

First Reported Case of Nodular Fasciitis with Intraosseous Patellar Involvement: A Case Report

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Learning Point of the Article:

Nodular fasciitis, though typically a benign superficial soft-tissue lesion, can rarely present as an intra-articular knee mass with patellar bone erosion, and USP6 molecular testing is critical for accurate diagnosis in such atypical, malignancy-mimicking cases.

Abstract

Introduction: Nodular fasciitis is a benign, self-limited myofibroblastic proliferation that most commonly arises in the superficial soft tissues of young adults. It is characterized by rapid growth and histologic features that can mimic sarcoma, often prompting concern for malignancy. Intra-articular nodular fasciitis is exceedingly rare, and involvement of bone is particularly unusual. The identification of recurrent ubiquitin-specific protease 6 (USP6) gene rearrangements has clarified the neoplastic nature of nodular fasciitis and provided a valuable molecular diagnostic tool, especially in atypical clinical or anatomic presentations. We report the first documented case of nodular fasciitis with intraosseous involvement of the patella.

Case Report: A 67-year-old man with a history of follicular lymphoma presented with a 6-month history of progressively worsening right anterior knee pain. Magnetic resonance imaging demonstrated a $2.1 \times 1.3 \times 1.9$ cm heterogeneous subpatellar soft-tissue mass with internal nodularity, peripheral enhancement, and cortical erosion of the inferior patella. Given the patient's oncologic history and aggressive imaging features, the differential diagnosis included metastatic disease, tenosynovial giant cell tumor, synovial chondromatosis, and gouty arthritis. Image-guided biopsy revealed a hypercellular spindle cell proliferation in a myxoid stroma with extravasated erythrocytes and occasional giant cells, suggestive of nodular fasciitis; however, the intra-articular location and osseous involvement were highly atypical. Fluorescence in situ hybridization demonstrated a rearrangement of the USP6 gene, confirming the diagnosis. Due to persistent symptoms and bony involvement, the patient underwent surgical excision of the mass with curettage of the patella. Post-operatively, he experienced significant pain relief without complications.

Conclusion: This case represents the first reported instance of nodular fasciitis with intraosseous involvement of the patella. It highlights the importance of considering nodular fasciitis in the differential diagnosis of intra-articular knee masses, even in older patients and in the presence of bone erosion. Molecular confirmation with USP6 testing is invaluable in establishing the diagnosis when clinical, radiographic, or histologic features are atypical. Surgical excision remains an effective treatment option for symptomatic lesions refractory to conservative management.

Keywords: Nodular fasciitis, intra-articular knee mass, patella, ubiquitin-specific protease 6 gene rearrangement, bone erosion.

Introduction

Nodular fasciitis is a benign, self-limited myofibroblastic proliferation initially described by Konwaler et al. in 1955 as

subcutaneous pseudosarcomatous fibromatosis [1]. This lesion typically presents as a rapidly growing, solitary soft-tissue mass arising in the subcutaneous tissues or fascia of the upper

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Author's Photo Gallery



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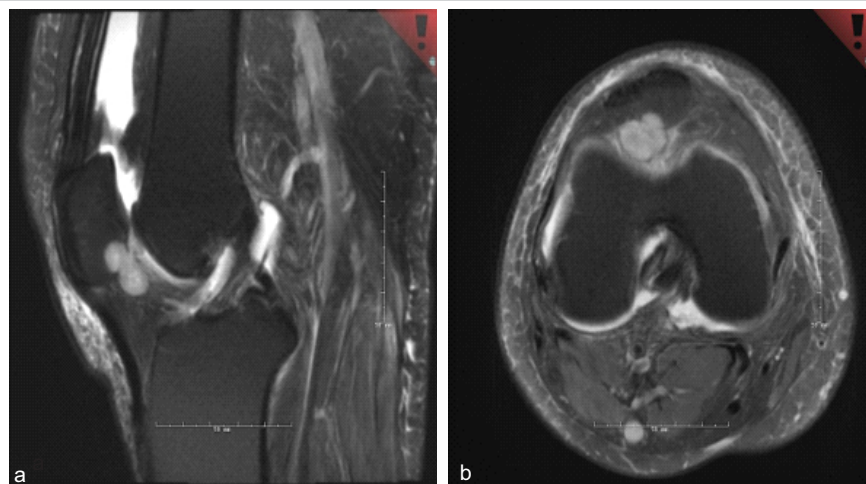


Figure 1: Magnetic resonance imaging (MRI) of subpatellar nodular fasciitis with patellar erosion. (a) Sagittal T2-weighted MRI of the right knee demonstrating a multilobulated, hyperintense intra-articular mass arising from the subpatellar region with erosion of the inferior cortical surface of the patella. (b) Axial T2-weighted MRI of the right knee showing a heterogeneous hyperintense subpatellar soft-tissue mass with associated cortical erosion of the undersurface of the patella.

extremities, trunk, or head and neck region of young adults [2,3]. Despite its benign nature, its clinical presentation and histologic features may be alarming, often mimicking sarcoma with rapid growth, high cellularity, and prominent mitotic activity [4]. Although nodular fasciitis most commonly arises in superficial soft tissues, intra-articular occurrence is exceedingly rare and is rarely reported in the literature. Among documented cases, the knee is the most frequently affected joint, representing approximately 27% of intra-articular nodular fasciitis cases [5,6,7]. The rarity of this presentation, combined with non-specific and occasionally aggressive imaging findings, creates significant diagnostic challenges and often raises concern for malignancy.

The understanding of nodular fasciitis has evolved from being considered a reactive process to recognition as a self-limited neoplasm. In 2011, Erickson-Johnson et al. identified the recurrent ubiquitin-specific protease 6 (USP6) gene rearrangements in nodular fasciitis, with MYH9-USP6 being the most common fusion product [8]. USP6 gene rearrangements are now detected in up to 92% of cases and serve as a valuable diagnostic tool, particularly in morphologically or clinically atypical cases [9,10].

We report a unique case of nodular fasciitis arising in the subpatellar region with erosion into the undersurface of the patella in a 67-year-old man. To our knowledge, this represents the first reported case of nodular fasciitis with intraosseous involvement of the

patella. This case highlights the diagnostic complexity of intra-articular nodular fasciitis and the critical role of molecular confirmation.

Case Report

Patient consent was obtained to write this case report.

A 67-year-old male with a medical history significant for gout and stage IV follicular lymphoma presented to a sports medicine clinic with a 6-month history of progressively worsening right anterior knee pain. He had been previously treated at an outside hospital with corticosteroid injections and knee aspiration, which demonstrated no evidence of infection or gout. The patient described sharp, stabbing anterior knee pain that was exacerbated with knee flexion and walking.

Magnetic resonance imaging with and without contrast was performed, revealing a 2.1 cm × 1.3 cm × 1.9 cm heterogeneous soft tissue mass in the subpatellar region of the right knee. The lesion was hyperintense on T2-weighted images with internal nodularity and peripheral enhancement. Notably, the mass demonstrated cortical erosion into the undersurface of the patella (Fig. 1). Given the patients' oncologic history and the aggressive imaging features, the differential diagnosis included metastatic disease, primary soft-tissue neoplasms, such as tenosynovial giant cell tumor or synovial chondromatosis, gouty arthritis, and, less likely, degenerative arthropathy.

The magnetic resonance imaging (MRI) findings prompted a referral to orthopedic oncology, where, following a

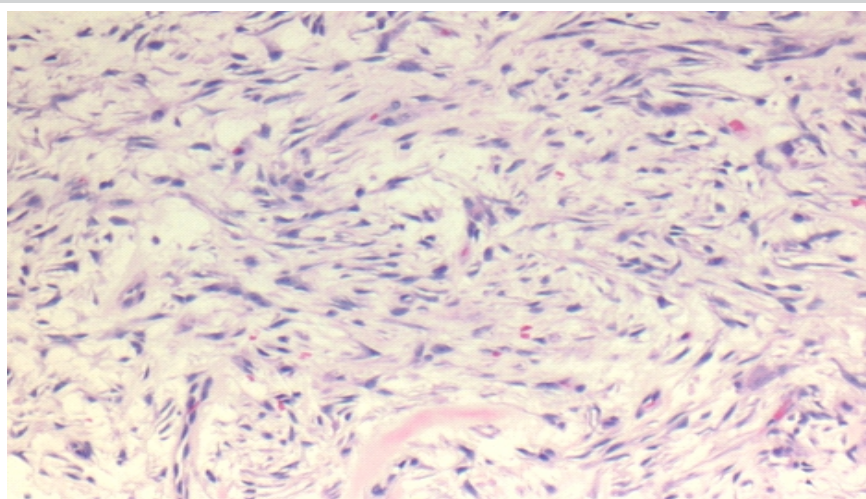


Figure 2: Histopathology of nodular fasciitis with ubiquitin-specific protease 6 confirmation. A variably cellular proliferation of plump fibroblasts and myofibroblasts in a loose matrix, with extravasated red blood cells and without morphologic atypia (Hematoxylin and eosin, ×20).

multidisciplinary tumor board meeting, the patient underwent an image-guided biopsy by interventional radiology. Histopathologic examination revealed a hypercellular lesion composed of spindled cells with mild atypia and minimal mitotic activity in a myxoid background that contained occasional erythrocytes and giant cells (Fig. 2). While the morphology was suggestive of nodular fasciitis, the intra-articular location and osseous involvement were highly atypical. Fluorescence in situ hybridization (FISH) for USP6 was therefore performed and demonstrated a rearrangement at 17p13, confirming the diagnosis of nodular fasciitis.

Given the patient's refractory pain to conservative management and associated bony involvement, surgical excision was recommended. An incision was made over the anterior right knee, and a medial parapatellar arthrotomy was performed. Upon entering the joint, nodular synovitis and copious amounts of synovial fluid were found. The mass was identified arising from the subpatellar region and extending into the inferior portion of the patella. The lesion was excised using electrocautery and curettage of the patella. The joint was thoroughly irrigated and closed in layers.

Final pathology was consistent with the pre-operative diagnosis of nodular fasciitis involving both the subpatellar soft tissues and the intraosseous patellar component. At 2-week post-operative follow-up, the patient reported significant improvement in pain without complications.

Discussion

Nodular fasciitis is a benign, self-limited myofibroblastic proliferation that classically affects young adults between the second and fourth decades of life [2]. Presentations in patients over 60 years of age, as in our patient, are exceedingly uncommon. In the extremities, nodular fasciitis is typically found in the forearm (27%), thigh (17%), and upper arm (12%) [3]. Intra-articular occurrence is exceptionally rare, representing a diagnostic challenge for clinicians and pathologists.

A comprehensive review by Wang et al. identified only 21 reported cases of intra-articular nodular fasciitis in the literature [5]. Of these cases, the knee was the most commonly affected joint (67%), followed by the shoulder (14%), hand (10%), hip (5%), and ankle (5%). Of the lesions in the knee, the subpatellar fat pad appears to be a common site for nodular fasciitis to arise. The median reported age of 26 years (range 4–54 years) is substantially younger than in our case, underscoring the unusual demographic and clinical features of our patient [5,6,7,11].

The most striking and novel feature of our case is the presence of

intraosseous erosion of the patella. While osseous involvement in nodular fasciitis has been rarely documented, it is typically seen in the cranial fasciitis variant, which affects the calvarium in young children [12]. A recent study by Zhang et al. reported rare cases of nodular fasciitis with bone involvement in locations other than the skull, including one case affecting the hallux [13,14]. However, to our knowledge, our patient represents the first reported case of nodular fasciitis with intraosseous involvement of the patella.

Radiographically, nodular fasciitis often demonstrates non-specific and at times aggressive features resembling those of malignancy. On MRI, lesions typically appear iso- to hypointense on T1-weighted images and hyperintense on T2-weighted images [15,16]. Heterogeneous enhancement is common, and some cases demonstrate aggressive features, including transcompartmental spread and osseous involvement [17]. In our patient, the presence of cortical erosion combined with his history of follicular lymphoma raised concern for malignancy, highlighting the importance of tissue diagnosis.

The histopathologic diagnosis of nodular fasciitis is characterized by a proliferation of plump, immature-appearing myofibroblasts arranged in short, irregular fascicles within a variably myxoid to collagenous stroma [18,19]. Scattered inflammatory cells, extravasated erythrocytes, and occasional multinucleated giant cells are common findings. Immunohistochemically, the cells typically stain positive for smooth muscle actin and vimentin but negative for desmin, distinguishing them from smooth muscle tumors [19].

The discovery of recurrent USP6 gene rearrangements has revolutionized our understanding of nodular fasciitis. In 2011, Erickson-Johnson et al. identified the MYH9-USP6 fusion gene as the primary genetic alteration in nodular fasciitis [8]. USP6 rearrangements are now detected in 86–92% of cases by FISH analysis, with a specificity approaching 100% [9,10]. The gene fusion results in overexpression of USP6, a deubiquitinase that promotes cell proliferation through activation of JAK-STAT and NF- κ B signaling pathways [20]. In our patient, FISH confirmed USP6 (17p13) rearrangement, supporting the diagnosis of nodular fasciitis despite the unusual presentation with bone involvement.

Management of nodular fasciitis varies depending on the severity of symptoms and anatomic location. Although spontaneous regression has been reported, symptomatic lesions or those in critical locations often warrant surgical excision. Marginal resection is usually curative, and recurrence is exceedingly rare even with incomplete resection [2]. In our patient, the decision to proceed with surgical resection was based on the severity of symptoms refractory to conservative management and the presence of bony erosion into the patella.

This case highlights several important clinical principles. First, nodular fasciitis should be considered in the differential diagnosis of intra-articular knee masses, even in older patients and when aggressive features, such as bone erosion are present. Second, USP6 FISH analysis is an invaluable diagnostic tool when the morphologic diagnosis is uncertain or when the clinical presentation is atypical. Third, surgical treatment remains an appropriate option for symptomatic lesions despite the self-limited nature of nodular fasciitis, particularly when conservative management has failed. Ultimately, a close clinical correlation between imaging, histopathology, and molecular findings is crucial for accurate diagnosis and effective management.

Conclusion

We report the first documented case of nodular fasciitis with intraosseous involvement of the patella in a 67-year-old man. This unusual presentation highlights the importance of maintaining a broad differential diagnosis for intra-articular knee masses with bony erosion. Molecular confirmation through USP6 FISH analysis proved essential in establishing

the correct diagnosis in this clinically challenging case. Surgical resection provided both diagnostic certainty and symptom relief for this patient with symptoms refractory to conservative management. This case expands our understanding of the anatomic diversity of nodular fasciitis and emphasizes the value of molecular diagnostics.

Clinical Message

Nodular fasciitis is a benign myofibroblastic proliferation that can closely mimic malignancy due to its rapid growth, high cellularity, and occasionally aggressive radiographic appearance. Although typically confined to superficial soft tissues, it can rarely present as an intra-articular knee mass with associated osseous erosion, creating significant diagnostic uncertainty, particularly in patients with a history of malignancy. This case emphasizes the importance of maintaining a broad differential diagnosis for intra-articular lesions with bone involvement and highlights the critical role of molecular confirmation using USP6 gene rearrangement analysis to establish an accurate diagnosis and avoid overtreatment. Recognition of this rare presentation allows for appropriate surgical management and symptom resolution while preventing misclassification as a malignant process.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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