An Approach to Muscular Masses

By Lucie Roy, MD; and Alessandra Bruns, MD, MSc

The first patient is a 39-year-old man, working in construction, who was referred by the orthopedic service for triceps rupture and radial neuralgia. This is a healthy man, without medical or surgical antecedents, who presents with a voluminous painless mass of the right distal triceps, which had gradually increased in size over three months. He has no history of past trauma. He mentions intermittent paresthesia for three years in the median and ulnar nerve territory. On physical examination, a mass located distally to the right arm is noted. Furthermore, the vascular and cervical exams are completely normal and the patient has a full extension of his forearm (Figure 1). A musculoskeletal (MSK) ultrasound reveals a hyperechoic lesion of 9 cm by 3 cm on the medial chief of the right triceps (Figure 2) and a normal triceps tendon (Figures 3 and 4). The Doppler study is negative. An ulnar nerve subluxation on the right medial epicondyle was also noted. The magnetic resonance imaging (MRI) study reveals an enhanced intramuscular mass of 7.4 cm by 6.6 cm by 3.6 cm on T1-weighted images and a suppressed lesion on fat suppression technique that confirms the suspicion of intramuscular lipoma.

The second patient is a 64-year-old man who was referred for an impingement syndrome of the right shoulder. The physical exam reveals a full range of motion, a positive impingement manoeuvre and a deltoid mass (Figures 5 and 6). The ultrasound shows a small rupture of the subscapularis, a light internal impingement and a 7.9 cm by 1.9 cm mass located in the deltoid muscle. An MRI of the shoulder confirms the presence of a lipoma in the deltoid muscle.

Muscle masses can take different forms and the differential diagnosis of these masses is wide-ranging. Described above are the cases of two men with asymptomatic muscular masses who have undergone a complete investigation, including ultrasound and MRI. These imaging modalities point to the diagnosis of lipoma, though no definitive diagnosis could be raised, because there is no histologic proof. The differential diagnosis of a muscular mass is varied and includes traumatic lesions, abscesses, and tumors. These tumors are usually benign; though malignancy is rare (Table 1),[1] the occurrence of a malignant lesion should always be kept in mind when evaluating a mass, even if it occurs in the setting of a local trauma.

Clinical Forms of Lipoma

Lipomas are the most frequently occurring soft-tissue neoplasia, accounting for 50% of cases. They affect approximately 1% of the general population at any age, with an incidence peak between 40 and 60 years of age.[2] They usually form as a unique lesion, but can present as multiple lesions in 5% of cases. The most common presentation is a mass of the subcutaneous tissue measuring less than 5 cm, but lipoma may affect virtually any organ in the body. Like the skeletal muscle, lipomas are almost always located in the trunk, the thigh, the shoulder or the arm. They are intramuscular and usually form a well-defined mass, except when an infiltrative non-malignant form exists.

Table 1
Most Common Tumors of the Muscle[1]

Tumor	Description
Lipomas	Benign soft tissue tumor; usually subcutaneous, may occur in or among muscles.
Intramuscular cysts	Benign soft tissue tumor composed of liquid.
Hemangioma	Benign soft tissue tumor; often forms within muscle, typically in the thigh.
Liposarcoma	Soft tissue sarcoma, includes five subtypes. Not the result of malignant transformation of lipoma.
Myxoma	Benign tumor composed of fibroblast and myxoid deposits.
Desmoid	Aggressive soft tissue tumor of connective tissue; characterized by rapid growth and highly infiltrative.
Rhabdomyosarcoma	Most frequent malignancy of the muscle; usually affecting children.
Metastasis	Rare; usually painless. Most often from carcinoma of breast, lung, and/or colon.

Figure 1
Triceps mass (left) and full extension of the forearm (right)

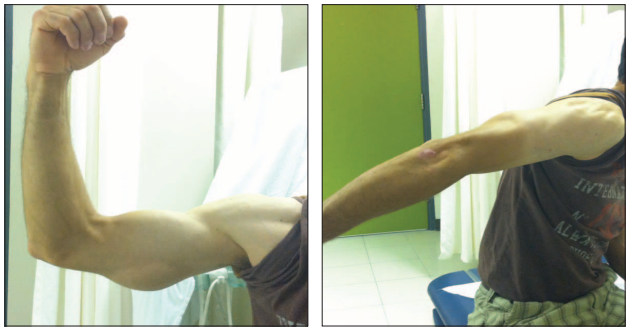


Figure 2
Triceps lipoma (panoramic view)

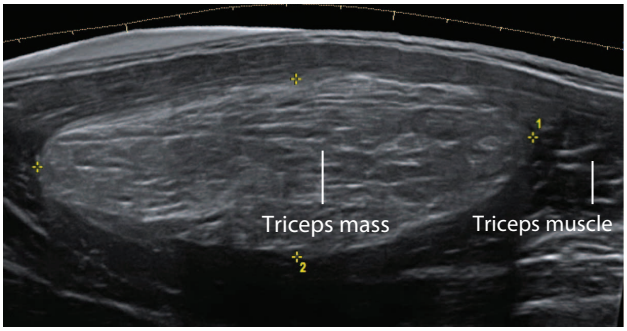


Figure 3
Triceps tendon (longitudinal view)

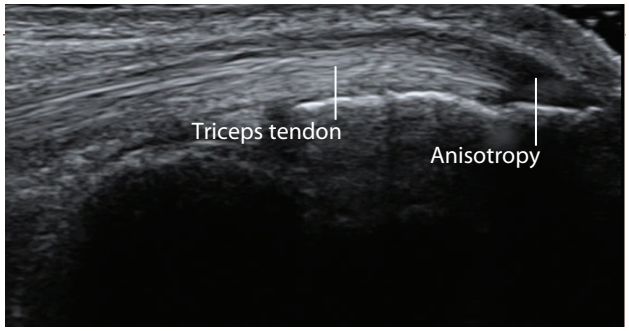


Figure 4
Triceps tendon (transverse view)

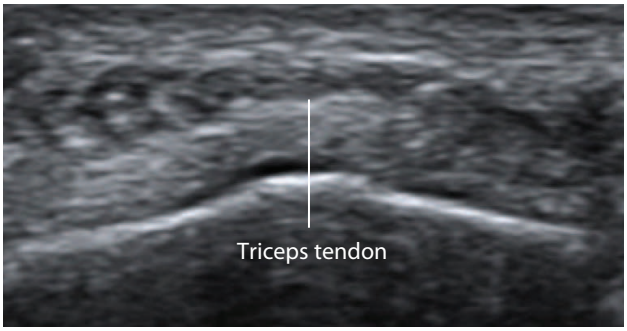


Figure 5
Deltoid lipoma (panoramic view)

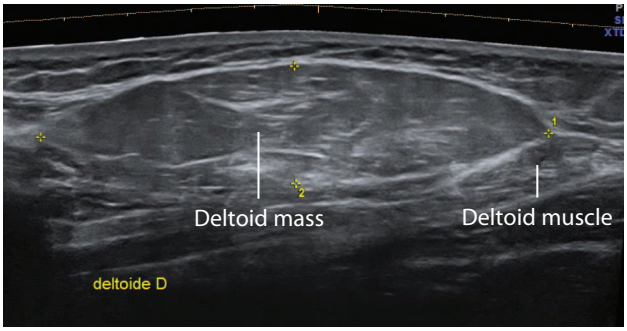
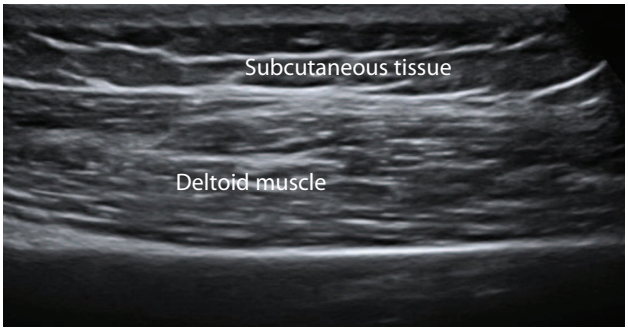


Figure 6
Contralateral normal deltoid muscle



Clinically, lipoma forms a painless soft mass that usually grows slowly, although rapidly growing masses with compressive symptoms have been described. These symptoms might be vascular, respiratory and/or neurologic. Indeed, several case reports describe lipoma of the proximal forearm with radial nerve compression.[3] In a literature search on Pubmed, four cases of sternocleidomastoid lipoma,[4] two cases of deltoid lipoma,[5] and no cases of triceps lipoma were described.

Imaging Modalities

Although subcutaneous lipoma typically does not necessitate the use of an imaging modality, care must be taken in the case of a large lipoma (more than 5 cm) or in the presence of an irregular shape or with suspicion of myofascial involvement. Multiple radiologic modalities exist to help in the diagnosis of lipoma, with sonography, computed tomography, and MRI to rule out a malignant process. A rapid and accessible technique is ultrasonography. The most common ultrasound findings are a well-defined ovoid-shape lesion inside the muscle with the typical striated appearance of a subcutaneous lipoma. Intermuscular lipomas are a less common variant than intramuscular occurences. In the well-circumscribed intramuscular lipoma, fatty tissue (hyperechoic appearance) is clearly delineated from the surrounding muscle (Figures 2 and 5). However, because of the different subtypes of lipoma, the sonographic appearance, in particular the echogenicity, is variable.

Intramuscular lipomas are generally non-compressible and the Doppler effect is negative.[1] Finding blood-flow signals in a lipoma-like mass with color and power Doppler imaging merits further investigation with contrast-enhanced MRI.

One study[6] retrospectively evaluated the accuracy of sonography to distinguish soft-tissue lipomas from other masses by using a histologic proof as the standard. This study concluded that sonography has low precision for the diagnosis of muscular masses because of the highly variable sonographic appearance. MRI remains the most sensible imaging modality for lipomatous masses and has a high negative predictive value.[7] The appearance of lipoma shows a fat signal intensity on all pulse sequences in MRI.[8] It is useful to distinguish a benign lesion from one that is malignant, which would present with an enhancing septae, nonadipose area, and a high T2 signal within the lesion. Despite these findings, some studies reveal difficulties with predicting a well-differentiated liposarcoma from a benign lesion, with a tendency to falsely identify many masses as a more aggressive entity. A definitive diagnosis can be posed with a biopsy or a surgical excision. The histologic features reveal well-circumscribed masses of mature adipocyte cells surrounded by a thin fibrous capsule. Note that there are different histologic variations of lipoma-forming subclasses, including fibrolipoma, myxolipoma, and many others.

Conclusions

In summary, an ultrasound helps determine whether a mass is composed of fat or not, but is less useful for determining a lesion's degree of malignity. As the appearance of most soft- tissue lesions is sufficiently specific in MRI, it is likely that no further investigation will be necessary. If there is a doubt, a biopsy must be performed.

The usual treatment for lipoma involves surgical removal.[2] Cosmetic concerns, compressive symptoms, functional limitation and concerns that the lipoma might actually be a malignant tumor are typical reasons for surgery. Some research[9] also demonstrated positive results with steroid injection that allowed for the shrinking of the lipoma. The risk of local recurrence after removal is higher with an intramuscular lipoma (19%), compared to the recurrence rate of a subcutaneous lipoma (1% to 2%).[9]

To conclude, despite the fact that lipomas are a frequent entity, a systematic approach must be adopted with muscular masses to avoid missing a malignant lesion. For the first case of intramuscular lipoma presented here, given the cosmetic impact for the patient, a surgical excision was suggested.

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