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Extradigital Glomus Tumor of the Knee Mimicking Osteoarthritis: A Case Report

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Learning Point of the Article:

Extradigital glomus tumors of the knee can mimic degenerative joint disease, particularly when radiographic osteoarthritis is present. Focal, exquisite, cold-sensitive pain localized to a superficial nodule and disproportionate to radiographic findings should prompt orthopedic clinicians to consider extra-articular soft-tissue pathology and obtain magnetic resonance imaging for further evaluation.

Abstract

Introduction: Glomus tumors are rare benign vascular neoplasms that usually arise in the subungual region. Around the knee, they remain exceptional and may be mistaken for degenerative or cystic pathology. This case highlights that, in patients with focal, exquisitely tender, cold-sensitive pain that is disproportionate to radiographic osteoarthritis, orthopedic clinicians should broaden the differential diagnosis to include soft tissue pathology and consider magnetic resonance imaging (MRI) to facilitate timely and accurate diagnosis.

Case Report: A 78-year-old Hispanic male presented with a 15-year history of medial left knee pain. Conservative treatment for presumed osteoarthritis provided partial symptomatic relief during the first 7 years; however, during the subsequent 8 years before presentation to our facility, the pain became progressively refractory to conservative measures and increasingly localized to a small palpable, discolored, superficial medial parapatellar nodule. Radiographs demonstrated mild-to-moderate osteoarthritic changes and a discrete medial soft-tissue radiodensity. Upon evaluation at our clinic, the above history, together with persistent focal tenderness to light touch and cold hypersensitivity, prompted MRI, which demonstrated a 1.3 cm well-circumscribed subcutaneous nodule in the upper medial parapatellar soft tissues, hypointense on T1-weighted images and hyperintense on T2-weighted images, without intra-articular extension or osseous involvement. Complete local excision was performed with a 2 cm gross soft-tissue cuff to the retinacular level, followed by layered closure. Histopathologic examination demonstrated uniform glomus cells arranged around dilated vascular channels. Immunohistochemical staining was positive for muscle actin and alpha-smooth muscle actin and negative for epithelial membrane antigen, S100, Cluster of differentiation 34 (CD34), and desmin, confirming a glomus tumor. Margins were free of tumor. The patient experienced immediate complete pain relief and remained symptom-free without recurrence at 12-month follow-up.

Conclusion: A small extradigital glomus tumor can masquerade as osteoarthritic knee pain. When tenderness is focal, exquisite, cold sensitive, and not explained by radiographs, orthopedic evaluation should extend beyond arthritis. The clinician should consider MRI and biopsy with histopathologic confirmation to prevent prolonged ineffective treatment.

Keywords: Glomus tumor, extradigital glomus tumor, knee pain, osteoarthritis, soft tissue neoplasm, case report, surgical excision.

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Introduction

Glomus tumors are uncommon benign mesenchymal neoplasms arising from the glomus body, a specialized arteriovenous structure involved in thermoregulation. They account for <2% of soft-tissue tumors and classically occur in the subungual region [1,2].

Around the knee, glomus tumors are distinctly rare. Wang et al. reviewed 30 published reports containing 36 cases through December 2020, and subsequent case series and individual reports have expanded the number only modestly [3,4,5]. This limited literature makes each well-documented knee case valuable, especially when it illustrates an orthopedic diagnostic pitfall rather than only pathologic confirmation.

The classic clinical triad includes paroxysmal pain, pinpoint tenderness, and cold hypersensitivity [2,6]. Extradigital tumors may show an incomplete triad and are often delayed or misdiagnosed as osteoarthritis, meniscal pathology, cystic disease, soft-tissue injury, vascular lesions, or neurogenic tumors [2,3,6]. In the knee, the diagnostic challenge is magnified because mild degenerative radiographic findings are common and can distract attention from a small extra-articular pain generator.

We report a superficial upper medial parapatellar glomus tumor in a 78-year-old male with a 15-year history of left knee pain initially managed as a degenerative disease. Conservative treatment provided symptom relief during the first 7 years but became ineffective after the pain localized to a palpable, cold-sensitive medial parapatellar nodule 8 years before presentation. The teaching point is that when knee pain is focal, exquisite, cold-sensitive, and not explained by radiographs, orthopedic evaluation should extend beyond arthritis. Clinicians should consider magnetic resonance imaging (MRI) and biopsy or excision with histopathologic confirmation to prevent prolonged ineffective treatment.

Case Report

A 78-year-old Hispanic male with hypertension and gastroesophageal reflux disease presented for evaluation of a 15-year history of left knee pain. During the first 7 years after symptom onset, the pain was treated as osteoarthritis-related and responded partially to conservative measures. Eight years before presentation to our facility, the patient noticed that the pain became more focal along the medial parapatellar region and was associated with a small palpable superficial nodule. Since that time, the nodule gradually enlarged and became discolored, and the pain progressively worsened despite continued non-operative management. At presentation, the pain was constant, severe with light touch over the lesion, and exacerbated by cold exposure. The symptoms limited the activities of daily living and made contact with clothing uncomfortable.

Physical examination demonstrated a round, superficial soft-tissue mass over the upper medial parapatellar region. The most reproducible pain was elicited by gentle palpation of the mass rather than by joint-line loading or knee range of motion. The overlying skin was glossy and violaceous without breakdown. Initial radiographs demonstrated mild-to-moderate degenerative changes (Fig. 1).

Before presentation to our facility, the patient had been treated for presumed degenerative knee disease because radiographs demonstrated osteoarthritic changes, and the superficial lesion had a non-specific appearance. The lesion had also been considered a possible synovial or degenerative cyst.

During the initial 7 years after symptom onset, oral analgesics, topical non-steroidal anti-inflammatory gel, and physical therapy provided partial symptom relief. During the subsequent 8 years before presentation, these measures no longer provided meaningful relief. An intra-articular corticosteroid injection was also performed during this refractory period, but did not improve the localized pain. Upon presentation, the lack of response to standard osteoarthritis-directed treatment, together with focal cold-sensitive tenderness, prompted reconsideration of the diagnosis.

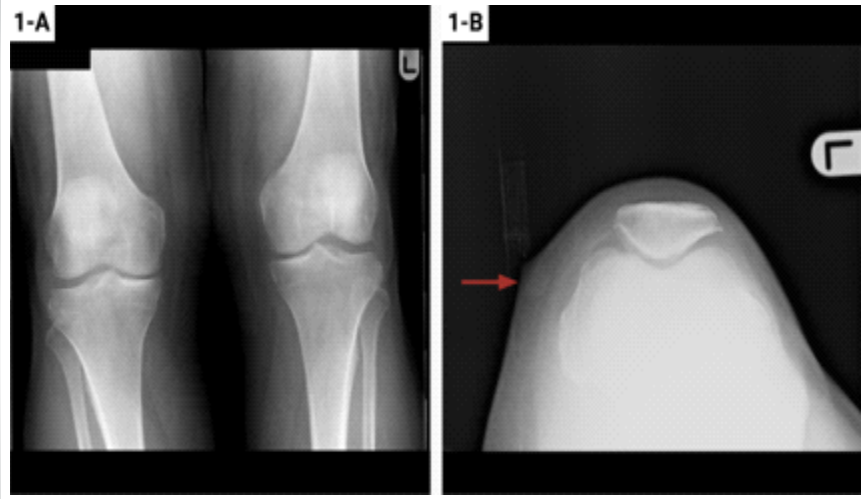

Figure 1: Initial radiographs of the knees: Anteroposterior radiograph of both knees and sunrise view of the left knee. The radiographs demonstrate mild-to-moderate degenerative change consistent with Kellgren-Lawrence grade I-II arthrosis, including subchondral sclerosis and mild joint-space narrowing. The left knee sunrise view shows a discrete, round, superficial medial soft-tissue mass measuring approximately 1.2 × 1.2 cm with cutaneous apex.

Figure 2: Magnetic resonance images of the left knee: T1-weighted sagittal and axial images and T2-weighted sagittal and axial images of the left knee. The symptomatic lesion measures 1.3 cm and is located in the superficial upper medial parapatellar soft tissues, anterior to the joint capsule and medial to the patella. The nodule is well-demarcated, hypointense on T1-weighted images, hyperintense on T2-weighted images, and shows no intra-articular extension, osseous involvement, or cortical erosion.

MRI of the left knee showed a 1.3 cm sharply marginated subcutaneous nodule in the upper medial parapatellar soft tissues, anterior to the joint capsule and medial to the patella. The lesion was hypointense on T1-weighted sequences and hyperintense on T2-weighted sequences, without intra-articular extension, osseous involvement, cortical erosion, or visible continuity with a major neurovascular structure (Fig. 2). These imaging findings were not diagnostic by themselves; however, in the setting of disproportionate focal tenderness and cold sensitivity, they favored a small benign vascular or neurovascular lesion over primary degenerative knee pain.

Given persistent symptoms and failure of conservative care, complete local excision of the symptomatic superficial mass was performed (Fig. 3). A complete local excision with an approximately 2 cm gross soft-tissue cuff around the palpable lesion was performed, carried to the retinacular level, rather than as an oncologic wide resection. No visible nerve or vascular pedicle was identified. The wound was closed in layers.

Gross examination demonstrated a well-circumscribed tan-pink subcutaneous nodule with a smooth surface and punctate whitish foci. Histopathologic examination demonstrated uniform round glomus cells arranged around dilated vascular channels, with margins free of tumor (Fig. 4). Immunohistochemical staining showed positivity for muscle actin and alpha-smooth muscle actin (α-SMA). The lesion was negative for epithelial membrane antigen (EMA), S100, cluster of differentiation 34 (CD34), and desmin (Fig. 5). These findings confirmed the diagnosis of a glomus tumor.

Post-operatively, the patient reported immediate complete resolution of his characteristic pre-operative pain. At 1 month, the incision was healed, knee motion was unrestricted, ambulation was independent, and he was able to wear regular clothing without discomfort. At 12-month follow-up, he remained symptom-free with no clinical evidence of recurrence.

Discussion

This case highlights the orthopedic diagnostic challenge created by a rare extra-articular tumor in the setting of common degenerative disease. Mild-to-moderate osteoarthritis was visible on radiographs and initially supported arthritis-directed treatment, which provided partial relief early in the clinical course. However, the later development of a localized superficial nodule, exquisite focal tenderness, cold sensitivity, and

Figure 3: Gross specimen after local excision: Intraoperative gross image of the excised left knee lesion. The specimen is a firm tan-pink nodule with a smooth external surface and surrounding soft tissue. The specimen measures 2.0 cm medial to lateral, 4.5 cm proximal to distal, and 1.5 cm anterior to posterior. The single stitch identifies the proximal margin, and the double stitch identifies the lateral margin.

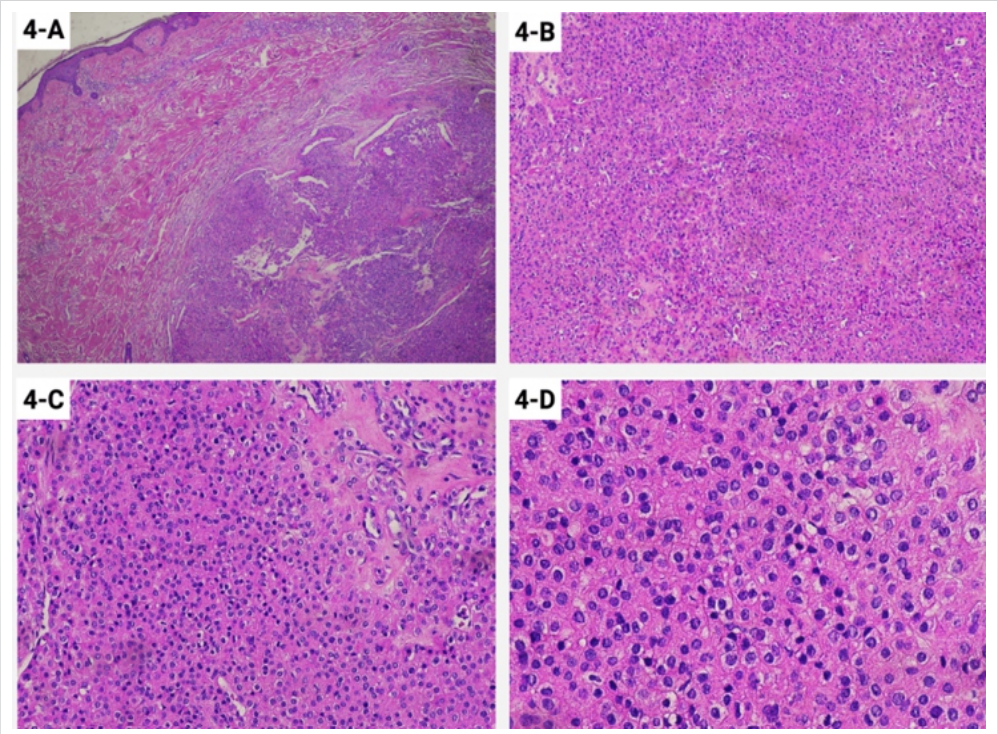

Figure 4: Hematoxylin and eosin-stained sections of the lesion: Representative histologic sections at ×4, ×10, ×20, and ×40 magnification. Low-power images show a well-circumscribed dermal and subcutaneous proliferation. Higher magnification demonstrates uniform round to oval glomus cells with centrally placed nuclei and pale eosinophilic cytoplasm, arranged around dilated vascular channels within focally hyalinized to myxoid stroma.

progressive failure of conservative treatment were not compatible with osteoarthritis alone. The diagnostic turning point was recognition of these localized features and the acquisition of MRI.

Knee-region glomus tumors are uncommon, but published reports show recurring patterns that are relevant to orthopedic practice. Wang et al. found 36 cases in 30 reports through December 2020, with locations, including soft tissue, popliteal fossa, patellar tendon, iliotibial band, Hoffa's fat pad, distal femur, and proximal tibia [3]. A later case series found five anterior knee glomus tumors, all in men aged 30 years or older, most with several years of pain before diagnosis [4]. Additional recent reports, including patellar tendon and anterior knee cases, confirm that the number of knee cases remains small and that diagnostic delay is common [5,7,8]. Our patient contributes an elderly presentation with concomitant osteoarthritis, which is a realistic confounder in orthopedic clinics.

The classic triad of paroxysmal pain, pinpoint tenderness, and

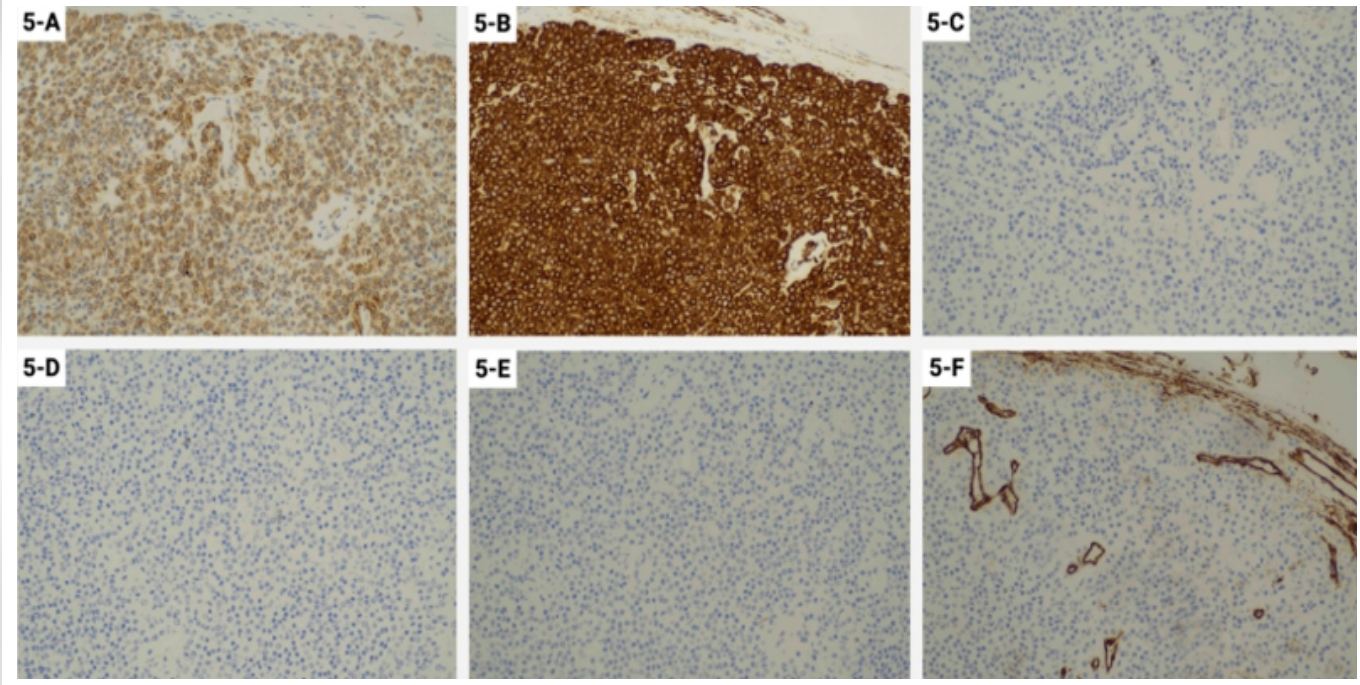

Figure 5: Immunohistochemical staining of the lesion: Immunohistochemical profile at ×20 magnification. The neoplastic cells are positive for muscle actin and alpha smooth muscle actin, supporting smooth muscle differentiation. The lesion is negative for S100 protein, epithelial membrane antigen, desmin, and Cluster of differentiation 34.

cold hypersensitivity is helpful but not always complete in extradigital locations [2,6]. Our patient demonstrated two of the three features, namely, pinpoint tenderness and cold hypersensitivity. His pain was constant rather than paroxysmal, and the early partial response to conservative treatment for presumed osteoarthritis further obscured the diagnosis. Nevertheless, the later pain pattern was focal and exquisite, and it was out of proportion to both the size of the lesion and the radiographic arthrosis.

MRI is useful for diagnosis, localization and surgical planning. Typical glomus tumors are well-circumscribed and show low signal intensity on T1-weighted images and high signal intensity on T2-weighted images, often with enhancement when contrast is used [3,9,10,11]. The lesion in this case matched the expected T1 and T2 pattern and was clearly superficial and extra-articular. These details strengthened the decision to treat the superficial mass rather than continue injections or therapy for presumed osteoarthritis.

The differential diagnosis for a small painful medial knee mass includes ganglion or synovial cyst, hemangioma, epidermal inclusion cyst, schwannoma, leiomyoma, pigmented lesion, giant cell tumor of tendon sheath, and other benign or malignant soft-tissue tumors [3,12,13,14,15,16,17]. Imaging can narrow this differential, but it cannot reliably confirm a glomus tumor. Histopathology and immunohistochemistry are essential for definitive diagnosis.

Histologically, glomus tumors consist of uniform glomus cells arranged around vascular channels, with variable smooth muscle and vascular components [1,18].

Immunohistochemical positivity for muscle actin and α-SMA supports myoid differentiation, while negative S100, EMA, CD34, and desmin help exclude common neural, epithelial, endothelial, and muscular lesions. In this case, the pathologic profile matched a benign glomus tumor.

Complete excision is both diagnostic and therapeutic. In knee cases, pain relief is often immediate after removal, and recurrence is uncommon when excision is complete [3,14,19,20]. Our patient's immediate and durable 12-month relief after local excision, despite persistent radiographic osteoarthritic changes, reinforces that a small superficial tumor can be the primary pain generator. For orthopedic surgeons, the key is to pause when symptoms are focal, exquisite, cold-sensitive, and disproportionate to the radiographic explanation.

Conclusion

Glomus tumors around the knee are rare but important because they are curable and can mimic common orthopedic conditions. This case demonstrates how radiographic osteoarthritis can coexist with and distract from a small extra-articular source of pain. In this patient, a 15-year pain history became clinically suspicious after an 8-year period of focal, cold-sensitive, refractory pain associated with a palpable medial parapatellar nodule. MRI defined the lesion, but definitive diagnosis required histopathology and immunohistochemistry. Complete local excision with clear margins produced immediate and durable pain relief.

Clinical Message

In patients with presumed osteoarthritic knee pain, symptoms that are focal, exquisitely tender, cold-sensitive, and refractory to standard conservative management should prompt reconsideration of the diagnosis. Orthopedic clinicians should broaden the differential diagnosis to include extra-articular soft tissue lesions, obtain magnetic resonance imaging to localize and characterize the abnormality, and proceed with biopsy or complete excision when indicated for definitive histopathologic diagnosis and treatment.

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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