Case reports

A case report of an intermuscular lipoma: presentation, pathophysiology, differential diagnosis

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Abstract

Objective: The purpose of this report is to present the case of a 54-year-old female patient with a pathologically confirmed diagnosis of soft tissue lipoma. The clinical presentation, pathophysiology, differential diagnosis, and treatment options for lipoma are described.

Clinical Features: The patient presented to a chiropractic clinic with painful swelling in the right anterior thigh. Physical examination revealed a palpable mobile mass with minimal tenderness.

Intervention and Outcome: The initial consultation was with the primary care physician, and it resulted in a sonographic examination as the initial imaging modality to rule out deep venous thrombosis. The result of this examination was negative. Following a delay by additional incorrect diagnoses and treatments, a diagnosis of an intermuscular lipoma was established by magnetic resonance imaging and confirmed on biopsy as a soft tissue lipoma. The patient underwent complete excision of the mass.

Conclusion: Lipomas are common benign soft tissue masses and should be considered in the differential diagnosis of a thigh mass. Magnetic resonance imaging with contrast depicts the lipomatous mass as having a characteristic high-intensity fat signal without enhancement. It is important for clinicians to have an increased awareness in recognizing the clinical and imaging manifestations of a soft tissue lipoma to optimize an initial diagnosis and treatment.

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Introduction

There are 9 benign lipomatous musculoskeletal masses, with lipomas being the most common (Fig 1¹). Lipomas occur in 2% of the population and make up 50% of all musculoskeletal soft tissue tumors.¹ Lipomas are composed of mature lipocytes.^{2,3} The most common malignant soft tissue

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Lipoma
Lipomatosis
Lipomatosis of nerve
Lipoblastoma or lipoblastomatosis
Angiolipoma
Myolipoma of soft tissue
Chondroid lipoma
Spindle cell lipoma and pleomorphic lipoma
Hibernoma

Fig 1. Benign lipomatous lesions of soft tissue.

mass is malignant fibrous histiocytoma followed by liposarcoma, which resembles lipomas on computed tomography (CT) and magnetic resonance imaging (MRI)⁴ and is most common in the thigh.⁵ Solitary lipoma occurs with equal frequency in males and females, with multiple lipomas more common in males.⁶ In contrast, Nigri et al⁷ reported that lipomas are more prevalent in the obese, female patient in the fifth to seventh decades of life. In a large study conducted by Kransdorf,⁸ it was found that the majority of lipomas were located in the trunk, followed by the head/neck and lower extremity; and Murphey et al¹ note a prevalence of lipomas in the upper back, neck, proximal extremities (especially the shoulder), and abdomen. Lipomas may be either superficial or deep, with the former being more common.⁴ Roberts et al⁹ further classified the superficial palpable fatty masses into encapsulated and unencapsulated. The deep lipoma is usually larger and deforms the surrounding tissue as compared with superficial lipomas, which are generally more circumscribed.⁴ The subfascial or deep lipomas can be classified as parosteal, interosseous, or visceral and intermuscular or intramuscular. The muscular lipomas can be infiltrating.³ The deep lipoma often presents without clinical symptoms and therefore grows to a large size before detection.³ Lipomas are typically asymptomatic unless they compress neurovascular structures.⁷

Given the prevalence of lipoma and the likelihood of soft tissue masses being discovered during clinical examinations, the intent of this article is to describe a recent case presentation and discuss the pathophysiology of lipomas, differential diagnosis, imaging characteristics, and the range of treatment options.

Case report

A 54-year-old, 155-lb, 5'6"-tall woman presented to her primary care physician with bilateral hip pain and

swelling and discomfort in her right anterior thigh. Both complaints were described as insidious for 1 month with no history of trauma. A history of breast cancer was reported. She was taking medications for hypertension and depression.

The patient was referred by her primary care physician for a venous duplex diagnostic ultrasound of the right lower extremity to assess the pain and swelling of the right thigh. The examination found no evidence of deep vein thrombosis. The patient was then referred to an orthopedic surgeon who diagnosed her with left hip bursitis and an anterior thigh strain. She was then referred to physical therapy where hip exercises were performed for 3 weeks with no improvement. The patient then sought chiropractic care. On inspection, the right thigh was asymmetrical compared with the left. The patient's gait was noticeably altered because of discomfort. Physical examination revealed a palpable mobile mass in the right anterior thigh with minimal tenderness. The patient demonstrated near-normal (approximately 100° flexion, 30° internal and external rotation, and 30° extension) but painful hip range of motion. The hip pain, localized to the greater trochanter and iliotibial band, was reproducible with palpation. Muscular movement provoked soft tissue pain while walking and contracting the anterior thigh muscles. An MRI of the hips and right thigh was then ordered by the chiropractic physician. No bursitis was noted. A large 11.5 × 4.0 × 2.8-cm intermuscular lipoma of the medial right thigh was reported. The ovoid mass was well circumscribed and returned a high signal intensity consistent with fat, although some heterogeneous signal on the fluid-sensitive sequence was noted. There was no infiltration of the mass into surrounding musculature, nor were enhancements or thick septations demonstrated within the mass. Surgical consultation was obtained. The mass was excised and diagnosed as a lipoma. The patient's discomfort and swelling in the anterior thigh were significantly reduced, and her gait normalized. Follow-up chiropractic management for residual hip pain was relieved with acupuncture and deep tissue massage of the iliotibial band as it crosses the greater trochanter. Acupuncture in this case included 2 treatments of 20-minute duration, using four to six 2-in needles penetrating approximately 1.5 in, with attached electric stimulation. The acupuncture points included fascial trigger points in the area of the patient's iliotibial band. Following acupuncture, deep trigger point massage for a period of 5 minutes was provided. Reevaluations at 1 and 2 months revealed continued improvement in hip

mobility and resolution of hip pain. The patient reported being able to exercise regularly and walk briskly without experiencing pain. The patient gave her consent to have her personal health information published without divulging personal identifiers.

Discussion

Lipoma is a common benign soft tissue neoplasm described as either superficial or deep.¹⁰ Differential diagnostic considerations presented by Resnick¹¹ for benign and malignant soft tissue masses that occur in the lower extremity in individuals aged 46 to 65 years are included in Table 1. Given the patient's history of breast carcinoma, metastasis to soft tissue from recurrence was included in the differential diagnosis. Plaza et al¹² report that soft tissue metastasis rarely occurs and that, when it does, direct extension is more common than hematogenous metastases. Superficial lipomas are more common than deep lipomas.^{1,4} Our case described a deep, unusually large intermuscular lipoma located between the rectus femoris and vastus intermedius of the medial right thigh. Intermuscular lipomas are rare, with an incidence of 1.8%. After complete resection, there is a 1% recurrence rate compared with a 19% recurrence rate of intramuscular lipomas.¹³ Deep lipomas that are either intermuscular or intramuscular have been described as infiltrating lipomas by Terzioglu et al.³ Lipomas are more likely to be encapsulated in the shoulder than in the thigh.⁹ Tumors within the popliteal or inguinal region may compromise neurovascular bundles through encasement.¹

Diagnostic imaging plays an important role in assessing soft tissue masses. Radiography is often the initial imaging modality. When results are positive, radiographs may reveal osseous changes (periosteal reaction, remodeling, or overt destruction) and cartilaginous or osseous matrix within the masses.¹⁴ Computed tomography may be used to further assess

osseous architecture, soft tissue matrix, and subtle areas of mineralization or soft tissue gas.¹⁴ On CT, fat has low attenuation, that is, less than −20 Hounsfield units¹⁴ and typically between −65 and −120 Hounsfield units.⁴ Benign lipomas have a homogeneous low attenuation on CT. Malignant liposarcomas, such as myxoid liposarcoma, accounting for 50% of all liposarcomas, demonstrate low to intermediate attenuation and often have an inhomogeneous appearance owing to cystic areas representing myxoid material.⁴ The lipoma in this case was evident on T1- and T2-weighted coronal, sagittal, and axial MRI. T1- and T2-weighted fat-suppressed coronal, sagittal, and axial images and contrast-enhanced coronal and axial T1 images were also performed. The classic MRI signal intensity for lipomas is similar to subcutaneous fat.⁴ Therefore, on T1-weighted images, the lipomatous mass is isointense to surrounding subcutaneous fat (Fig 2). When fibrous connective tissue appears within the lipoma, the septa will show a decreased signal (hypointense) on all pulse sequences (Fig 3). Fat-suppressed T1-weighted images with contrast will demonstrate signal intensity suppression of the lipoma without enhancement of the lipoma or the septae¹⁵ (Fig 4).

Terzioglu et al³ describe lipomas of 10.0 × 5.0 × 3.0 cm or greater as giant lipomas and note that tumors of this size should include liposarcomas in the differential diagnosis. In this case, the MRI measurements of the

Table 1 Benign and malignant soft tissue tumors

Benign Soft Tissue Tumors	Malignant Soft Tissue Tumors
Lipoma	Malignant fibrous histiocytoma
Myxoma	Liposarcoma
Fibrous histiocytoma	Leiomyosarcoma
Nodular fasciitis	Synovial sarcoma
Schwannoma	Malignant peripheral nerve sheath tumor
Neurofibroma	Chondrosarcoma
Proliferative fasciitis	Fibrosarcoma

Fig 2. A T1-weighted coronal MRI of the right hip and thigh in a 55-year-old woman with a medial right thigh mass between the rectus femoris and vastus intermedius muscles. The mass was isointense to adjacent subcutaneous fat, consistent with a lipoma.

Fig 3. T2-weighted axial MRI of the right thigh demonstrated increased signal intensity within the intermuscular mass consistent with fat. Septations less than 2 mm within the mass are hypointense, commonly seen with lipomatous masses.

lipoma were $11.5 \times 4.0 \times 2.8$ cm; and it was diagnosed as an intermuscular lipoma. Although liposarcomas resemble lipomas on both CT and MRI⁴ and both show MRI signal intensity that is equivalent to fat,¹⁵ the pathologic report confirmed the absence of lipoblasts or significant atypical adipocytes. The presence of lipoblasts^{3,16} or atypical adipocytes¹⁷ would raise the concern for liposarcoma. Histologically, lipomas resemble normal fat, whereas well-differentiated

Fig 4. T1-weighted fat-saturated coronal MRI with gadolinium contrast demonstrated a relatively homogeneous mass with nonenhancement, consistent with a benign lipoma.

liposarcomas, although similarly resembling⁹ fat histologically, also have dense bands of collagen traversing the mass with associated gelatinous areas.¹⁶ Kransdorf et al¹⁶ reported that distinguishing between a well-differentiated liposarcoma and lipoma is challenging. Magnetic resonance imaging and CT depict well-differentiated liposarcomas as having *thickened* septae (defined as septae greater than 2 mm thick or focal thickening) and nodular and/or globular areas of nonadipose tissue within the lesion or associated with the mass. Nonadipose tissue comprising more than 25% of the lesion is also a feature consistent with well-differentiated liposarcoma.^{15,16} With imaging, characteristics that would exclude the diagnosis of a lipoma include thick septations, soft tissue elements, and nodular enhancing regions.⁹ The MRI examination revealed none of these findings. The lipoma in this case largely contained fat signal, although some heterogeneous signal on the fluid sensitive sequence was noted and was attributed to fat necrosis.

Ultrasonography of a lipoma is often the initial diagnostic procedure due to its availability and low cost when compared with MRI.¹⁸ When a soft tissue mass is large, unless the split screen feature is used to increase the field of view 2-fold, the mass may not be fully visualized at sonographic examination. Given that the intent of the sonographic examination in this case was to rule out a venous occlusion using duplex ultrasound of the right lower extremity, the large field of view was not used. A sonographic examination of a lipoma is performed most often on superficial masses and will parallel the skin surface. Commonly, lipomas will be homogeneous in echotexture and typically slightly hyperechoic to subcutaneous fat.¹⁸ Inampudi et al¹⁹ reported that pure fatty tumors have less acoustic impedance due to fewer interfaces when compared with tumors that have a mixed composition of fat and water and therefore an increased number of interfaces creating a more heterogeneous echogenicity at sonography.

Histopathology indicated a $9.0 \times 6.6 \times 1.2$ -cm well-circumscribed specimen covered by a thin, pink-tar, membranous capsule. Roberts et al⁹ report controversy in regard to a lipoma having a true capsule vs a pseudocapsule that is depicted as compression of normal adjacent tissue. A membranous capsule was also reported, a finding evident on MRI. A capsule is not pathognomonic for a lipoma; rather, it is the presence of mature adipose tissue that characterizes the mass as a lipoma.⁹

Treatment of the intermuscular deep lipoma in this case required complete excision. Indications for

excision include a mass greater than 5 cm in size; a subfascial location; a tumor that is growing; clinical features such as pain, firmness, or irregularity; or a questionable preoperative needle biopsy result. Another reason for excision includes a patient's cosmetic concern.⁵ In this case, a history of breast cancer led to the patient's concern that the mass, although clinically benign, could nonetheless pose a serious threat. After excision, recurrence rates of deep-seated lipomas were described by Weiss⁶ as being modest, with the lowest rate at 3% and the highest at 62.5%, most likely due to incomplete surgical excision.

Postoperative chiropractic pain management in this case included acupuncture and deep tissue massage. The use of complementary medicine techniques for the management of hip joint pain may be promising because a decrease in pain and dysfunction, after acupuncture treatments, was reported by Haslam.²⁰

Conclusion

This case report described an adult female patient with an unusually large, deep, intermuscular lipoma in the anterior right thigh that evaded early diagnosis. The patient initially presented with pain most likely from pressure exerted on adjacent tissue by the large lipoma. Her pain was another unusual presentation, as lipomas are typically asymptomatic until they grow to a considerable size. Subsequent to the diagnosis by MRI, excision was performed. Postoperative chiropractic treatment resolved the residual symptoms.

During examination and palpation of musculoskeletal soft tissues, chiropractors will likely encounter a range of superficial and deep soft tissue masses. The recognition of clinical signs of a superficial or deep lipoma and the use of magnetic resonance and sonographic imaging will assist clinicians in recognizing the diagnosis, allowing for optimal and timely treatment.

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