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PRIKAZ SLUČAJA CASE REPORT

# Inflammatory Myofibroblastic Tumor of the Knee in a 7-year-old Child: A Case Report

## Inflamatorni miofibroblastični tumor kolena sedmogodišnjeg dečaka: prikaz slučaja

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**Abstract**
Inflammatory myofibroblastic tumor (IMT) is a rare mesenchymal neoplasm with intermediate malignant potential, typically occurring in children and young adults. We report a case of seven-year-old boy with a well-defined, extra-articular medial knee mass. MRI demonstrated a solid lesion with strong homogeneous enhancement without joint or bone invasion. Complete surgical excision was performed. Histopathology revealed myofibroblastic spindle-cell proliferation in a myxoid stroma with mixed inflammatory infiltrate. Immunohistochemistry showed SMA positivity and ALK negativity; molecular testing identified ROS1 rearrangement and COL1A1–PDGFRα fusion. The postoperative course was uneventful with no recurrence on follow-up. This case underscores the value of comprehensive molecular profiling in atypical IMT locations and the potential for targeted therapy in unresectable or recurrent disease.

**Key words**: inflammatory myofibroblastic tumor, knee, child, ROS1, PDGFRα, ALK-negative

**Apstrakt**
Inflamatorni miofibroblastični tumor (IMT) predstavlja retku mezenhimalnu neoplazmu intermedijernog biološkog potencijala, koja češće zahvata decu i mlade. Najčešće je lokalizovan u plućima i abdominopelvičnom predelu, ali može nastati u gotovo svakom organu. Prikazujemo slučaj sedmogodišnjeg dečaka sa ekstraartikularnom tumoroznom masom medijalnog aspekta desnog kolena. Radiološki (MRI) je lezija bila dobro ograničena, intenzivno homogeno pojačana nakon aplikacije kontrasta, bez invazije zgloba ili kosti. Lezija je u celosti hirurški uklonjena. Histopatološki nalaz je pokazao proliferaciju miofibroblasta u miksodnoj stromi sa izraženim inflamatornim infiltratom. Imunohistohemijski tumor je bio SMA pozitivan, ALK negativan; molekularno je dokazan rearanžman ROS1 i fuzija COL1A1–PDGFRα. Postoperativni tok protekao je bez komplikacija, bez recidiva na kontroli. Ovaj slučaj naglašava značaj sveobuhvatne molekularne dijagnostike u atipičnim lokalizacijama IMT-a i potencijal za ciljanu terapiju kod neresektabilnih ili rekurentnih formi.

**Ključne reči**: inflamatorni miofibroblastični tumor, koleno, dete, ROS1, PDGFRα, ALK-negativan

## Introduction

Inflammatory myofibroblastic tumor (IMT) is a rare mesenchymal neoplasm of intermediate biological potential, composed of myofibroblastic/fibroblastic spindle cells accompanied by a prominent inflammatory infiltrate. IMT most commonly arises in the lung and abdominopelvic region of children and young adults, but virtually any anatomic site may be affected; metastasis is uncommon, whereas local recurrence can occur (1,2,3). Histologically, three patterns—myxoid/vascular, compact spindle--cell, and fibrous/hypocellular—often coexist within the same lesion, contributing to diagnostic difficulty (1). Accurate diagnosis therefore relies on integration of morphology with immunohistochemistry and molecular testing in line with the 2020 WHO soft--tissue tumor framework (4). Approximately half of



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IMTs harbor ALK rearrangements with ALK protein overexpression, while a substantial subset—particularly ALK-negative tumors—shows alternative kinase fusions including ROS1, PDGFRB, NTRK or RET; recognizing these alterations is important both diagnostically and therapeutically (5,6). Pediatric extrapulmonary IMTs, including those of the extremities, are uncommon and may present as painless masses with nonspecific imaging findings, necessitating clinicopathologic correlation (2,7,8). Complete surgical excision with negative margins remains the cornerstone of treatment; in selected fusion-positive, unresectable or recurrent cases, targeted therapy (e.g., ALK/ROS1 inhibitors) can induce meaningful responses (1,2,4,9,10). Reported recurrence rates vary by site and margin status but are generally low-to-moderate; long-term follow-up is advised, particularly for ALK-negative tumors (2,3).

## Case report

A 7-year-old boy was referred for evaluation of asymmetry of the inner aspect of the right knee. The swelling was incidentally noted by the parents; there was no history of trauma, pain, or functional limitation. The child remained afebrile and asymptomatic throughout.

On examination, a firm, non-tender, well-circumscribed mass was palpable medially on the right knee. The overlying skin was normal, and the joint had full, painless range of motion.

Initial CT of the knee revealed a well-defined collection (10×30×28 mm) in the medial tibiofemoral recess with homogeneous post-contrast enhancement and density suggesting a fluid-hemorrhagic content with potential vascular leakage. There was no bone erosion, soft tissue infiltration, or vascular malformation evident (Figure 1). Subsequent MRI showed a solid, extra-articular mass medial to the knee joint measuring 39×12×50 mm (Figure 2). It was isointense on T1, hyperintense on T2, and showed strong homogeneous enhancement after contrast application. No fat, hemorrhage, or cystic components were present. The mass was in contact with the medial collateral ligament but without joint invasion or bone involvement.

Due to progressive growth and unclear etiology, the lesion was surgically excised in total, without prior biopsy (Figure 3).

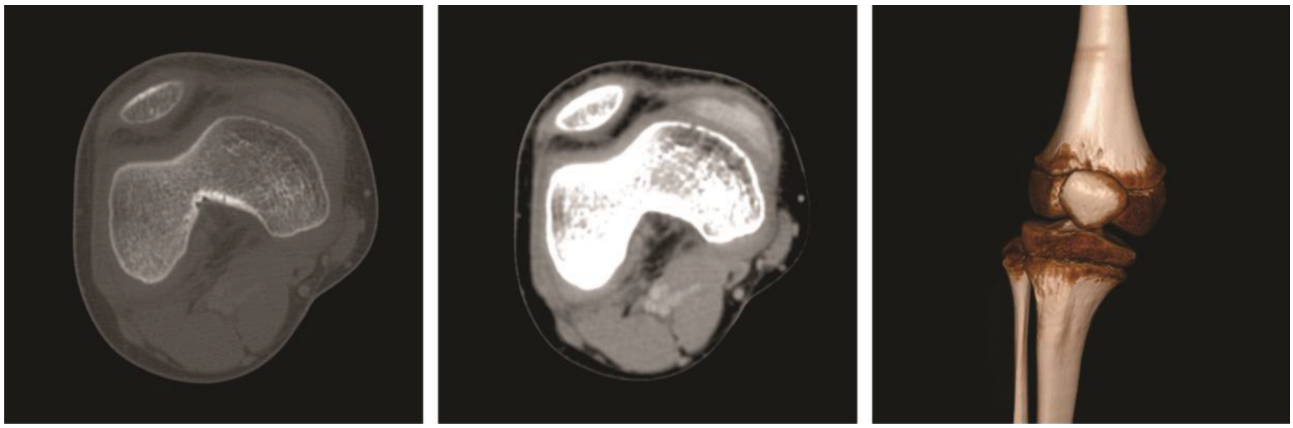

**Figure 1. Computed tomography (CT) images of the right knee - axial images, with different contrast and window settings (left and center) show a well-defined lesion in the medial tibiofemoral recess. The lesion is not clearly visible on the 3D reconstruction (right), which displays only the bony anatomy.**

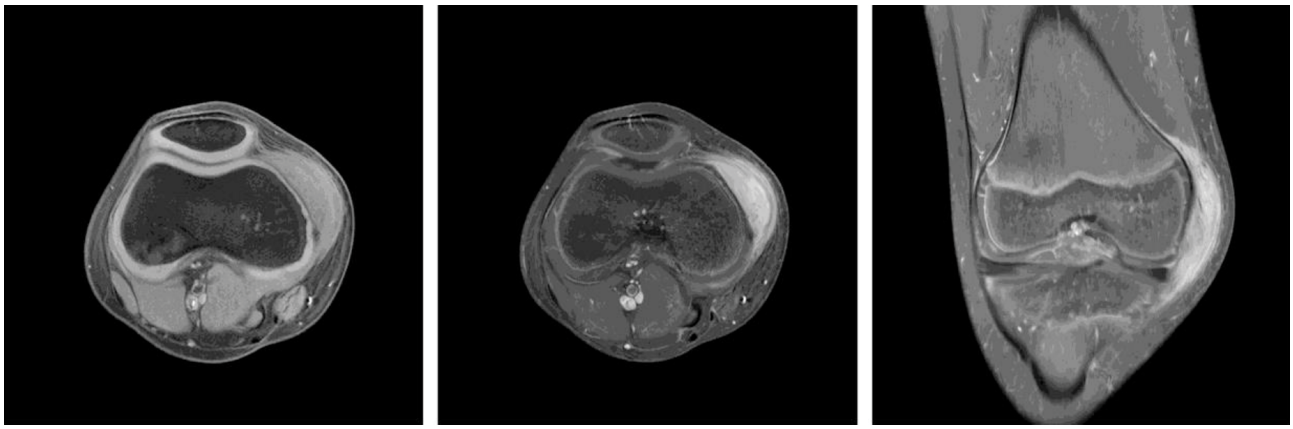

**Figure 2. MRI of the right knee - well-circumscribed extra-articular medial mass (≈39×12×50 mm), isointense on T1, hyperintense on T2, with homogeneous enhancement after contrast; no invasion of the joint or bone.**

Histopathology revealed a spindle-cell tumor composed of myofibroblasts in a myxoid stroma with a mixed inflammatory infiltrate (lymphocytes, plasma cells, eosinophils), (Figure 4). The lesion measured 62×33×17 mm. Immunohistochemistry showed strong cytoplasmic SMA positivity, focal positivity for D2-40, CD10, and Factor XIIIa, negative for ALK, CD34, S-100, and EMA, retained INI-1 nuclear expression. FISH analysis demonstrated ROS1 rearrangement in 30% of nuclei, COL1A1–PDGFRα fusion in 20% and no ALK rearrangement detected.

These findings confirmed the diagnosis of ALK--negative inflammatory myofibroblastic tumor with ROS1 and PDGFRα alterations.

The patient recovered without complications. Laboratory parameters and tumor markers remained within normal range. At 7 months postoperatively, clinical and radiological follow-up showed no evidence of local recurrence or metastatic disease.

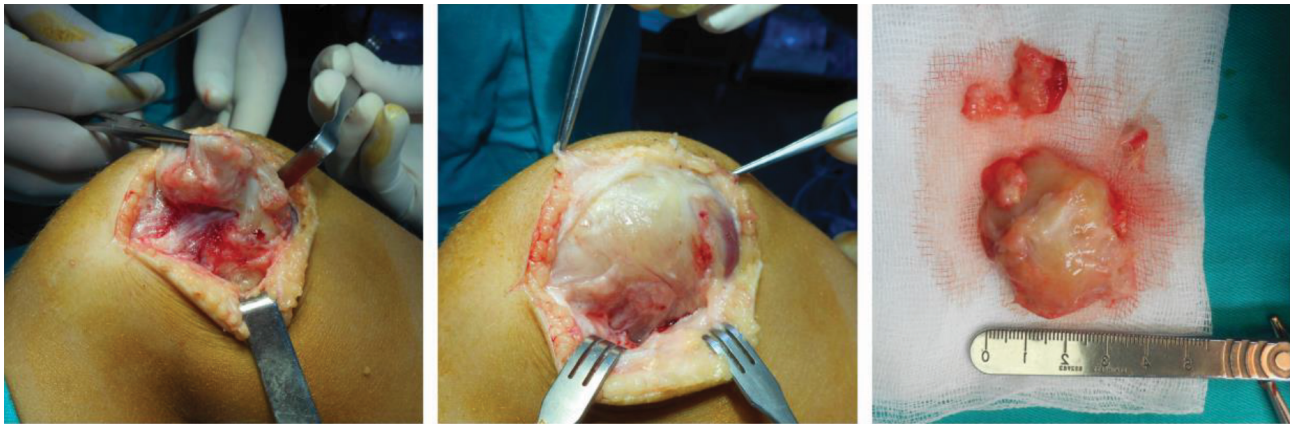

**Figure 3. Intraoperative views - medial approach, careful dissection around the medial collateral ligament, and an block tumor excision; grossly well-circumscribed, firm lesion with smooth outer surface.**

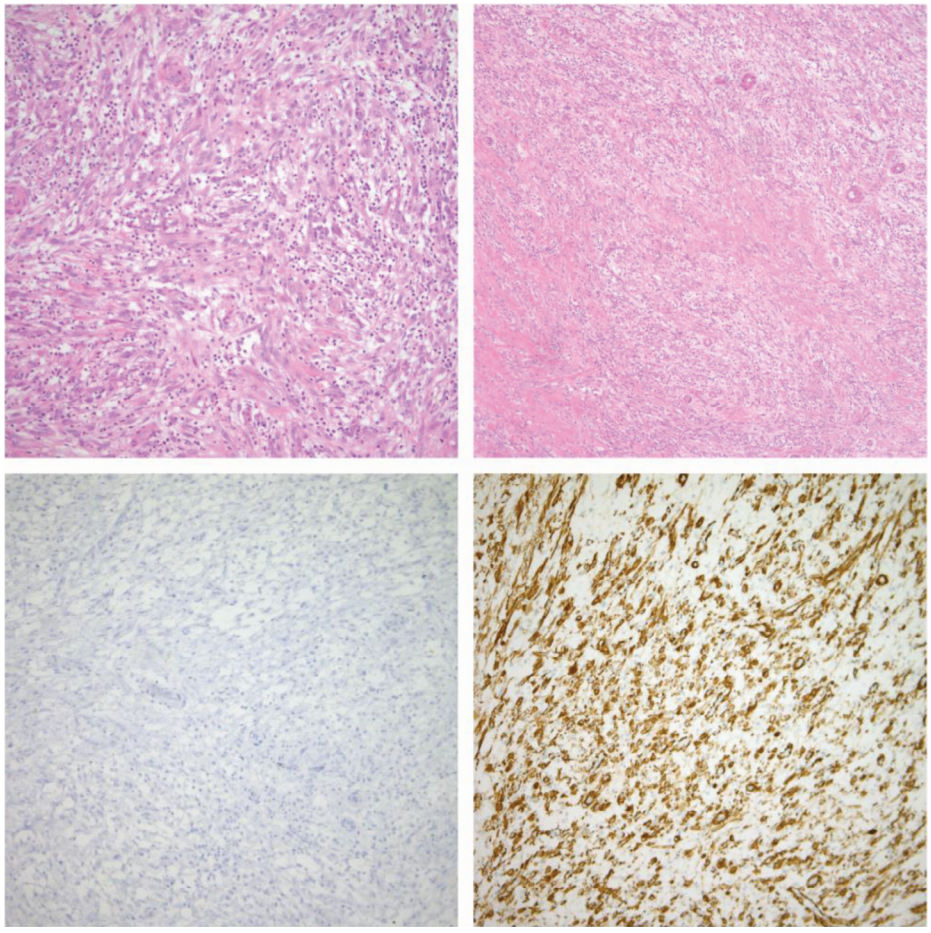

**Figure 4. Composite histological and immunohistochemical images — H&E ×100 and ×50; SMA ×100; ALK ×100.**

## Discussion

Inflammatory myofibroblastic tumor (IMT) is a rare neoplasm of mesenchymal origin, characterized by the proliferation of spindle-shaped myofibroblasts within a variably collagenous or myxoid stroma, accompanied by a prominent inflammatory infiltrate (1,2,3). Despite its benign histologic appearance, IMT is classified as a tumor of intermediate biological potential due to its propensity for local recurrence and, in rare instances, distant metastasis (1,2,3). It occurs more frequently in children and young adults, and while most commonly localized in the lung, it can also arise in extrapulmonary sites such as the mesentery, retroperitoneum, bladder, and soft tissues (2,7). Involvement of the extremities, particularly the knee, is exceedingly rare and poses a diagnostic challenge due to the nonspecific clinical and radiologic presentation (7,8,11).

Our case describes a 7-year-old male with an incidentally discovered soft tissue mass on the medial side of the right knee. The absence of systemic symptoms, normal laboratory findings, and lack of joint involvement initially suggested a benign lesion such as a synovial cyst or post-traumatic hematoma. Cross-sectional imaging (CT and MRI) raised suspicion for a vascularized lesion, though the post-contrast behavior and signal characteristics remained nonspecific (2). Only after complete excision and histopathological assessment a definitive diagnosis of IMT was established.

Histologically, IMTs display considerable variability, but they are typically composed of myofibroblastic spindle cells embedded in a myxoid to collagenous matrix with an admixture of lymphocytes, plasma cells, and eosinophils (1,2). The immunohistochemical profile in our patient—SMA positive, ALK negative, CD34 and S100 negative—helped rule out other soft tissue neoplasms such as nodular fasciitis, fibrosarcoma, or malignant peripheral nerve sheath tumors (4,5). Retention of INI-1 expression excluded epithelioid sarcoma and other rhabdoid tumors (4).

Approximately 50% of IMTs are positive for ALK rearrangements, most often t(2;5)(p23;q35), which result in overexpression of the ALK protein detectable by immunohistochemistry (5,6,11). ALK positivity is more frequently seen in pediatric cases and is associated with a more favorable prognosis (5,6). In our case, the tumor was ALK-negative but showed ROS1 rearrangement (30%) and COL1A1–PDGFRα fusion (20%) as detected by FISH. These genetic alterations support the diagnosis of IMT, as ALK-negative tumors often harbor alternative kinase gene fusions involving ROS1, PDGFRB, NTRK3, RET, or FN1 (5, 6, 9,12). Identification of these gene rearrangements is not only useful for diagnostic confirmation but also has therapeutic implications. Crizotinib, originally developed as an ALK inhibitor, has demonstrated efficacy in ROS1-rearranged IMTs, offering a potential targeted treatment option for unresectable, recurrent, or metastatic disease (5,9,10,12).

The standard of care for IMT remains complete surgical excision with negative margins (1,2,5,11,13). In our patient, the tumor was successfully resected in toto without complications. There was no evidence of recurrence at follow-up, and given the absence of systemic inflammatory signs or elevated tumor markers, no adjuvant therapy was required. However, considering the intermediate malignant potential of IMTs, especially those that are ALK-negative, long-term clinical and radiologic surveillance is warranted (2,3,5,11). The risk of recurrence varies between 15% and 37%, and although rare, metastases have been reported in the lung, liver, bone, and brain (2,3,7). Given the more aggressive clinical behavior of ALK-negative IMTs, current recommendations emphasize closer and prolonged follow-up, including clinical examination and imaging of the primary site and chest every 3–6 months during the first two years, every 6–12 months up to five years, and annually thereafter. There are no specific serum tumor markers for IMT; laboratory monitoring is generally limited to nonspecific inflammatory parameters such as CRP and ESR, which may be useful in patients with systemic manifestations (5,6).

Another important consideration in the diagnostic process is the differential diagnosis. IMT must be distinguished from other spindle cell tumors of childhood, including fibromatosis, low-grade myofibroblastic sarcoma, leiomyosarcoma, and even lymphoma or reactive inflammatory lesions (4,5). The combination of histology, immunohistochemistry, and molecular genetics is therefore essential (4,5,6,11). In the present case, molecular profiling was pivotal not only in confirming the diagnosis but also in identifying potential therapeutic targets.

IMT represents a unique pathological entity with distinct clinical, histological, and molecular features. The current case underscores the importance of considering IMT in the differential diagnosis of soft tissue masses in children, even in unusual locations such as the extremities (7,8,11). A multidisciplinary approach—including imaging, histopathology, immunohistochemistry, and molecular diagnostics—is critical for accurate diagnosis and optimal management (1,2,5,6). While surgery remains the primary treatment modality, advances in molecular genetics have opened new avenues for targeted therapy, especially in ALK-negative or unresectable tumors (5, 6,9,12). Further research is needed to better define prognostic markers and long-term outcomes in pediatric IMT patients (1,2,3,13).

## Conclusion

We report a rare case of an ALK-negative inflammatory myofibroblastic tumor in the knee of a 7-year-old child, with confirmed ROS1 and PDGFRα rearrangements. The patient underwent successful

complete resection without complications. This case underlines the need for high clinical suspicion in atypical soft tissue masses, the diagnostic value of molecular profiling, and the potential for targeted therapy in select cases.

## References


1. Choi JH. Inflammatory Myofibroblastic Tumor: An Updated Review. Cancers (Basel) 2025;17(8):1327.
2. Gros L, Dei Tos AP, Jones RL, Digklia A. Inflammatory Myofibroblastic Tumour: State of the Art. Cancers (Basel) 2022;14(15):3662.
3. Siemion K, Reszec-Gielazyn J, Kisluk J, Roszkowiak L, Zak J, Korzynska A. What do we know about inflammatory myofibroblastic tumors? - A systematic review. Adv Med Sci 2022;67(1):129-38.
4. Sbaraglia M, Bellan E, Dei Tos AP. The 2020 WHO Classification of Soft Tissue Tumours: news and perspectives. Pathologica 2021;113(2):70-84.
5. Chmiel P, Słowikowska A, Banaszek Ł, et al. Inflammatory myofibroblastic tumor from molecular pathology to targeted therapies. Oncol Res 2024;32(7):1141–62.
6. Casanova M, Brennan B, Alaggio R, et al. Inflammatory myofibroblastic tumor: The experience of the European pediatric Soft Tissue Sarcoma Study Group (EpSSG). Eur J Cancer 2020;127:123-29.
7. Da M, Qian B, Mo X, et al. Inflammatory Myofibroblastic Tumors in Children: A Clinical Retrospective Study on 19 Cases. Front Pediatr 2021;9:543078.
8. Raitio A, Losty PD. Treatment and outcomes in pediatric inflammatory myofibroblastic tumors - A systematic review of published studies. Eur J Surg Oncol 2024;50(7):108388.
9. Comandini D, Catalano F, Grassi M, et al. Outstanding Response in a Patient With ROS1-Rearranged Inflammatory Myofibroblastic Tumor of Soft Tissues Treated With Crizotinib: Case Report. Front Oncol 2021;11:658327.
10. Mai S, Xiong G, Diao D, Wang W, Zhou Y, Cai R. Case report: Crizotinib is effective in a patient with ROS1-rearranged pulmonary inflammatory myofibroblastic tumor. Lung Cancer 2019;128:101-4.
11. Yıldırım ÜM, Kebudi R, Zülfikar B, Bilgiç B. Inflammatory myofibroblastic tumor in children: clinical characteristics and treatment outcomes with a focus on targeted therapies. Turk J Pediatr 2025;67(1):51–60.
12. Lovly CM, Gupta A, Lipson D, et al. Inflammatory myofibroblastic tumors harbor multiple potentially actionable kinase fusions. Cancer Discov 2014;4(8):889-95.
13. Liu M, Zhu D. Two cases of inflammatory myofibroblastic tumor treated with targeted drugs: A case report. Medicine (Baltimore) 2024;103(21):e38136.