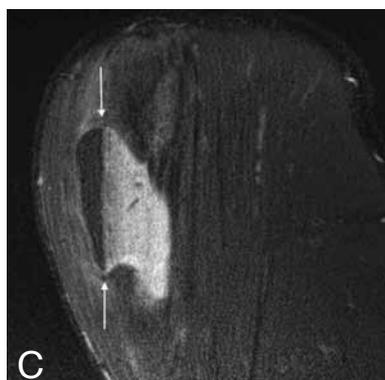
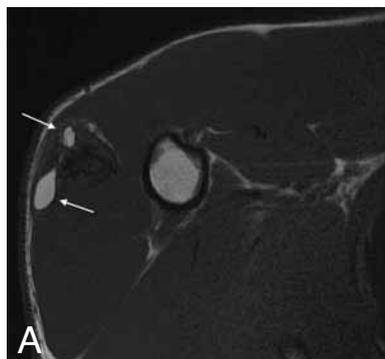


IMAGES IN CLINICAL RADIOLOGY



Bilateral intramuscular pseudotumor in a bodybuilder

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A 29-year-old bodybuilder presented with a bilateral palpable and painful soft tissue mass in the deltoid region. CT scan showed a bilateral intramuscular mass within the deltoid muscle with intralesional fat (not shown). For further differentiation and exclusion of a fat-containing sarcomatous lesion, MRI of both shoulders was performed. Axial T1-weighted images (WI) of the right shoulder showed a heterogeneous mass lesion containing multiple fatty components (Fig. A, arrows). Axial T1-WI of the left shoulder depicted a mass with a T1-hyperintense fatty component and marked fat-fluid level (Fig. B, arrow). The lesion also demonstrated a fat-fluid level on a sagittal fat suppressed T2-WI (Fig. C, arrow).

The presence of a bilateral fat containing soft tissue mass, combined with a history of local steroid injections were highly suggestive of pseudotumoral fat necrosis with surrounding inflammation rather than a fat-containing sarcoma. Because the lesions were painful, surgical removal was done. Pathological examination of the resection specimens showed fragments of necrotic muscle tissue with cystic degeneration, foamy macrophages and granulomatous foreign body inflammation. These findings confirmed the imaging diagnosis. Because both lesions showed no signs of malignancy and the patient was relieved of his complaints, no further follow-up exams were planned.

Comment

Anabolic steroids are synthetic derivatives of the male hormone testosterone, having an anabolic and androgenic effect. They are often used by bodybuilders to enhance muscle growth and maybe administered orally or by intramuscular injections.

Parenteral intake of anabolic steroids results in an increased risk of systemic side effects such as hepatotoxicity, hypercholesterolemia, hypertension and also sex-specific side effects.

Intramuscular injection of anabolic steroids may result in acute or chronic local complications. Acute complications include infection, abscess formation, arthritis, tendon tears or nerve damage, and are often caused by the injection technique itself. On rare occasions, injection of steroids can lead to chronic local disease with formation of soft tissue lesions mimicking sarcomas or liposarcomas.

The most common sites of involvement are the deltoid and gluteus muscles. The biceps or quadriceps muscles are not commonly involved, because they are less frequently used as injection sites.

Histologically, there are several possible causative mechanisms explaining the origin of these soft tissue lesions: infectious non-sterile injections caused by needle sharing, physical trauma induced by recurrent intramuscular injections, reaction against the steroid or agent mixed with the steroid. In our case, the inflammatory response was characterized by macrophages, foam-cells and the presence of foreign material. These findings were indicative of a foreign body inflammation against the steroid, and more in particular the oil-based components mixed with the steroid. Besides the inflammatory reaction, the lesion also contained multiple areas of muscle necrosis with cystic transformation and fibrosis. Both on MRI and CT, the lesion featured multiple fat-containing areas. A fat-fluid level can sometimes be seen and is a consequence of repeated trauma and fat-necrosis. Recurrent injections can also lead to intralesional bleeding and hemosiderin deposition, causing faster loss of signal intensity on T2-WI weighted images and gradient echo images.

In conclusion, the presence of a bilateral fat containing lesion in the deltoid muscle in a young bodybuilder is highly suggestive for a local complication related to intramuscular injections rather than a tumoral mass lesion.

Reference

1. Al-Ismail K., Torreggiani W.C., Munk P.L., Nicolaou S.: Gluteal mass in a bodybuilder: radiological depiction of a complication of anabolic steroid use. *EurRadiol*, 2002, 12: 1366-1369.

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