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Case report

Osteolipoma Presenting as a Deep-Seated Intermuscular Mass: Case Report of a Rare Clinical Entity

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Abstract
Osteolipoma is an extremely rare histological variant of lipoma, characterized by the presence of mature osseous elements within a benign fatty tumor. We report the case of a 60-year-old woman patient who presented with a slowly enlarging four-year-old, painless mass in the left forearm. Diagnostic imaging, including ultrasound and magnetic resonance imaging (MRI), suggested a lipomatous tumor with calcification. Surgical excision was performed. Histopathological examination confirmed the diagnosis of osteolipoma, showing mature adipose tissue interspersed with trabeculae of lamellar bone. This report highlights the clinical, radiological, and histopathological features of this rare entity and reviews the current literature.
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Introduction

Lipomas are the most common benign mesenchymal tumours, originating from mature adipose tissue. While common, they present a variety of histological subtypes, including angiolipoma, spindle cell lipoma, and fibrolipoma. Osteolipoma is an exceptionally rare variant, estimated to account for less than 1% of all lipomas [1]. The term osteolipoma is used when mature bone tissue is found within the lipoma. This entity should be differentiated from ossification that occurs secondary to trauma or long-standing tumors, and from primary bone tumors [2, 3]**.** It has been described under different names in the literature, including osseous lipoma, ossifying lipoma, osseous lipomatous hamartoma, and lipoma with osseous metaplasia {Dougherty, 2015 #7}. Although typically benign, its rarity makes accurate diagnosis challenging, relying heavily on histopathological confirmation. This paper presents a case of osteolipoma deeply embedded between forearm muscles and contributes to the limited body of literature on this condition.

Case Presentation

A 60-year-old woman presented to the clinic with a history of a 4-year slowly growing, non-tender subcutaneous mass located in the left forearm. The patient denied any history of trauma to the area, prior infection, or constitutional symptoms. Physical examination revealed a firm, mobile, non-pitting, well-circumscribed mass measuring approximately 8 cm in its largest dimension .Ultrasound examination demonstrated a well-defined, heterogeneous mass suggestive of a lipoma, but with calcification or ossification. MRI of the left forearm showed an intermuscular 8 cm mass with signal intensity predominantly consistent with fat, but contained a prominent, centrally located nodule exhibiting high signal intensity on all sequences, with no fat suppression on the fat suppression sequence, highly suggestive of hemorrhagic areas. No invasion of adjacent structures was noted**.**

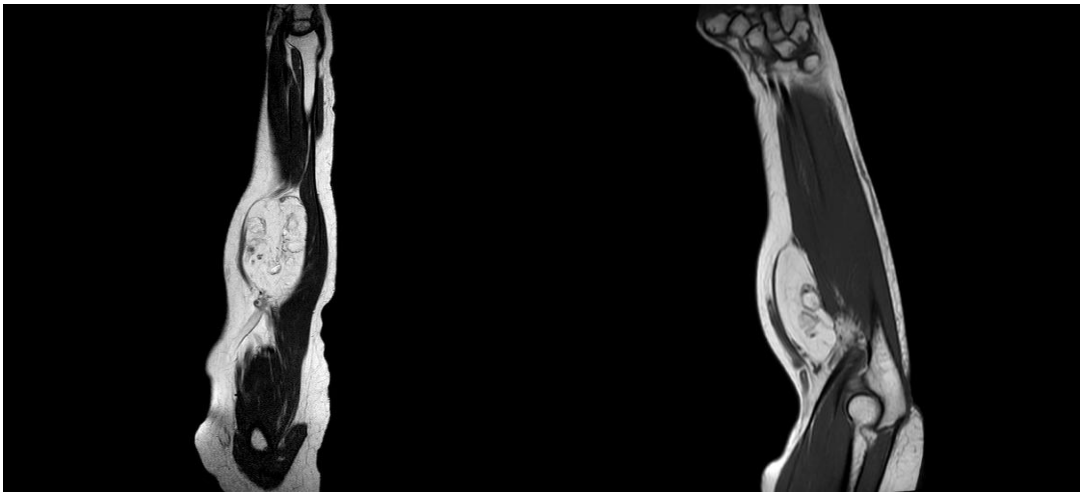

Figure 1. MRI T2-weighted sequence and T1-weighted sequence for the forearm show a well-defined intramuscular hyperintense lesion with foci of low signal intensity on the T1-weighted sequence.

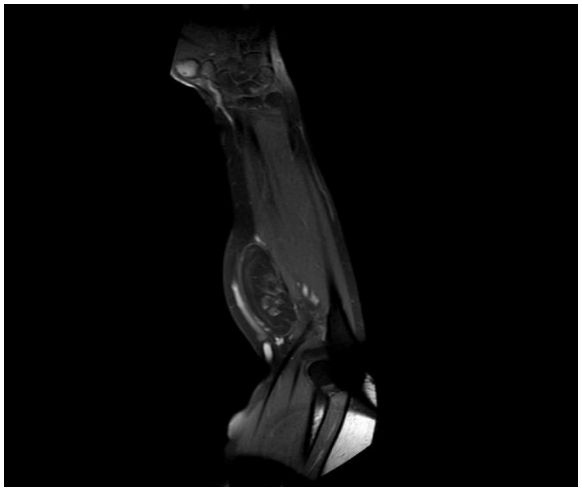

Figure 2. The lesion shows fat suppression with high signal foci on this T1 fat suppression sequence

The patient underwent complete surgical excision [5, 17] of the mass under General Anesthesia. The tumour was well-encapsulated and easily enucleated. Gross examination of the excised specimen revealed a yellowish, lobulated mass with a hard, gritty, white focus within the center.

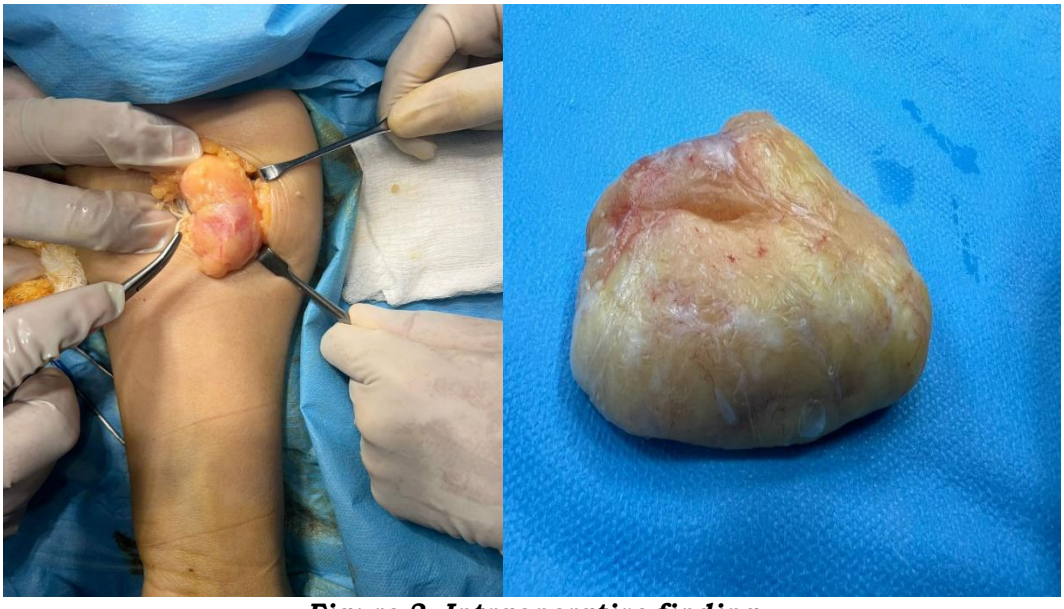

Figure 3. Intraoperative finding

Microscopic examination revealed a tumor composed primarily of mature adipose tissue, consistent with a benign lipoma. Interspersed within the fatty tissue were trabeculae of mature lamellar bone with surrounding osteoblasts and occasional hematopoietic elements, confirming the diagnosis of osteolipoma. The ossification appeared to be a primary component of the tumor rather than secondary dystrophic calcification. The margins of resection were clear. The patient had an uncomplicated post-operative recovery and was discharged on the first post-operative day. In good general condition, with 6 months' follow-up, no evidence of recurrence.

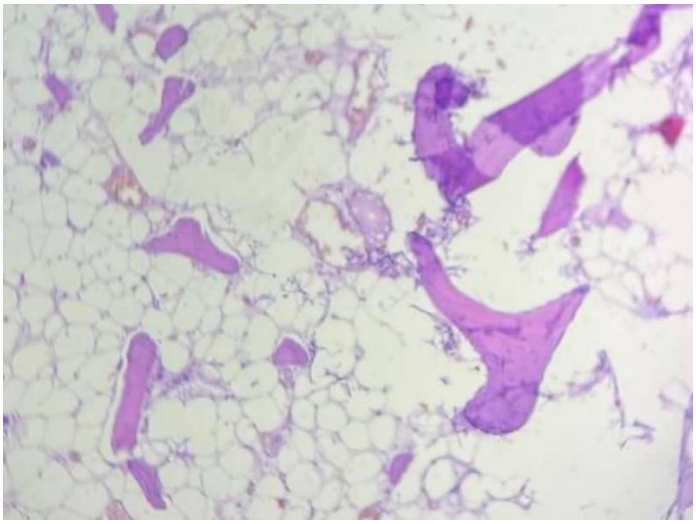

Figure (4) Photomicrograph (H&E, 100x magnification) reveals a background of mature adipose tissue, characterized by clear, univacuolated adipocytes with irregular and pink bone trabeculae. These bony structures appear as branching islands within the lipomatous matrix.

Discussion

Plaut et al first reported Osteolipoma in 1959{Plaut, 1959 #6}. The osteolipoma is a rare tumor with an unclear pathogenesis. Several theories exist, including metaplasia of connective tissue elements within a lipoma. In addition, the pathogenesis of osteolipoma remains debated, with other theories suggesting either divergent differentiation of mesenchymal stem cells or metaplasia of fibroblasts into osteoblasts following repetitive trauma [7, 10]. In this case, the large size (8 cm) and deep intermuscular location required careful preoperative MRI assessment to rule out more aggressive liposarcomas [9]. The focal hypointensities on T1WI are characteristic of the "osteo" component [6, 8], which distinguishes this entity from a simple lipoma. The definitive diagnosis of osteolipoma is based on histopathology. Radiologically, the presence of a well-defined, fatty mass on MRI combined with a dense, calcified/ossified component on CT or X-ray is highly suggestive, but non-specific, as it can be mistaken for other lesions like calcifying hemangioma, myositis ossificans, or low-grade osteosarcoma (though malignancy is rare). The key feature that distinguishes osteolipoma from other ossifying lesions is the finding of mature osseous tissue intimately mixed with mature adipose tissue upon microscopic review [12, 14].

While most lipomas are superficial, osteolipomas have been reported in various locations, including the head and neck region, tongue [4], parotid gland [10], and as in our case located deeply in the forearm [16]. The treatment of choice for osteolipoma is complete surgical excision [5, 17], which is usually curative, and the prognosis is excellent [13, 15], with a low risk of recurrence.

Table 1. List of previous cases published

Study	Age/Sex	Location	Size	Depth	Imaging	Histopathology
Chai et al., 2007	52/F	Thigh	5 cm	Deep	Fat + calcification	Fat + bone
Kumar et al., 2017	45/M	Tongue	2 cm	Superficial	Well-defined	Fat + ossification
Allen et al., 2016	60/M	Forearm	6 cm	Intermuscular	MRI fat + low signal	Adipocytes + bone
Gupta et al., 2019	58/F	Thigh	7 cm	Deep	Heterogeneous	Lipoma + bone
Adeeb et al., 2021	40–65	Extremities	3–9 cm	Deep	Mixed density	Fat + bone
Present case	60/F	Forearm	8 cm	Intermuscular	MRI fat + ossified component	Fat + lamellar bone

Osteolipoma is an exceedingly rare and poorly characterized variant of benign lipomatous tumors, defined by the presence of mature osseous tissue within an otherwise conventional lipoma. Although lipomas represent the most common mesenchymal neoplasms, osteolipoma constitutes less than 1% of all reported cases, thereby limiting the availability of robust clinicopathological data and contributing to ongoing diagnostic ambiguity. Since its initial description by Plaut et al. in 1959, osteolipoma has remained a diagnostically challenging entity, not only due to its rarity but also because of inconsistent terminology and overlapping histological features with other ossifying soft tissue lesions. The pathogenesis of osteolipoma continues to be a subject of debate. Proposed mechanisms include osseous metaplasia due to chronic irritation or differentiation from pluripotent mesenchymal stem cells. However, definitive molecular evidence remains lacking. Clinically, osteolipomas are slow-growing and painless but may mimic malignant tumors when located in deep tissues. Imaging findings are non-specific, often requiring histopathological confirmation.

Histologically, osteolipoma is characterized by mature adipose tissue mixed with lamellar bone. Surgical excision is curative, with excellent prognosis and minimal recurrence risk. The present case adds to the limited literature, particularly due to its deep intermuscular location and large size, emphasizing diagnostic challenges and the importance of histopathology.

Critical Comparison Table

The present case demonstrates several key clinicopathological features that are highly consistent with previously reported cases of osteolipoma, while also contributing unique aspects that enhance the current understanding of this rare entity. Similar to the case reported by Demiralp et al., where an intramuscular osteolipoma of the thigh presented as a slowly enlarging mass without malignant features, our case also exhibited a deep-seated location with indolent clinical behavior and no evidence of recurrence following complete excision. Furthermore, the radiological findings in our case—characterized by a predominantly lipomatous lesion with internal ossified components—closely mirror those described in forearm osteolipoma cases, where MRI typically reveals fat signal intensity interspersed with calcified or ossified areas. This reinforces the concept that, although suggestive, imaging findings remain non-specific and may overlap with more aggressive neoplasms such as well-differentiated liposarcoma.

From a pathological standpoint, the presence of mature lamellar bone embedded within adipose tissue in our case is in line with the defining histological criteria consistently reported across the literature. Notably, similar to observations in intramuscular osteolipomas, the absence of cellular atypia or lipoblasts further supports the benign nature of the lesion. However, an important distinguishing feature of the present case lies in its intermuscular forearm location combined with relatively large size (8 cm), which is less commonly reported. While most osteolipomas occur in superficial tissues or in the head and neck region, deep intermuscular involvement remains rare and may significantly complicate preoperative diagnosis by mimicking sarcomatous lesions. In addition, the debated pathogenesis observed in previous studies is also reflected in our findings. While some authors favor metaplastic ossification due to chronic irritation or ischemia, others propose a mesenchymal stem cell origin. The organized lamellar bone and occasional hematopoietic elements observed in our case lend support to the latter hypothesis, suggesting a more intrinsic differentiation process rather than a purely reactive phenomenon.

Importantly, the clinical outcome in our case aligns with the broader literature, where complete surgical excision is consistently associated with excellent prognosis and minimal risk of recurrence. Across multiple reports—including intra-articular and intramuscular variants—no significant recurrence or malignant transformation has been documented, further reinforcing the benign biological behavior of osteolipoma.

From a critical perspective, the existing body of literature remains limited by its reliance on isolated case reports and small case series, with a lack of long-term follow-up and molecular characterization. The present case contributes to narrowing this gap by documenting a rare deep intermuscular presentation in the forearm, thereby expanding the anatomical spectrum of osteolipoma and highlighting the importance of considering this entity in the differential diagnosis of calcified soft tissue masses.

Comparison with previously reported cases demonstrates consistent benign behavior despite variable clinical and radiological presentations. Deep-seated lesions, such as the present case, pose significant diagnostic challenges due to overlap with malignant entities. Histopathology remains the gold standard for diagnosis. The presence of mature bone within adipose tissue supports true mesenchymal differentiation rather than reactive ossification. Surgical excision is uniformly curative across reported cases. However, the literature remains limited to case reports, highlighting the need for larger studies and molecular insights.

Conclusion

This case report adds to the sparse literature on osteolipoma, a rare and benign variant of lipoma. Although its clinical presentation is often unremarkable, the characteristic imaging findings and definitive histopathology are crucial for accurate diagnosis. Complete surgical resection provides an excellent outcome.

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