompanying clinical images.

Conflict of Interest

The authors declare no conflict of interest.

Funding

No funding was received for this study.

Ethical Approval

Institutional ethical approval was waived as this is a single case report with informed patient consent.

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