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TEST YOURSELF: ANSWER

A chronic thigh mass in a 69-year-old man

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Diagnosis

Amyloidoma presenting as a chronic soft tissue mass. Congo red staining (×40) in Fig. 1 shows characteristic apple green birefringence under polarised light.

Discussion

Amyloidosis is the result of extra-cellular deposits of amyloid fibril proteins and protein derivatives, recognised histologically by the presence on congo red preparations of apple-green birefringence under polarised light microscopy (Fig 1).

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Amyloid is classified by the fibrillar protein [1]. Type AL is secondary to a plasma cell disorder. Type AA, as in our case, is usually associated with chronic inflammation and our patient had chronic obstructive pulmonary disease. β2 microglobulin deposits are found in patients on long-term haemodialysis. Other forms of amyloidosis are associated with Alzheimer's and Creutzfeld–Jacob Diseases; hereditary variants include familial polyneuropathy and cardiomyopathy.

In our case, MRI showed a 6 × 6.5 × 1.5 cm subcutaneous mass overlying the vastus lateralis muscle. The mass was isointense to muscle on T1-weighted (Fig. 2a) and T2-weighted (Fig. 2b) images, heterogeneous on the STIR sequence, mostly slightly or moderately hyperintense to muscle, but also containing central hypointense areas. It showed patchy, low-grade enhancement on post-contrast fat-suppressed T1-weighted images (Fig. 2c).

Extremity soft-tissue amyloidomas are rare. Maheshwari et al. [2] reported a case in the thigh and identified 20 previous reports of extremity amyloidomas, 17 in the lower limbs. In their case [2], the mass was ulcerated, infected and had a purulent discharge. It was large, encapsulated, multilobulated and showed heterogeneous signal on T1- and T2-weighted images, including areas identical to fat on T1-weighted images. Intravenous contrast medium was not administered. Amyloidomas in other sites have also been reported to appear heterogeneous on MRI. They are generally of similar intensity to muscle on T1-weighted images, heterogeneous and contain low-signal intensity areas on T2-weighted images, and show variable enhancement after intravenous contrast medium administration [2], although one patient had several lesions that were hyperintense on T2-weighted images and showed rim enhancement after intravenous contrast

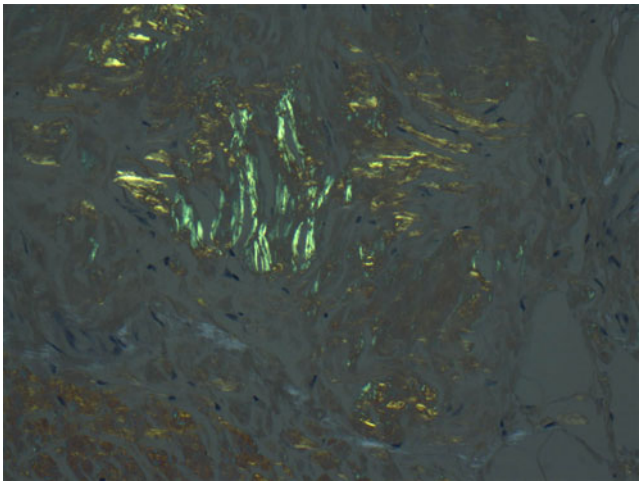

Fig. 1 Characteristic apple green birefringence under polarised light

medium administration [3]. High signal intensity, similar to fat, on T1-weighted images has been reported.

Dark areas on T2-weighted images may be prominent features of amyloidomas. The β-pleated structure of the amyloid protein may result in internal magnetic fields that reduce phase coherence and transverse magnetisation, thus reducing T2 signal intensity, and may also cause reduced proton density. Chemical exchange and spin–spin interactions between the amyloid protein and adjacent water molecules and the presence of collagen, vessels and

Table 1 Masses that are hypointense on T2-weighted images[a]

Amyloid
Fibrotic
a) Location-specific
Scar
Plantar fibroma
Dupuytren's disease
GCT of tendon sheath/PVNS
Elastofibroma
Foreign body
b) Location non-specific
Fibroma
Rheumatoid nodule
Malignant fibrous histiocytoma
Fibrosarcoma
Desmoid
Leiomyoma
Lymphoma
Haemosiderin-containing
GCT of tendon sheath/PVNS
Haemorrhagic mass
Calcium-containing
Calcification
Tophus

[a] Adapted from Wu and Hochman [7].

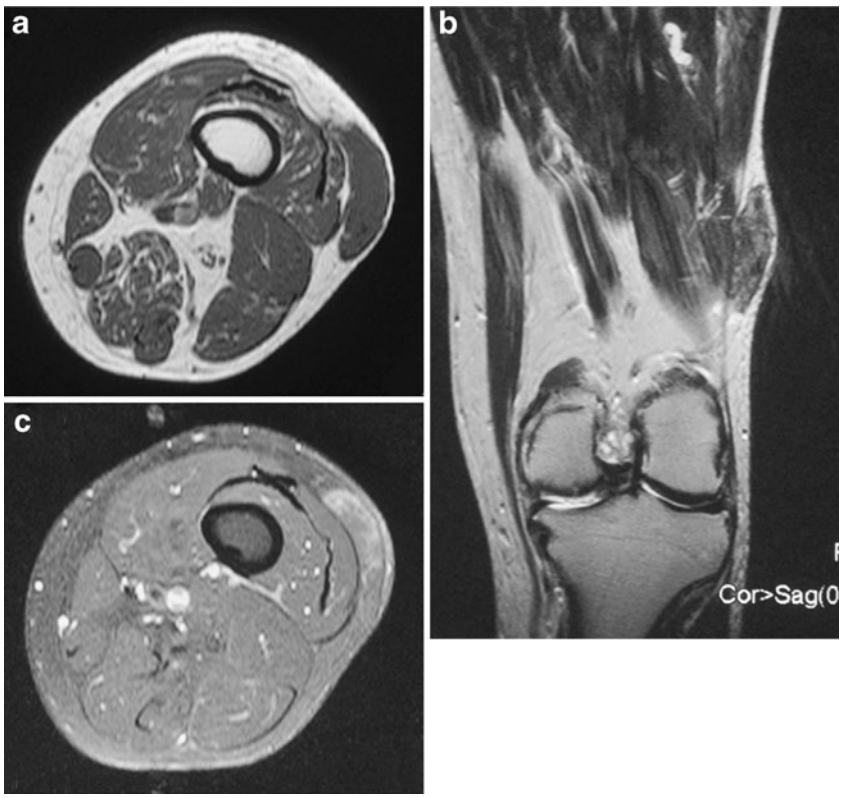

Fig. 2 Magnetic resonance imaging of the thigh, including **a** axial T1-weighted, **b** coronal T2-weighted and **c** axial fat-suppressed T1-weighted images after gadolinium administration, was followed by ultrasound-guided core biopsy

calcification within the amyloidoma may further reduce signal intensity [4].

The limited differential diagnoses of soft tissue masses that are substantially hypointense on T2-weighted images are listed in Table 1. Fibrotic lesions that combine hypocellularity and abundant collagen have low signal due to lack of mobile protons [5]. Lesions such as rheumatoid nodules and lymphoma that are not primarily fibrotic may contain fibrous elements [6]. Hypointense signal from haemosiderin is due to magnetic susceptibility and may result in blooming artefact on T2* images. Calcification is hypointense because the crystalline structure immobilises the protons, although a hydration shell may result in a high signal [7]. Air and some foreign bodies may cause hypointense areas, although surrounding inflammation may obscure small foreign bodies.

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