Case Report | Journal of Orthopaedic Case Reports 2025 October:15(10):Page 114-119

Synovial Sarcoma Disguised as a Ganglion Cyst in a Patient with Chronic Knee Pain

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Learning Point of the Article:

Synovial sarcoma, particularly when intra-articular and small (<5 cm), can present with symptoms and imaging features similar to benign conditions such as ganglion cysts, venous malformations, or PVNS, making diagnosis challenging.

Long-standing "Nodular synovitis/ Ganglion cyst" is not benign enough to be ignored. Prompt evaluation must be done radiologically before surgery to prevent unwarranted consequences. Multi-disciplinary approach helps in preventing recurrence and improves the long-term survival rate of the patient.

Abstract

Introduction: An uncommon malignant soft-tissue tumor, synovial sarcoma (SS) usually develops close to large joints like the knee and ankle, and most frequently affects young adults. These tumors might be confused for benign intra-articular lesions such as pigmented villonodular synovitis, synovial osteochondromatosis, or ganglion cysts because they frequently manifest as slow-growing, painless masses. The diagnostic difficulties and significance of taking SS into account when making a differential diagnosis for chronic intra-articular lesions are highlighted by this case.

Case Report: A 25-year-old man from South India came in complaining of right knee pain and limited flexion that had gotten worse for 6 months. Physiotherapy has not alleviated his symptoms in the past. Although the quality of the initial imaging was poor, it showed a cystic lesion close to the lateral femoral condyle. A clinical examination revealed a limited range of motion (0–100°), point discomfort over the lateral femoral condyle, and no indications of joint instability or effusion. Arthroscopic excision of the lesion was done, followed by Radio and Chemotherapy. According to MRI and PET CT, the patient was still disease-free and had good knee function 14 months after surgery. A Yearly follow-up was recommended for him due to the possibility of a late relapse.

Conclusion: Prompt diagnosis and the best possible care depend on early surgical intervention and comprehensive histological assessment. To prevent treatment delays and enhance patient outcomes, clinicians should take SS consideration when establishing a differential diagnosis for any persistent or unusual intra-articular mass, especially in young adults.

Keywords: Synovial sarcoma, biphasic synovial sarcoma, pigmented villonodular synovitis, ganglion cyst.

Introduction

Synovial sarcomas (SSs) are uncommon malignancies predominantly seen in the younger population [1]. Less than 10% of soft-tissue sarcomas are SS, which are malignant mesenchymal spindle cell tumors with variable epithelial differentiation and unknown histogenesis. SS can be either monophasic or biphasic. However, intra-articular SS is quite uncommon [2, 3]. These sarcomas usually appear as a slow-growing non-tender mass found more common in the extremities with male predominance and no ethnic variance in

Access this article online

Website: www.jocr.co.in

DOI: https://doi.org/10.13107/jocr.2025.v15.i10.6178

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Submitted: 11/07/2025; Review: 07/08/2025; Accepted: September 2025; Published: October 2025

DOI: https://doi.org/10.13107/jocr.2025.v15.i10.6178

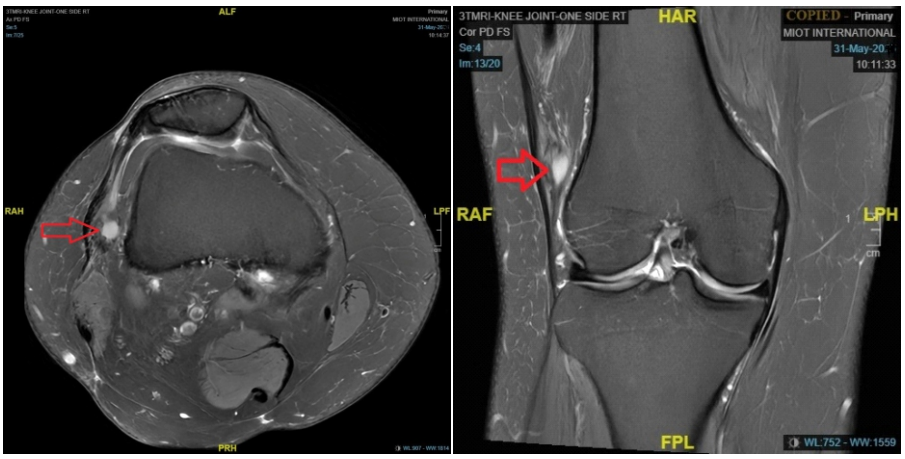

Figure 1: Magnetic resonance imaging scan of the right knee joint in 2023 shows that there is a cystic lesion in close proximity to the lateral femoral condyle in coronal and axial sections.

incidence [4]. Due to its slow growth and non-specific clinical and radiologic features, the diagnosis and treatment of intra-articular SS are often delayed [5,6,7]. While larger lesions tend to appear more heterogeneous on magnetic resonance imaging (MRI), smaller SS lesions (<5 cm) may present with well-demarcated margins and homogeneous signal intensity, mimicking benign conditions such as intra-articular localized nodular synovitis [7]. The most common site of occurrence is around large joints frequently knee joints and ankle, comprising approximately two-thirds of total incidences [8]. This malignancy usually has an overall poor prognosis with a 5-year survival rate of 59–75% [8,9]. In a few cases, these tumors may be confused with benign intra-articular lesions such as pigmented villonodular synovitis (PVNS), synovial osteochondromatosis (SOC), and synovial hemangioma [10,11,12]. Various surgical interventions were employed in the case series, including excision (arthroscopic/open), radical tumor resection, neoadjuvant chemotherapy, radiotherapy, and even amputation, depending on the individual case's characteristics and requirements. The present case underwent excision via arthroscopy. Even though SS can present as benign lesions, certain cases of SS appear to exhibit distinct behavioral patterns compared to others. Hence, it is important for prompt diagnosis and appropriate treatment.

Case Report

A 25-year-old South Indian man, doing his graduation and playing recreational sports, presented with right knee pain and restricted flexion beyond 100° for the past 4 years and increased in severity for the past 6 months. In 2023, he sought treatment for knee pain and restricted mobility in the form of physiotherapy with no relief from his symptoms Even though the image quality was poor; a cystic lesion could be identified close to the lateral femoral condyle proximal aspect with surrounding soft-tissue edema (Fig. 1). Despite undergoing multiple physiotherapy sessions, the stiffness persisted along with mild intermittent anterolateral knee pain. Although he reported no systemic symptoms, he had pain and discomfort during his regular and sports activities.

During the clinical examination, a point tenderness was appreciated over the lateral femoral condyle with no effusion or synovitis. Range of motion was 0–100° further restricted and associated with pain. The Lachman test indicated no laxity. Collateral ligaments were stable, and no distal neurovascular deficits.

MRI images (Fig. 1) reported by the senior musculoskeletal radiologist suggested a probability of nodular synovitis/ganglion cyst/venous malformation as potential diagnoses, as the lesion is <5 cm with no distinct features suggesting toward the SS, it is not included in the differentials. The lesion demonstrated well-defined margins, homogenous signal, lack of aggressive bone or soft-tissue invasion, and no red flags, including periosteal reaction or bone destruction so contrast MRI was not done.

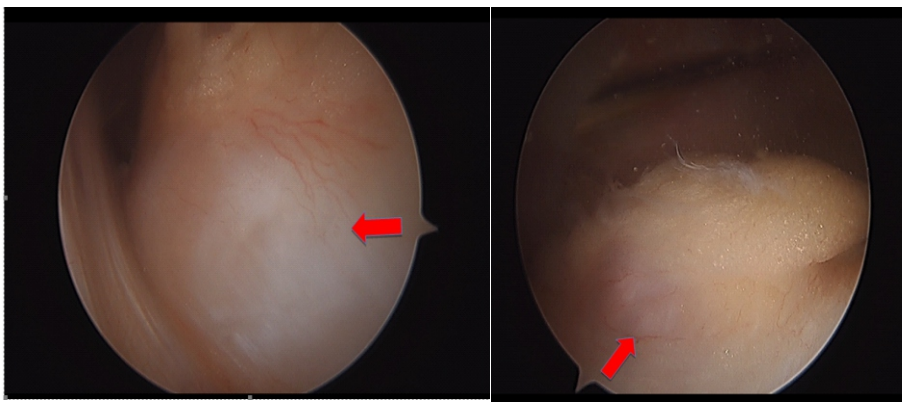

Figure 2: Intraoperative picture of the arthroscopic lateral gutter view with lesion in the right knee.

Surgery was conducted under general anesthesia and adductor canal block with tourniquet control. Standard anterolateral, anteromedial portals, superolateral, and accessory anterolateral portals were established. During the arthroscopic evaluation, anterior cruciate ligament and posterior cruciate ligament appeared intact and the medial and lateral compartments appeared pristine, except for the lateral gutter showing a cystic swelling adhered to the lateral femoral condyle, we thought of

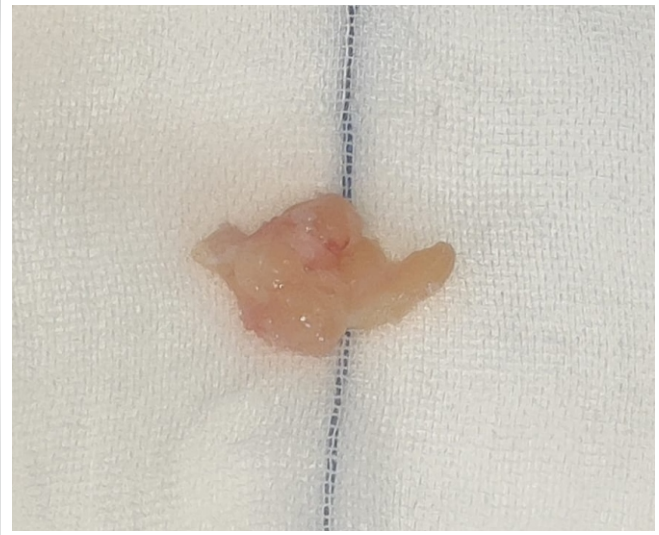

Figure 3: Photograph of removed gross specimen.

venous malformation/ganglion cyst (Fig. 2 and 3) for which biopsy was obtained and sent for histopathological examination, rest of the lesion removed by using motorized shaver and surrounding tissue was cauterized to ensure lesion free margins and knee portals were closed and regular physiotherapy initiated postoperatively.

Surprisingly, the biopsy revealed SS, characterized by tumor cells forming short intersecting fascicles with nuclear pleomorphism, elongated spindle cells, fine chromatin, scant cytoplasm, low mitotic activity, and no necrosis (Fig. 4). Immunohistochemistry indicated positivity for Pan Cytokeratin and Transducin-like enhancer of split 1 consistent with a monophasic type of SS. An expert oncology panel was convened to plan further management. Follow-up positron emission tomography-computed tomography (PET-CT) at 3 weeks post-surgery showed post-operative inflammation in the right knee joint synovium without residual disease with no systemic involvement. Subsequent treatment included local radiotherapy with a total dose of 54 Gy and 6 cycles of adjuvant chemotherapy with Adriamycin, Mesna, and ifosfamide over 16 weeks. The patient tolerated the therapy with no complications. The patient maintains good knee function, with no signs of disease recurrence at 14 months post-surgery. Follow-up PET-CT scan at 12 months post-operative showed no residual disease. He was advised to have yearly follow-ups due to the potential for late relapse.

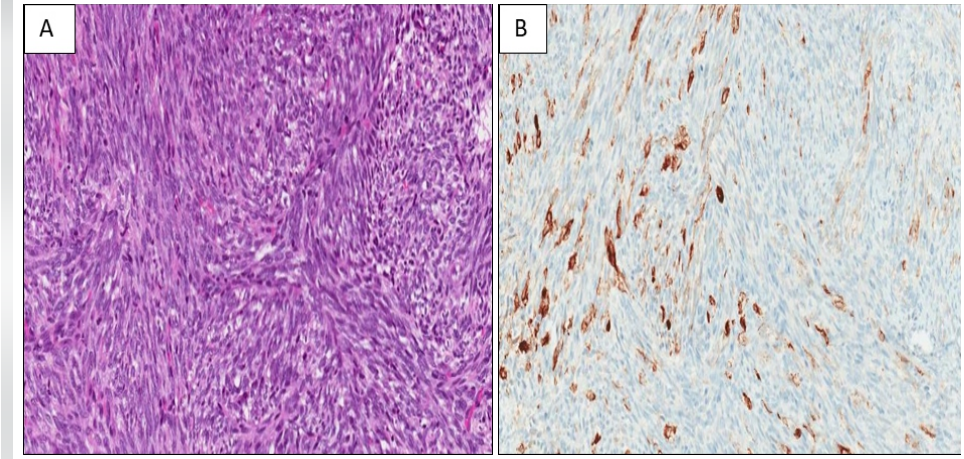

Figure 4: Histopathology assessment (A) Hematoxylin and Eosin staining of ×200 magnification fascicles of spindle cells seen with minimal atypia. (B) Pan Cytokeratin ×200 magnification.

Discussion

Most intra-articular tumors are benign (non-cancerous), and they are rare. Rarely do primary intra-articular sarcomas occur. Less than 5% of instances of SS begin in a joint, despite the fact that it makes up 5–10% of all soft-tissue sarcomas [13]. SS are not derived from synovial tissue, despite their name. Rather, the misnomer comes from the fact that they typically occur close to joint gaps [14]. Only 23 cases of primary, intra-articular SS, including our patient, have been published in the literature, and only 13 cases of intra-articular SS have been reported in the last 10 years, demonstrating how uncommon this condition is still. Along with our instance, the majority of all cases that have been recorded to yet started in the knee.

SS is known to have a benign presentation often diagnosed after surgical excision of misdiagnosed benign lesions, same happened with our case as well, but with suspicion of lesion we have employed complete resection of lesion through arthroscopy and thermal ablation of the margins for tumor-free margins as it is one of the employed technique in the reviewed literature. As the MRI characteristics of intra-articular SS are generally non-specific, as the lesion is <5 cm, demonstrating homogenous signal intensity with well-circumscribed margins, making accurate diagnosis more difficult [15], which made our diagnosis doubtful. Till to date, only nine cases of intra-articular SS have been reported with specific MRI findings [16]. Intra-articular SS is a highly uncommon condition. The knee joint is the most frequently affected site, accounting for 88% of cases. Due to its uncommon occurrence, slow growth and vague clinical and radiological features, intra-articular SS can cause a significant delay in diagnosis and treatment [6]. Biphasic SS demonstrated a markedly higher survival rate in histological comparisons to monophasic variants, indicating distinct biological behaviors associated with the different histotypes

Table 1: Table presenting the other similar type of cases

Year	Author/Source	Patient age/sex	Joint involved	Clinical presentation	Imaging findings	Treatment	Outcome/follow -up	References
2024	Talamo et al., [Knee]	22/F	Knee	Chronic medial knee pain	MRI: Well-circumscribed intra-articular mass	Wide resection, ligament/capsule reconstruction	Good function, no recurrence	[16]
2023	Saito et al. [Hip]	42/M	Hip	7 years hip pain	MRI: Intra-articular lesion	Arthroscopic excision, chemo, radiation	Local control at 6 months, no metastasis	[24]
2020	Asiri et al. [Hip]	17/F	Hip	Hip pain, mass	MRI: Intra-articular mass	Neoadjuvant chemoradiation, hemipelvectomy	No local recurrence; later lung metastasis	[22]
2018	Bergovec et al. [Knee]	14/M	Knee	Knee pain, mimicked meniscus tear	MRI: Intra-articular mass, lateral meniscus	Arthroscopic biopsy, open resection	No recurrence at follow-up	[21]
2018	Hellwinkel et al. [Knee]	26/F	Knee	Knee pain, swelling	MRI: Intra-articular lesion	Arthroscopic biopsy	Good function, no recurrence	[5]
2016	Hara et al. [Ankle]	32/F	Ankle	Ankle pain, swelling	MRI: Intra-articular mass, calcification	Wide excision	Disease -free at follow-up	[25]
2016	Gupta et al. [Knee]	14/M	Knee	Knee pain, swelling	MRI: Infrapatellar bursa mass	Complete surgical excision, chemo	No recurrence at follow-up	[26]
2003	Hara et al. [Knee]	81/F	Knee	Knee pain, recurrent mass	MRI: Intra-articular mass	Wide excision	No recurrence at 2 years	[27]

MRI: Magnetic resonance imaging

[10,17]. This case report is interesting in the sense that we could have been easily misled to not address the nodular lesion, as the patient was not significantly symptomatic except for terminal flexion restriction. Despite the higher threshold to explore the lesion, a correct decision was made ultimately which guided us to the reality of the presence of a SS. The fact that the patient had symptoms for 4 years before the first "evidence" of the cyst creates the possibility of this lesion being undercover for several years which was excised through arthroscopy and followed by chemo and radiotherapy. Excision of these masses has shown to leave residual tumor in up to 82% of cases [15,18,19]. (Table 1). Radiotherapy has a well-established role in improving local control, but while surgery and radiation therapy have achieved excellent local control, distant metastasis remains the principal problem limiting survival [20,21]. Adjuvant chemotherapy helped to increase long-term survival for SS, a soft-tissue sarcoma that is susceptible to chemotherapy [9]. Ifosfamide-based chemotherapy has been associated with an improved survival in patients with SS [22]. Chemotherapy combined with surgical excision and radiation therapy increases overall survival to 80–95% after 3 years [23,24]. This was employed in our case showing no recurrence after 12 months with follow-up PET CT and MRI. Nevertheless, it is important to include intra-articular SS in the differential diagnosis of an intra-articular mass, particularly in the knee joint, when the radiological features do not align with those of SOC, synovial hemangioma, or PVNS.

Conclusion

This case highlights the diagnostic challenge posed by intra-articular SS, particularly when presenting with non-specific symptoms and radiological findings. Despite long-standing knee pain and restricted motion, the lesion was initially presumed benign, underscoring the importance of maintaining a broad differential diagnosis for persistent intra-articular masses. Early arthroscopic intervention, followed by histopathological evaluation, was crucial in identifying the true nature of the pathology. The timely diagnosis and multidisciplinary management enabled a favorable outcome, with the patient showing no recurrence at 14 months postoperatively. This case emphasizes the need for heightened clinical suspicion and thorough evaluation in cases of atypical or unresolving joint symptoms, even in young, otherwise healthy individuals.

Clinical Message

This case emphasizes that not every long-standing "Nodular synovitis/Ganglion cyst" is benign enough to be ignored. Prompt evaluation must be done radiologically before surgery to prevent unwarranted consequences. Multi-disciplinary approach helps in preventing recurrence and improves the long-term survival rate of the patient.

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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Conflict of Interest: Nil
Source of Support: Nil

Consent: The authors confirm that informed consent was obtained from the patient for publication of this case report

How to Cite this Article

Selvaraj A, Kumar A, Alex RG, Narayanan S. Synovial Sarcoma Disguised as a Ganglion Cyst in a Patient with Chronic Knee Pain. Journal of Orthopaedic Case Reports 2025 October;15(10):114-119.