

Synovial and tenosynovial lipoma arborescens of the ankle in an adult: a case report

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Abstract Lipoma arborescens is a rare benign fat-containing synovial proliferative lesion that is typically known to affect the knee joint in adults. We present the first case of lipoma arborescens of the ankle joint in an adult patient with involvement of the intra-articular synovium as well as the synovial sheath of the tendons around the ankle. The MRI features of this lesion in the adult ankle are described.

Keywords Magnetic resonance imaging · Lipoma · Arborescens · Ankle

Introduction

Lipoma arborescens is a benign but rare intra-articular, non-infectious, proliferative fatty process of the synovium that typically involves the knee joint. Other synovial joints have been involved, including the hip, shoulder, elbow and wrist. It is also rarely known to affect the synovial sheaths surrounding the tendons and bursae. There has been a single case report about involvement of the ankle joint in a child. We present the first reported case of lipoma arborescens in the intra-articular synovium of the ankle joint and the synovial sheath surrounding the tendons of the ankle in an adult patient.

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Case report

We present a case of 46-year-old male patient who presented to the orthopaedic surgeons with a 2-year history of the gradual onset of swelling of the left ankle. This was painless to start with, but gradually became painful, especially on standing and walking. There was no morning stiffness, skin problems, systemic manifestations or history of involvement of any other joint. Examination showed a warm swollen ankle with no erythema and minimal joint line tenderness. His blood tests showed normal values for serum urate and a negative rheumatoid factor. The erythrocyte sedimentation rate (ESR), white cell count and C-reactive protein (CRP) were within normal limits. A plain radiograph showed soft tissue swelling around the ankle with no underlying bone or joint abnormality. There was no erosion or any periostitis. An MRI scan of the ankle was performed. Standard sagittal, axial and coronal T1- and T2-weighted sequences were supplemented by a coronal short tau inversion recovery (STIR) and post-gadolinium axial and sagittal scans through the ankle. There was extensive synovial hypertrophy encasing the extensor as well as the flexor tendons and also involving the synovium of the ankle joint. However, the synovium showed high signal intensity on both T1- and T2-weighted sequences, with low signal intensity on the fat-suppressed scan and enhancement on the post-contrast scans (Fig. 1). The high signal on the T1- and T2-weighted scans, with loss of signal on the fat-suppressed sequences, was compatible with the presence of fatty tissue. The underlying joint was unremarkable and had no erosions or joint effusion. An ultrasound scan also showed echogenic thickening of the synovium surrounding the tendons (Fig. 2). This was biopsied, the histology of which showed fibro-fatty tissue. This was further confirmed by an open biopsy. The

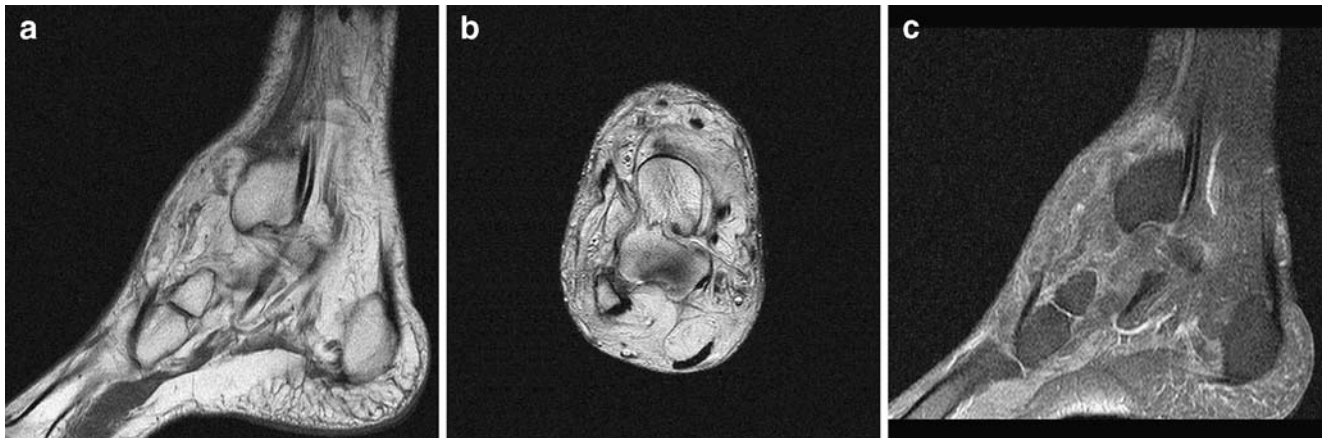


Fig. 1 **a** Sagittal T1-weighted sequence (TR 500, TE 17) shows diffuse thickening of the synovium encasing the extensor tendons and extending into the ankle joint. The synovium is characteristically high signal intensity on the T1-weighted sequence in keeping with fat. **b** Axial T2W scan (TR 4,117, TE 100) shows high-signal, abnormally

thickened synovium encasing the extensor tendons with extension into the ankle mortise. **c** Sagittal proton density fat saturation scan (TR 1,800, TE 20) shows loss of signal in the thickened synovium in keeping with the fatty contents

histology showed mature adipose tissue with synovium focally present on the surface (Fig. 3). There was no evidence of infection or neoplasia and the culture was negative for TB. The histological features were consistent with a lipoma arborescens.

Discussion

Lipoma arborescens is a rare lesion. To our knowledge, this is only the second reported case of lipoma arborescens involving the synovial lining of the ankle joint and the extra-articular tendons and the first in an adult. Lipomas of the joint and tendon sheaths have been divided into two variant categories, namely a discrete solid fatty mass in the joint or tendon and diffuse hypertrophic synovial villi distended with fat [1]. Lipoma arborescens falls into the second category of the lipomas.

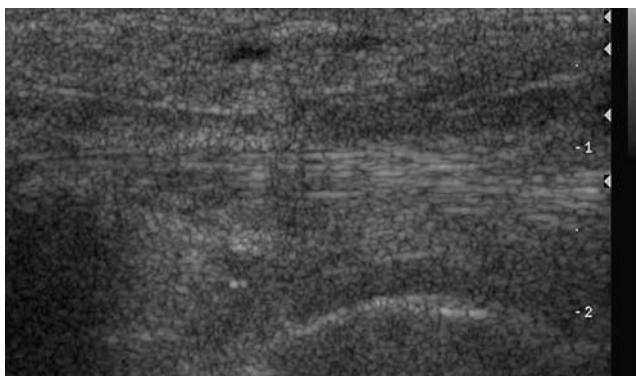


Fig. 2 Ultrasound scan, longitudinal view, shows encasement of the extensor tendons by the thickened synovium, which is echogenic, suggestive of fatty content

Lipoma arborescens is a rare, benign, synovial, proliferative process of the joints in which the subsynovial tissue is infiltrated by mature fat cells. This is a fat-containing “lipoma-like lesion” that has also been called “diffuse synovial lipoma”. Although this entity has been labelled a neoplasm, it is not a true neoplastic process, but rather a villous synovial hyperplastic lesion [2]. The majority of cases arise de novo (primary lipoma arborescens), although some may be a secondary reactive phenomenon related to underlying osteoarthritis, chronic rheumatoid arthritis or previous trauma (secondary lipoma arborescens) [3].

Most cases are seen in the knee, particularly in the suprapatellar pouch. However, this entity has also been seen in the hip, shoulder, elbow and wrist. In the shoulder, it is seen to involve both the subacromial subdeltoid bursa

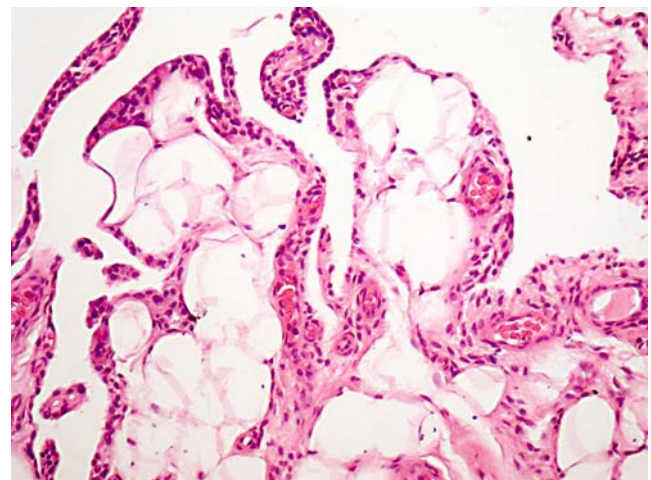


Fig. 3 A medium power view ($\times 100$) of a section from the synovial biopsy stained with haematoxylin and eosin. This shows bland mature adipocytes directly below a surface layer of synoviocytes

as well as the gleno-humeral joint. There has been a single case report of lipoma arborescens involving the tenosynovial sheath of the tendons around the ankle joint, seen in a child [4]. To our knowledge, this is the first reported case of this lesion in an adult involving the synovium of the ankle joint as well as the synovial sheath of the extra-articular tendons around the ankle. The lesion typically presents as an insidious onset of swelling over a period of months and years followed by pain, which can be debilitating. The clinical course is marked by intermittent exacerbations. Lipoma arborescens is usually mono-articular, but can be bilateral in about 20% of cases [5]. Most patients are in the 5th to 7th decades of life. The exact aetiology of this lesion is not known. The treatment of lipoma arborescens is synovectomy and recurrence is rarely seen.

The imaging features of the lipoma arborescens are quite typical. Plain radiographs may show a soft tissue swelling in the supra-patellar pouch region of the knee joint. This may or may not show the lucency typical of internal fatty contents. There may also be underlying degenerative changes and erosions. Ultrasound usually shows joint effusion and may also demonstrate villous frond-like projections, signifying underlying synovial hypertrophy.

Magnetic resonance imaging is the modality of choice for diagnosing lipoma arborescens because of its ability to demonstrate underlying fat in the villous synovial proliferation. The fat typically shows high signal intensity on both T1- and T2-weighted sequences, mirroring the subcutaneous tissue signal, and suppresses on the fat saturation sequences. In the ankle this fatty signal is seen to infiltrate the intra-articular synovium and also the synovial sheaths of the flexor, extensor and the peroneal tendons. The hypertrophic fatty synovium is not associated with erosion of the underlying bones. No significant joint effusion is seen within the joint, although this is usually noted in cases affecting the knee joint. There is mild enhancement of the hypertrophic synovium of the intra-articular as well as the tendon sheath on the post-gadolinium scans. The pattern of the lipoma arborescens in the ankle in our case was slightly different from that observed in its more classic location around the knee. In our patient, this was seen as a fatty synovial process involving the ankle joint with secondary diffuse encasement of the extra-articular tendons around the joint. The characteristic filiform frond-like appearance, as seen in the knee, was less evident in our case. A more diffuse fatty but infiltrative pattern was observed in the ankle.

The differential diagnosis in the ankle includes synovial osteochondromatosis, pigmented villonodular synovitis (PVNS), synovial haemangioma and rheumatoid arthritis [6]. Synovial osteochondromatosis typically shows the presence of intra-articular, well-faceted, loose bodies. Pigmented villonodular synovitis typically shows low

signal intensity on both T1- and T2-weighted sequences because of the presence of intra-articular haemosiderin. The presence of flow voids in the vessels and phleboliths points towards synovial haemangioma as the possible underlying cause. Chronic rheumatoid arthritis may present very similar signal intensities with synovial hypertrophy and underlying erosions. However, the lack of internal fatty signal intensity points towards rheumatoid as the underlying cause. The signal intensity in rheumatoid is typically low to intermediate on T1-weighted and intermediate to low on the T2-weighted images, secondary to fibrous pannus formation. Lipoma arborescens should also be distinguished from intra-articular synovial lipoma, which is also a fatty lesion but is a more focal discrete mass arising from the joint synovium, in contrast to the more diffuse proliferative fatty process of lipoma arborescens [7].

The presence of hypertrophic synovium lining the tendons around the ankle joint and intra-articular fibrous capsule with typically high signal intensity on both T1- and T2-weighted sequences, low signal intensity on the fat-suppressed sequence and minimal enhancement on the post-contrast-enhanced scans should be suggestive of lipoma arborescens.

Conclusion

Lipoma arborescens is a rare, benign, synovial, proliferative process. We describe the imaging appearances of this process in our case report of an adult ankle involving the joint synovium and the synovial lining of the extra-articular tendons. Diffuse thickening of the intra- and extra-articular synovium with a characteristic fatty signal on MRI is suggestive of lipoma arborescens.

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