

Recurrent Giant Intramuscular Lipoma of the Vastus Medialis Muscle: A Case Report and Comprehensive Review of the Literature

Ahmed Al-Sadek, Svetoslav A. Slavchev, Georgi Luchev,
Deyan Sokolov, Georgi P. Georgiev^(✉)

Department of Orthopedics and Traumatology, University Hospital “Queen Giovanna - ISUL”,
Medical University of Sofia, Sofia, Bulgaria
georgievgp@yahoo.com

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Abstract

Lipomas are the most common benign soft tissue tumors, yet their occurrence within deep muscular compartments (intramuscular lipomas) is relatively rare. Unlike superficial subcutaneous lipomas, intramuscular variants often display an infiltrative growth pattern, leading to significantly higher recurrence rates if not adequately and completely excised.

We present a compelling case of a 40-year-old female with a recurrent giant intramuscular lipoma located in the left vastus medialis muscle. The patient had undergone a surgical excision of a mass in the same anatomical location ten years prior. Clinical examination, plain radiography, and magnetic resonance imaging (MRI) revealed a deep-seated, 8.2-cm lipomatous mass engaging the quadriceps musculature. The patient was treated with an extended marginal re-excision.

This report discusses the diagnostic challenges, radiological characteristics, and surgical management of recurrent deep-seated lipomas. We emphasize the absolute necessity of preoperative MRI to distinguish these lesions from atypical lipomatous tumors and the importance of adequate surgical margins to prevent recurrence in infiltrative subtypes.

Keywords—intramuscular lipoma, recurrent lipoma, vastus medialis, giant lipoma, MRI, surgical excision.

1 Introduction

Lipomas represent the most frequent benign mesenchymal neoplasms encountered in clinical practice, accounting for approximately 16% of all soft-tissue mesenchymal tumors van¹. They are predominantly composed of mature adipose tissue and typically present as solitary, slow-growing, painless, and mobile masses. The vast majority of

these lesions are situated within the superficial subcutaneous fat of the trunk and extremities. Deep-seated lipomas, defined as those originating deep to the investing muscular fascia (subfascial), are comparatively rare, representing only about 1% of all lipomatous tumors².

Among these deep-seated lesions, intramuscular lipomas constitute a distinct and uncommon subgroup. These tumors originate directly within the muscle belly and must be distinguished from intermuscular lipomas, which grow in the fascial spaces between different muscle groups without invading the muscle substance itself. Intramuscular lipomas pose a unique therapeutic challenge because they frequently demonstrate an infiltrative growth pattern, wherein the adipocytes interdigitate extensively with the host skeletal muscle fibers. This histological feature makes it exceedingly difficult for the operating surgeon to identify a clear cleavage plane or pseudocapsule during dissection, thereby significantly increasing the risk of local recurrence compared to well-encapsulated superficial lipomas³.

In the context of the extremities, lipomatous masses are clinically defined as "giant lipomas" when their maximum diameter exceeds 5 cm⁴. Giant deep-seated lipomas can cause substantial aesthetic deformity, functional limitation of the affected limb, and occasionally, compression of adjacent neurovascular structures. Furthermore, their large size and deep location necessitate a rigorous differential diagnosis to definitively rule out low-grade malignancies, most notably well-differentiated liposarcoma (WDL) or atypical lipomatous tumor (ALT)⁵.

We report an instructive case of a recurrent giant intramuscular lipoma of the vastus medialis muscle in a 40-year-old female, which appeared ten years following the initial surgical intervention. This article aims to highlight the diagnostic importance of advanced imaging and the surgical requirements for preventing recurrence in deep-seated lipomatous tumors.

2. Case report

Patient Information and Clinical History

A 40-year-old female patient presented to our Department of Orthopedics and Traumatology complaining of a painless but progressively enlarging swelling in the antero-medial aspect of her left thigh. The patient provided a significant medical history, noting that a soft tissue mass had been surgically excised from the exact same location at a different medical facility exactly 10 years prior. Following that initial procedure, she experienced a period of asymptomatic relief, but she noticed the mass gradually reappearing and growing over the past four years. She adamantly denied any recent blunt trauma to the area, nor did she report any constitutional symptoms such as fever, unexplained weight loss, or night sweats. Laboratory tests were within normal limits.

Clinical Findings

Physical examination revealed a firm, palpable mass located in the distal third of the left thigh, originating deep to the fascia. The soft tissue mass was well-circumscribed. Notably, the mass became more prominent, firm, and fixed upon isometric contraction

of the quadriceps muscle, a classical physical finding consistent with an intramuscular or subfascial tumor location. The overlying skin was completely normal in appearance and temperature, featuring a well-healed longitudinal surgical scar (*Figure 1a*) from the previous intervention. The mass measured approximately 8.2 cm in its longest clinical dimension. The range of motion of the left knee and hip joints was fully preserved, and a detailed neurological examination revealed no distal sensory or motor deficits in the lower limb.

Imaging Assessment

Diagnostic imaging commenced with standard anteroposterior and lateral radiographs of the left thigh. These images revealed a well-delineated, radiolucent soft tissue shadow (exhibiting a water-clear density) situated in the anterior muscle compartment (*Figure 1b,c*). There was no evidence of bone involvement, cortical erosion, or intralesional calcification.

To thoroughly characterize the recurrent mass and plan the surgical approach, MRI was performed. MRI is considered the gold standard imaging modality for the preoperative assessment of soft tissue tumors⁶. The MRI demonstrated a well-defined, lobulated mass measuring approximately 8.2 x 5.4 x 2.8 cm within the substance of the vastus medialis muscle. The lesion showed high, homogeneous signal intensity on T1-weighted images and complete signal suppression on fat-saturated sequences (*Figure 1d,e*), which is highly characteristic of mature adipose tissue⁶. The mass displaced the surrounding muscle fibers of the vastus medialis. Although thin internal septations were visible, there were no thickened nodular components, non-adipose areas, or signs of frank infiltration into the neurovascular bundle to suggest dedifferentiation into a liposarcoma.

Surgical Intervention

Given the recurrent nature of the lesion and its giant size, surgical re-excision was strongly indicated. Under regional anesthesia, the patient was positioned supine. A longitudinal incision was made carefully incorporating the previous surgical scar. The subcutaneous tissues were dissected, and the deep fascia was incised, revealing a yellowish, lobulated lipomatous mass embedded within the muscle fibers of the vastus medialis.

Intraoperatively, it was noted that the tumor lacked a complete, distinct pseudocapsule in certain areas and adhered firmly to the surrounding muscle fibers, confirming its infiltrative intramuscular nature (*Figure 1f*). To minimize the risk of a second recurrence, a very thin layer of the adherent muscle fibers was sacrificed so that the tumor was completely removed en bloc along with a thin, continuous margin of healthy, uninvolved tissue in the areas of deficient pseudocapsule to ensure the complete extirpation of any microscopic infiltrative extensions⁷. Hemostasis was meticulously achieved, and the surgical site was closed over a suction drain.

Histopathology and Outcome

Histopathological analysis of the excised specimen confirmed the diagnosis of a benign intramuscular lipoma. The microscopic sections showed lobules of mature, benign

adipocytes separated by thin fibrous septa. Crucially, there was no evidence of lipoblasts, nuclear atypia, cellular pleomorphism, or increased mitotic activity, thereby definitively ruling out a malignancy⁸.

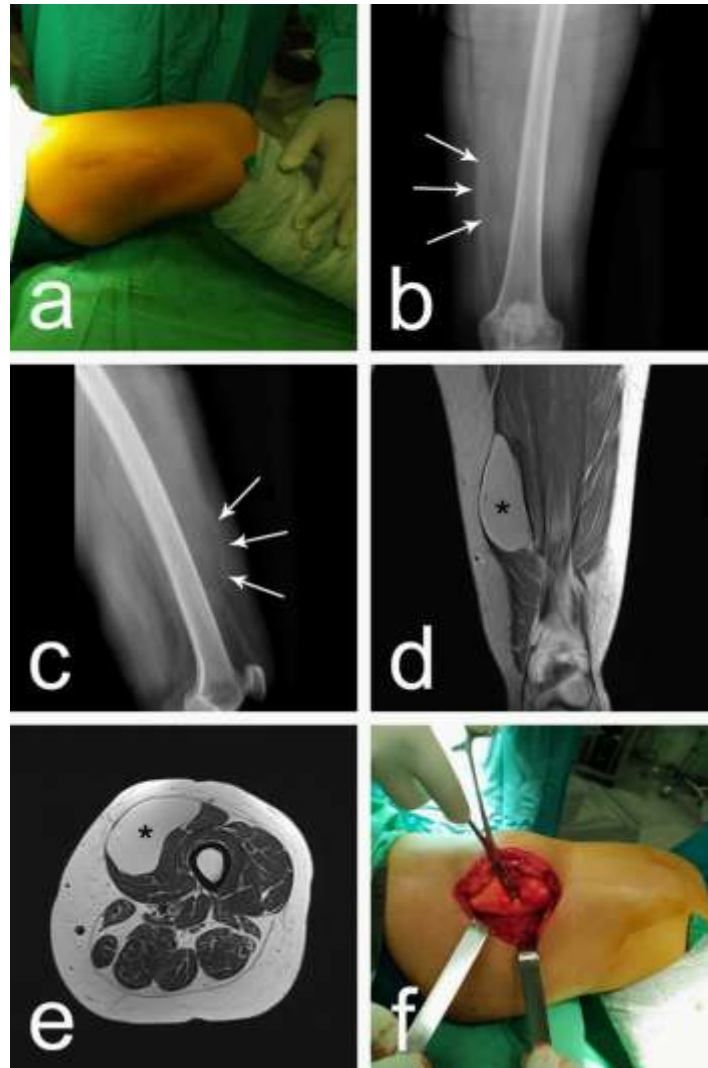


Figure 1. a) Preoperative photography; b, c) Preoperative AP and lateral radiographs of the left thigh showing a well-delineated radiolucent mass (arrows); d) Coronal T1-weighted MRI scan demonstrating a homogeneous, hyperintense mass located within the vastus medialis muscle (asterisk); e) Axial T2-weighted MRI demonstrating the mass located within the vastus medialis muscle (asterisk); f) Intraoperative photography.

The postoperative course was entirely uneventful, and the patient was discharged on the second postoperative day. At the 6-month clinical follow-up, the patient demonstrated a full recovery of quadriceps function, and there were no signs of local recurrence.

3. Discussion

Etiology and Pathophysiology

The exact etiology and pathogenesis of lipomas, particularly those exhibiting giant or recurrent growth patterns, remain somewhat unclear. Several causative factors have been implicated in the literature. Trauma is frequently cited as a potential trigger, particularly for giant lipomas; the theory posits that severe blunt trauma or repetitive microtrauma may cause rupture of the fibrous septa, leading to hematoma, fat necrosis, and the subsequent uncontrolled proliferation of preadipocytes⁹. Other proposed mechanisms include metabolic disorders (such as obesity and hypercholesterolemia), endocrine factors, and genetic abnormalities. In our reported case, while the patient explicitly denied recent trauma, the recurrent nature of the mass highlights the persistent, aggressive proliferative potential of any residual adipose tissue left behind after the first surgery.

Diagnostic Imaging: The Critical Role of MRI

Proper evaluation of deep-seated soft tissue masses requires comprehensive imaging studies to precisely rule out malignancy and facilitate careful preoperative planning¹⁰. While plain radiographs typically present the lipoma as a well-delineated, homogeneous radionegative tumor, MRI remains the undisputed gold standard. On MRI, benign lipomas appear as non-invasive masses with a homogeneous fat signal intensity that is identical to subcutaneous tissue (high on T1-weighted images and low on T2-weighted fat-suppressed images)¹¹.

The most critical diagnostic dilemma in managing giant, deep-seated fatty tumors is the differentiation from WDL or ALT¹². WDL/ALT is a low-grade malignancy that, while having a minimal tendency for metastasis, has a significant propensity for local recurrence if inadequately excised. MRI features that are highly suspicious for ALT/WDL include:

- Tumor size greater than 10 cm.
- Thickened, irregular, or enhancing septa (greater than 2 mm).
- The presence of non-adipose, nodular, or globular components.
- A decreased percentage of overall fat composition.

In our patient, the completely homogeneous signal intensity and the distinct lack of thick septations or nodular enhancement on MRI provided strong preoperative evidence against malignancy, despite the concerning clinical presentation of a rapid recurrence.

Surgical Management and the Problem of Recurrence

The definitive treatment for giant lipomas is complete surgical removal¹³. However, the surgical management of intramuscular lipomas requires specific attention to the resection margins. Superficial, well-encapsulated lipomas are considered "innocent" tumors and have an incredibly low recurrence rate (less than 5%) following simple marginal excision. Conversely, intramuscular lipomas have a dramatically higher reported recurrence rate in the literature. This elevated risk is directly attributed to their infiltrative growth pattern, where benign tumor cells intermingle deeply with normal muscle fibers, making it exceptionally difficult to visually determine the true tumor boundary during surgery.

In cases of recurrence of benign tumors, technical surgical mishaps, specifically incomplete resection, are held accountable. The recurrence in our specific case, occurring just one year after the initial operation, was undoubtedly the result of an incomplete initial resection (likely a simple marginal or intralesional excision or "shelling out") where microscopic infiltrative margins were inadvertently left behind. Therefore, for recurrent or known infiltrative intramuscular lipomas, a wide excision—which involves removing the tumor en bloc along with a deliberate cuff or rim of normal, healthy surrounding muscle tissue—is strongly recommended to ensure clear margins and prevent further recurrence¹⁴. The importance of complete excision to avoid recurrence has been similarly documented in rare cases of giant lipoblastomas¹⁵. It is also important to note that intralesional removal through techniques like liposuction is generally contraindicated for giant or deep-seated lipomas due to the unacceptably high risk of incomplete removal and the inability to provide an adequate, intact tissue sample for vital histological examination¹⁶.

4. Conclusion

Recurrent intramuscular lipomas are rare clinical entities that present significant diagnostic and therapeutic challenges to the orthopedic surgeon. The rapid recurrence of a deep-seated lipoma should immediately raise clinical suspicion of either an infiltrative tumor biology or an inadequate initial surgical excision. Preoperative MRI is an absolute mandatory requirement for precise surgical planning and, most importantly, for ruling out low-grade malignancies such as ALT. Complete, meticulous surgical excision that includes a margin of healthy tissue remains the most effective and reliable treatment modality to prevent further recurrence and ensure optimal patient outcomes.

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Authors

Ahmed Al-Sadek, M.D. is a member of the **Bulgarian Orthopedic and Traumatology Association (BOTA)**. He works as an orthopaedic surgeon University Hospital “Queen Giovanna - ISUL”, Medical University of Sofia, Bulgaria. He is assistant at the Department of Orthopedics and Traumatology, Medical University of Sofia, Sofia, Bulgaria.

Svetoslav A. Slavchev, M.D., Ph.D. is member of the **Bulgarian Orthopedic and Traumatology Association (BOTA)**. He works as an orthopaedic surgeon at the Department of Orthopedics and Traumatology, University Hospital “Queen Giovanna - ISUL”, Medical University of Sofia, Bulgaria. He is Assistant Professor at the Department of Orthopedics and Traumatology, Medical University of Sofia, Bulgaria.

Georgi Luchev, M.D. is member of the **Bulgarian Orthopedic and Traumatology Association (BOTA)**, **European Hip Society (EHS)**, **Young Member of Personalized Arthroplasty (PAS)**. He works as an orthopaedic surgeon at the University Hospital “Queen Giovanna - ISUL”, Medical University of Sofia, Bulgaria. He is a Ph.D. candidate at the Department of Orthopedics and Traumatology, Medical University of Sofia, Sofia, Bulgaria.

Deyan Sokolov, M.D. is member of the Bulgarian Orthopedic and Traumatology Association (BOTA). He works as an orthopaedic surgeon at the Department of Orthopedics and Traumatology, University Hospital “Queen Giovanna - ISUL”, Medical University of Sofia, Bulgaria.

Georgi P. Georgiev, M.D., Ph.D., D.Sc. is member of the **Bulgarian Orthopedic and Traumatology Association (BOTA)**. He works as an orthopaedic surgeon and Chairman at the Department of Orthopedics and Traumatology, University Hospital “Queen Giovanna - ISUL”, Medical University of Sofia, Bulgaria. He is Associate Professor at the Department of Orthopedics and Traumatology, Medical University of Sofia, Bulgaria. He is a member of the Editorial board of Journal of Orthopaedic Translation, BMC Musculoskeletal Disorders, Clinical Anatomy and Acta Medica Bulgarica.