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RESEARCH ARTICLE

REACTIVE BURSITIS SECONDARY TO DISTAL FEMORAL OSTEOCHONDROMA: MRI FEATURES, DIAGNOSTIC CHALLENGES, AND SURGICAL CORRELATION: A CASE REPORT

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Abstract

Osteochondroma is the most common benign bone tumor, typically presenting in children and adolescents. It is characterized by a bony outgrowth with a cartilage cap that usually arises in the metaphyseal regions of long bones. These lesions are often asymptomatic but may be complicated by fractures, deformities, neurovascular compression, or bursitis. Imaging, particularly MRI, plays a vital role in identifying these features, and distinguishing benign changes from malignant transformation can occur in adulthood, although metastasis is rare. We report an 18-year-old male presenting with progressive swelling and dull pain in the left distal thigh. Radiographs demonstrated a pedunculated bony lesion originating from the distal femoral metaphysis, with cortical and medullary continuity, consistent with an osteochondroma. MRI revealed a cartilage-capped lesion with an adjacent fluid-filled collection, indicative of secondary reactive bursitis. The lesion was surgically excised, and histopathology confirmed a benign osteochondroma with associated bursal tissue. The postoperative course was uneventful without complications. This case highlights the importance of advanced imaging—especially MRI—for accurately diagnosing osteochondroma and its secondary complications such as reactive bursitis, aiding surgical planning, and distinguishing benign pathology from potential malignant change. MRI also supports postoperative assessment for complete excision and recurrence.

Keywords: Osteochondroma; Distal femur; Reactive bursitis; MRI; Benign bone tumor.

Introduction

Osteochondromas represent is the most frequently encountered bone tumor, comprising nearly 10–15% of all primary bone tumors and 20–50% of benign bone neoplasms. It commonly develops during childhood and adolescence as a surface outgrowth of bone capped by hyaline cartilage. A defining diagnostic feature is the uninterrupted continuity of both the cortex and medullary cavity with the underlying parent bone [1-3]. Although osteochondromas can arise in the metaphyseal regions of various long bones, they most frequently occur around the knee [4]. Morphologically, these lesions may present as either sessile or pedunculated growth [5]. Clinically, osteochondromas may appear as isolated lesions or as part of a multiple form known as hereditary multiple exostosis (HME), an autosomal dominant condition that accounts for approximately 15% of cases [4].

Most osteochondromas remain asymptomatic and are incidentally detected on radiographs performed for other reasons [6]. They become symptomatic when they are large enough to cause cosmetic problems or secondary complications such as fracture of the bony stalk, vascular or neurologic compromise, or rarely malignant transformation [3, 7]. Reactive bursa formation overlying an osteochondroma—historically termed "exostosis bursata"—was first described by Orlow in 1891 and represents a recognized but relatively uncommon cause of new-onset pain and swelling [8].

We report the case of an 18-year-old male who presented with progressive swelling and dull pain over the medial distal left thigh for five months. He had no history of trauma, systemic disease, or family history of skeletal disorders. Plain radiography demonstrated a well-defined bony outgrowth with corticomedullary continuity, consistent with osteochondroma. MRI, the modality of choice for detailed tumor characterization, further evaluated cartilage cap thickness and associated complications.

This case is notable for a relatively thick cartilage cap (approximately 2 cm) associated with secondary inflamed bursa formation containing loose cartilaginous bodies, findings that mimicked features suspicious for secondary chondrosarcoma. The case emphasizes the importance of multimodality imaging in distinguishing reactive bursitis from malignant transformation and in guiding appropriate surgical management.

Case Presentation

An 18-year-old male presented with swelling over the left distal thigh that had progressively increased in size, accompanied by dull aching pain over the past five months. There was no history of trauma, prior surgeries, systemic disease, or a family history of similar lesions. Physical examination revealed 6x10 cm soft, compressible soft tissue swelling on the medial aspect of the distal third of the left thigh. The overlying skin appeared normal, with no signs of inflammation.

A preliminary anteroposterior (AP) and lateral X-ray of the knee joint (Fig. 1) revealed pedunculated bony outgrowth arising from the medial aspect of the distal femoral metaphysis and had cortex and medullary continuity with the underlying femur, and orienting away from the knee joint (white arrow). Overlying soft tissue swelling is seen. The cartilage cap was not mineralized and therefore not visible

Magnetic resonance imaging (MRI)

was performed using a 0.5-T system with an appropriate surface coil. Axial, coronal, and sagittal T1-weighted, T2-weighted, and STIR sequences were acquired, followed by contrast-enhanced axial, coronal, and sagittal T1-weighted images after intravenous administration of gadolinium-based contrast material (0.1 mmol/kg at 3 mL/s). Images were obtained with a slice thickness of 3 mm and an interslice gap of 1 mm.

MRI demonstrated a pedunculated osteochondroma arising from the distal femoral metaphysis, with a cartilage cap measuring approximately 2 cm in maximum thickness (short arrows, Fig. 2d, e). Surrounding the lesion was a well-defined fluid-filled bursal collection exhibiting low signal intensity on T1-weighted images and high signal intensity on T2-weighted and STIR sequences, consistent with secondary reactive bursitis (Fig. 2b, d & e). Multiple small intra-bursal loose cartilaginous bodies were identified within the collection, some of which were located dependently (curved arrows, Fig. 2c, d). Following contrast administration, the bursal wall demonstrated smooth peripheral enhancement (arrowheads, Fig. 2b, f), supporting the diagnosis of associated inflammatory bursitis.

Surgical excision of the osteochondroma was subsequently performed, the diagnosis was confirmed, and the bursa containing fragments of the cartilage cap was identified (Fig. 3). Histopathological examination excluded malignant transformation. The postoperative course was uneventful without complications. This case highlights the essential role of medical imaging and radiology in the diagnosis, management, and follow-up of osteochondromas.

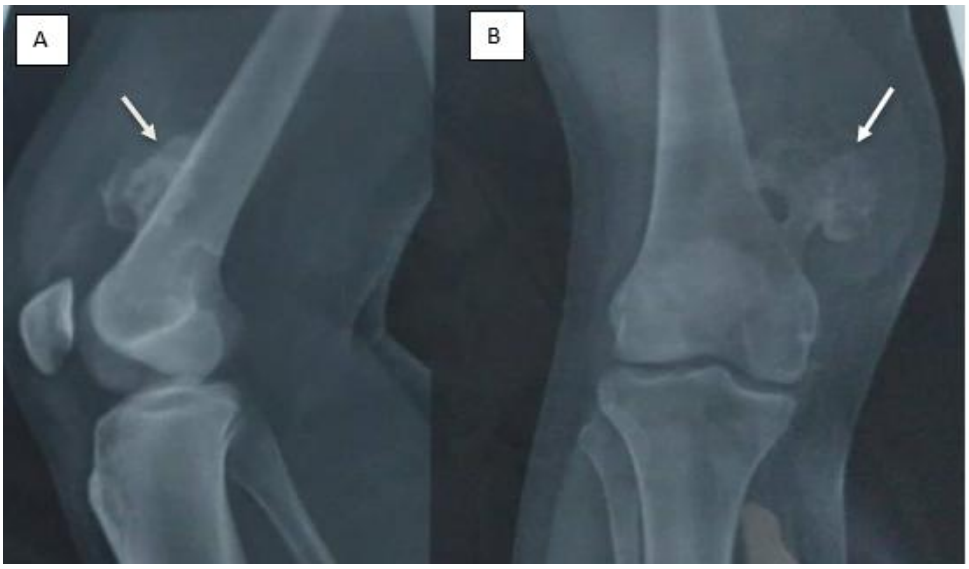

Fig.1: An initial knee x ray examination. (A) Lateral and (B) anteroposterior (AP) views revealed a radiopaque bony mass arising from the medial aspect of the distal femur (arrow)

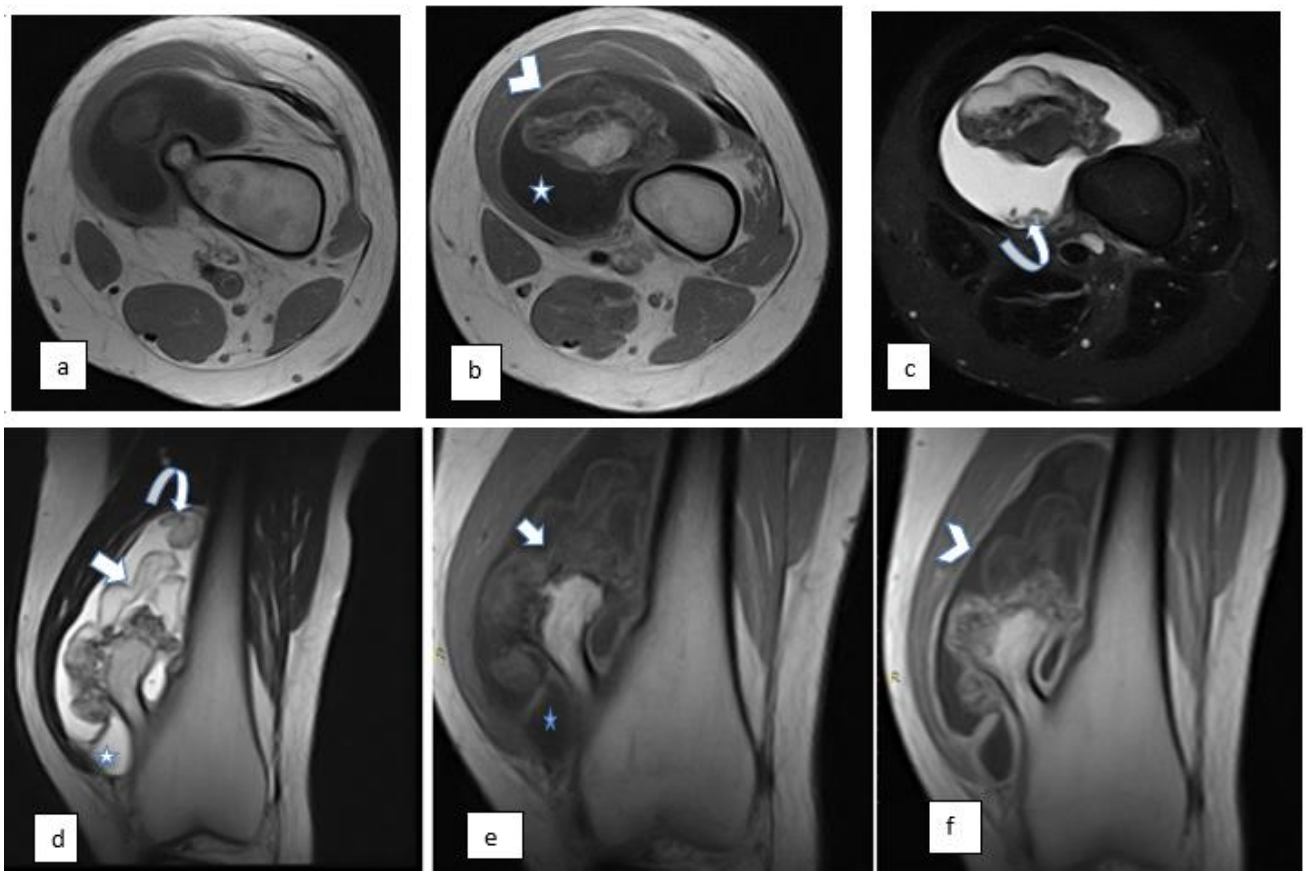

Fig 2: MRI findings of distal femoral osteochondroma complicated by reactive bursitis.
(a–f) Multiplanar MRI sequences, including axial T1-weighted, contrast-enhanced axial T1-weighted, axial STIR, coronal T2-weighted, coronal T1-weighted, and contrast-enhanced coronal T1-weighted images, demonstrating a distal femoral osteochondroma with an adjacent fluid-filled bursal collection consistent with secondary reactive bursitis.**

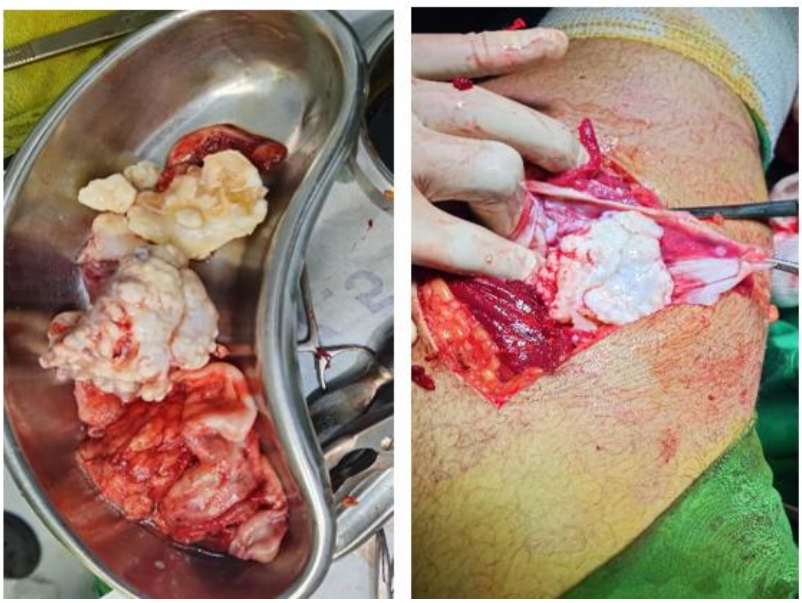

Fig. 3: Surgical excision of the osteochondroma.

Discussion

Osteochondroma is the most frequently encountered type of benign bone tumor, accounting for approximately 20–50% of all benign osseous tumors and 10–15% of all bone neoplasms. The World Health Organization defines osteochondroma as a cartilage-capped bony outgrowth arising from the external surface of a bone with continuity of both the cortex and the medullary cavity with the parent bone. Although the lesion is predominantly osseous, its growth occurs within the cartilaginous cap.

Morphologically, osteochondromas (OCs) may appear as either sessile or pedunculated lesions [5]. They may present as solitary lesions or as part of a multiple form known as HME, also referred to as familial osteochondromatosis, an autosomal dominant disorder [4].

The true incidence of osteochondroma remains uncertain, as many lesions are asymptomatic and therefore undiagnosed. The reported frequency varies according to lesion type, with solitary OCs occurring approximately six times more commonly than HME. Lesion growth typically occurs during childhood and adolescence, with no new development or enlargement after skeletal maturity is reached [9, 10]. A male predominance has been consistently reported [10]. OCs most frequently arise in the metaphyseal regions of long bones, particularly around the knee, and involve the proximal tibia and distal femur [4].

Most OCs are asymptomatic and are often detected incidentally on radiographs obtained for unrelated reasons [1, 6]. The second most common presentation is a painless, palpable mass, which may result in cosmetic concerns [1, 6]. Symptomatic cases may arise from mechanical irritation or compression of adjacent structures, pathological fracture, bursitis, or malignant transformation. Neural compression may lead to sensory disturbances such as numbness and tingling. Vascular involvement can cause intermittent ischemic symptoms, diminished pulses, or color changes in the affected limb and may result in complications such as arterial or venous thrombosis, aneurysm, or pseudoaneurysm formation. Additionally, chronic friction between the lesion and overlying soft tissues may lead to bursa formation and secondary bursitis [3], as demonstrated in the present case.

Reactive bursitis is a relatively common complication of osteochondroma. It was first described by Orlow in 1891, who introduced the term “exostosis bursata” to describe bursa formation between an osteochondroma and surrounding soft tissues [11]. He noted that inflammation of the bursa may result in localized pain and tenderness.

In patients with multiple OCs, skeletal abnormalities such as limb shortening, angular deformities, and disproportion between the trunk and extremities may be observed [2]. Common deformities include genu varum and genu valgum, which may lead to restricted joint range of motion.

Rapid lesion enlargement, the onset of localized pain, or continued growth after skeletal maturity should raise suspicion for malignant transformation, most commonly secondary chondrosarcoma.

Plain radiography remains the initial and primary imaging modality for evaluating suspected OCs. Radiographically, the lesion typically appears as a well-defined bony protuberance arising from the external surface of the bone (Fig. 1). Lesions usually measure between 1 and 10 cm and demonstrate cortical and medullary continuity with the parent bone, most commonly originating from the metaphyseal region [2]. Pedunculated OCs extend from the bone via a stalk and characteristically project away from the adjacent joint, whereas sessile lesions are broad-based without a stalk. Additional radiographic findings may include calcified flakes or linear interruptions within the cartilaginous cap. In the present case, the lesion appeared as a pedunculated bony outgrowth from the distal femoral metaphysis with clear corticomedullary continuity, which is consistent with the classic radiographic features of osteochondroma. The absence of a periosteal reaction or cortical destruction further supported its benign nature.

Other complications, such as fracture, joint dislocation, and growth disturbances, are readily identified on plain radiographs [6]. However, lesions located in anatomically complex regions, including the pelvis, shoulder girdle, or spine, are better evaluated via cross-sectional imaging modalities such as multidetector computed tomography (MDCT) or MRI.

MRI is considered the optimal modality for assessing lesion morphology, particularly the continuity of the cortex and medullary cavity with the parent bone, which is crucial for distinguishing osteochondroma from other surface bone tumors and for identifying associated complications [6, 12]. MRI is especially valuable in detecting malignant transformation, as it allows accurate and reproducible measurement of cartilage cap thickness. A cap thickness of 2 cm or greater is strongly suggestive of secondary chondrosarcoma. On MRI, the cartilage cap typically has low to intermediate signal intensity on T1-weighted images and high signal intensity on T2-weighted images because of its high-water content [2].

Furthermore, MRI provides critical information regarding associated bursitis, muscle impingement, and vascular complications. Bursa formation appears as an ill-defined fluid-filled lesion with peripheral enhancement following gadolinium administration [13].

Muscle impingement is characterized by increased T2-weighted signal intensity within affected muscles and

should be considered in patients presenting with pain or swelling near an exostosis. Vascular complications such as pseudoaneurysms and thrombosis exhibit characteristic MRI features, including heterogeneous signal intensity and layered thrombus appearance within the vessel lumen [6]. MRI also enhances diagnostic accuracy in identifying secondary chondrosarcoma. A cartilage cap thickness exceeding 3 cm in children or 2 cm in adults is highly indicative of malignant degeneration [3]. Additionally, septal enhancement following gadolinium administration is considered a concerning feature for malignant transformation.

Ultrasound represents an additional imaging modality for evaluating cartilage cap thickness. The cartilage cap appears as a hypoechoic layer overlying a hyperechoic bony surface. Malghem et al. evaluated 22 resected OCs and two exostotic chondrosarcomas and demonstrated that ultrasonographic measurements of cartilage cap thickness is highly accurate, comparable to those of MRI and superior to those of MDCT. Nevertheless, ultrasound remains limited by operator dependency.

A limitation of this case report is that MRI examinations were accomplished using a 0.5-T scanner instead of the more widely used 1.5-T or 3.0-T systems. MRI 0.5 T is the most widely available and accessible diagnostic tools in resource-limited regional healthcare setting such as Aden. Lower-field MRI scanners usually offer reduced signal-to-noise ratio and spatial resolution, which may limit the visualization of subtle anatomical details. However, 0.5 T MRI remains highly effective for representative the characteristic features of osteochondroma, including cartilage cap assessment, lesion morphology, associated bursitis, and the relationship of the lesion to adjacent soft tissues. In the current case, the 0.5-T MRI images were adequate to recognize the distal femoral osteochondroma, describe the reactive bursal formation, and support surgical planning and correlation.

The intraoperative identification of a bursa containing fragments of the cartilage cap correlates well with MRI findings, further highlighting the importance of cross-sectional imaging in preoperative planning. This case underscores the essential role of multimodality imaging not only in confirming the diagnosis of osteochondroma but also in identifying associated complications and excluding malignant transformation, thereby guiding appropriate surgical management and optimizing patient outcomes.

Conclusion

This case underscores the pivotal role of radiologic imaging in the diagnosis, characterization, and management of osteochondroma. The combined use of plain radiography and MRI provided a comprehensive evaluation — radiography delineated the osseous continuity confirming the benign exostotic nature of the lesion, whereas MRI offered superior assessment of the cartilage cap and detected secondary complications. Recognizing these imaging features is essential for differentiating benign OCs from malignant transformation. Postoperative imaging follow-up remains crucial for confirming complete excision and excluding recurrence. Ultimately, this case illustrates how advanced imaging modalities contribute not only to accurate diagnosis but also to optimal surgical planning and long-term patient care in musculoskeletal radiology.

Ethics Approval and Consent to Participate

All procedures performed in this case report were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in its most recently amended version. Informed consent was obtained from the patient included in the study. Additional informed consent was obtained from the patient(s) for whom identifying information is included in this article.

Consent for Publication

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

Conflict of Interest

The authors declare that they have no competing interests.

List of Abbreviations

AP: A preliminary anteroposterior

MDCT: Multidetector Computed Tomography

HME: Hereditary Multiple Exostosis

MRI: Magnetic Resonance Imaging

OCs: Osteochondromas

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مقالة بحثية

التهاب الجراب التفاعلي الثانوي لورم عظمي غضروفي في الطرف السفلي لعظم الفخذ: الخصائص في التصوير بالرنين المغناطيسي، والتحديات التشخيصية، والتأكيد الجراحي: تقرير حالة

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المُلخّص

يُعد الورم العظمي الغضروفي (Osteochondroma) أكثر الأورام العظمية الحميدة شيوعًا، ويظهر عادةً لدى الأطفال والمراهقين. يتميز بوجود نتوء عظمي مغطى بغطاء غضروفي ينشأ غالبًا في المناطق المشاشية (Metaphyseal regions) للعظام الطويلة. تكون هذه الآفات غالبًا عديمة الأعراض، إلا أنها قد تترافق مع مضاعفات مثل الكسور، والتشوهات العظمية، والانضغاط العصبي الوعائي، أو التهاب الجراب (Bursitis). ويُعد التصوير الطبي، وخاصة التصوير بالرنين المغناطيسي (MRI)، أداة أساسية في الكشف عن هذه السمات وتمييز التغيرات الحميدة من التحول الخبيث المحتمل الذي قد يحدث في مرحلة البلوغ، رغم أن حدوث النقائل يُعد نادرًا. تُقدم حالة شاب يبلغ من العمر 18 عامًا حضر بشكوى من تورم متزايد تدريجيًا وألم خفيف مستمر في الجزء السفلي من الفخذ الأيسر. أظهرت الأشعة السينية وجود آفة عظمية معنقة (Pedunculated) ناشئة من المشاش السفلي لعظمة الفخذ، مع استمرارية واضحة بين القشرة والنخاع العظمي للآفة والعظم الأصلي، وهي سمات تتوافق مع تشخيص الورم العظمي الغضروفي. أظهر التصوير بالرنين المغناطيسي وجود آفة مغطاة بغطاء غضروفي، مع تجمع سائل مجاور لها، مما يشير إلى وجود التهاب جراب تفاعلي ثانوي (Secondary Reactive Bursitis). تم استئصال الورم جراحيًا، وأكد الفحص النسيجي المرضي تشخيص الورم العظمي الغضروفي الحميد مع وجود نسيج جرابي مرافق. وكانت فترة ما بعد الجراحة خالية من المضاعفات، مع تعافٍ جيد للمريض. تُبرز هذه الحالة الأهمية الكبيرة للتصوير المتقدم، وخاصة التصوير بالرنين المغناطيسي، في التشخيص الدقيق للورم العظمي الغضروفي ومضاعفاته الثانوية مثل التهاب الجراب التفاعلي. كما يساعد التصوير بالرنين المغناطيسي في التخطيط الجراحي، وتمييز الآفات الحميدة من التغيرات الخبيثة المحتملة، إضافةً إلى دوره في تقييم الاستئصال الكامل للورم ومتابعة احتمالية النكس بعد الجراحة.

الكلمات المفتاحية: الورم العظمي الغضروفي؛ الجزء السفلي من عظم الفخذ؛ التهاب الجراب التفاعلي؛ التصوير بالرنين المغناطيسي (MRI)؛ ورم عظمي حميد.

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