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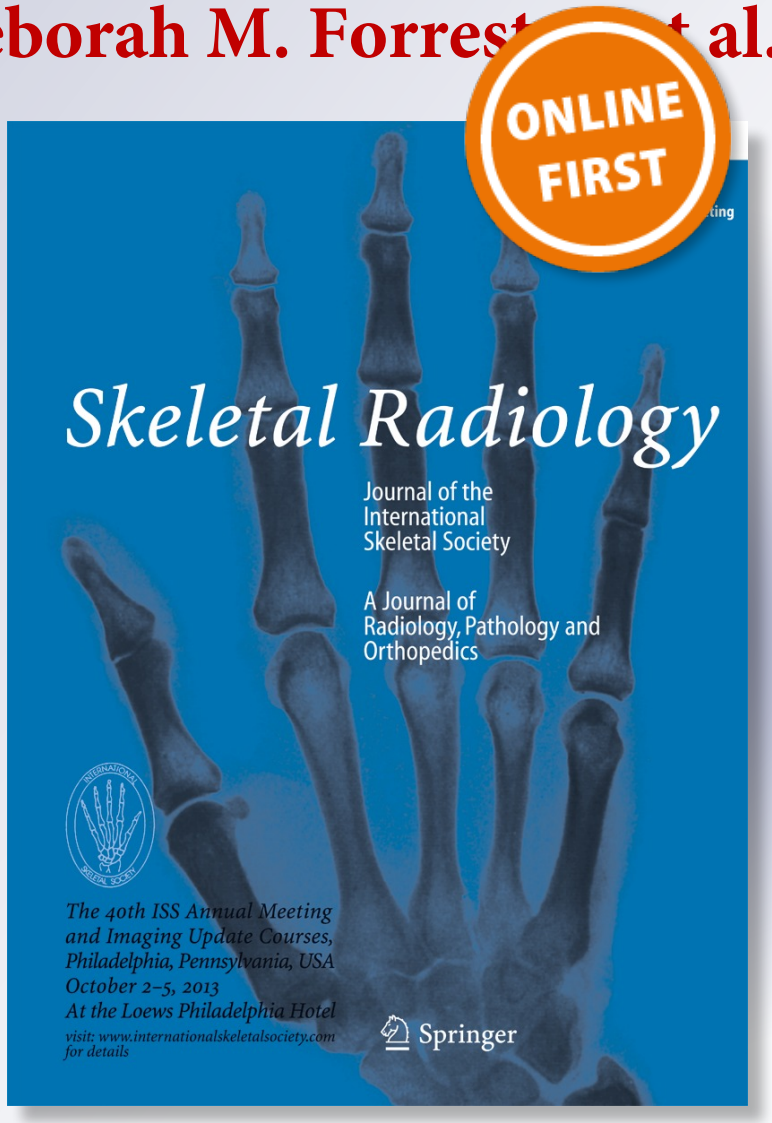
Skeletal Radiology
Journal of the International Skeletal Society A Journal of Radiology, Pathology and Orthopedics

ISSN 0364-2348

Skeletal Radiol
DOI 10.1007/s00256-013-1638-z



Springer

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CASE REPORT

Lipoma arborescens of the biceps tendon sheath

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Received: 29 January 2013 / Revised: 23 April 2013 / Accepted: 24 April 2013

Abstract Lipoma arborescens, described as lipomatous infiltration and distention of synovial villi resulting in a frond-like appearance, most frequently affects the suprapatellar recess of the knee. While there have been reports of this entity involving the upper extremity joints, bursa, and tendon sheaths, we present the first reported case of lipoma arborescens isolated to the biceps tendon sheath. We describe imaging and histologic findings with clinical correlation.

Keywords Lipoma arborescens · Biceps tendon sheath · Synovial lipomatosis

Introduction

Lipoma arborescens is a rare condition of unknown etiology that involves joints and synovial lined bursae or tendon sheaths. It is characterized by proliferation and infiltration of synovial connective tissue by mature adipose cells, forming hypertrophic villi [1, 2]. The hypertrophied synovium often demonstrates a frond-like appearance referred to as "arborescens". The Latin word *arbor* (meaning tree) describes the tree-like morphology of this fatty villous synovial proliferation [3]. Blais et al. have described the arthroscopic appearance of this entity as a synovial lesion with numerous globules and villous projections [4]. Kloen et al. described the arthroscopic appearance as having a yellow synovium with large villi and folds [5]. The term lipoma is a misnomer as there is no focal mass. It has been suggested that a more appropriate descriptor of this entity would be synovial lipomatosis [6].

Lipoma arborescens has been reported to involve the synovial lining of bursae, joints, and tendon sheaths of numerous upper and lower extremity joints. While lipoma arborescens most frequently affects the suprapatellar recess of the knee, it has also been reported to involve other lower extremity structures including the peroneal tendon sheath and ankle joint [7–10]. There have been limited reports of upper extremity involvement of the tendons and bursae of the hand, wrist, elbow, and shoulder, including: metacarpophalangeal and interphalangeal joints; extensor tendon sheaths of the wrist and hand; bicipitoradial bursa; subacromial–subdeltoid bursa; and glenohumeral joint [11–17]. We report a case of lipoma arborescens affecting the biceps tendon sheath, which to our knowledge is the first reported case in this location. We describe the MR imaging characteristics and present a short review of the available literature on the topic.

Case report

The patient, a 64-year-old male laborer, had a several-year history of progressively worsening anterior shoulder pain. The patient complained of up to 8/10 pain that was most severe at night. He had no history of inflammatory arthritis. He was treated for what was initially thought to be rotator cuff pathology with an 8-week course of physical therapy. The patient experienced no improvement with physical therapy. A corticosteroid injection was administered by the patient's orthopedic surgeon with minimal improvement of symptoms.

Radiographs of the shoulder were obtained, which were unremarkable. Magnetic resonance imaging (MRI) of the left

The authors have no grants or other assistance.

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Published online: 16 May 2013

shoulder was performed in a 3.0-Tesla (T) MR imaging system (General Electric, Milwaukee, WI, USA) using a dedicated shoulder coil. MR images demonstrated frond-like tissue extending from the synovium, which followed the signal intensity of subcutaneous fat on all sequences (Fig. 1). Figure 2 demonstrates that the synovium of the glenohumeral joint is unremarkable, without evidence of involvement by this process. The diagnosis of lipoma arborescens involving the biceps tendon sheath was made based on these MRI characteristics.

The patient was taken to surgery. A mini-open deltopectoral approach was performed initially. Villous frond-like fatty tissue was identified involving the synovium, which was biopsied and excised. Frozen sections, as well as final pathologic specimens, confirmed the diagnosis (Fig 3). Arthroscopy was then performed and showed fraying of the biceps tendon proximally but the remaining intraarticular synovium was uninvolved and no other significant pathology was noted. A tenotomy was then performed at the base of the biceps anchor. Through the open incision, all remaining synovium was removed and a biceps tenodesis was performed. Post-operatively, the patient's pain improved immediately. The patient returned for follow-up after 6 months and was pain free with full shoulder function and rotation.

Discussion

Lipoma arborescens is a rare idiopathic joint condition resulting from infiltration of subsynovial tissue with mature fat resulting in distended hypertrophied synovial villi [18]. It is usually monoarticular, and most frequently involving the knee, particularly in the suprapatellar pouch/recess [5]. Cases have been described in the hip, shoulder, elbow, and bursae [11]. Lipoma arborescens has also been reported in other tendon sheaths, including the peroneal tendon sheath [7, 10]. The entity is described pathologically as synovial tissue that is infiltrated by proliferating mature fat cells.

Patients are generally in their 5th to 7th decades of life. Affected patients typically report a chronic, painless, slowly progressive joint swelling with recurrent effusions [19]. Most cases of lipoma arborescens are idiopathic [20]. The most accepted hypothesis suggests that this entity represents a nonspecific synovial reaction to inflammatory or traumatic stimuli [3]. Aspirated synovial fluid typically shows an absence of cells and crystals [19].

Lipoma arborescens can be detected by numerous imaging modalities, including radiographs, ultrasound, computed tomography (CT), and MRI. Radiographs can show joint fullness and frequently osteoarthritic changes. These findings are nonspecific, and lipoma arborescence can be suspected only when lucent areas consistent with fat are seen in the joint space [21]. Ultrasound can demonstrate a hyperechoic, frond-like mass that bends and waves in real time during joint manipulation. The typical CT findings include a frond-like synovial lesion with attenuation values in the range of fat, absence of enhancement, and a coexisting joint effusion [22, 23].

The majority of lipoma arborescens appear as a diffuse villous proliferation, but they can present as focal

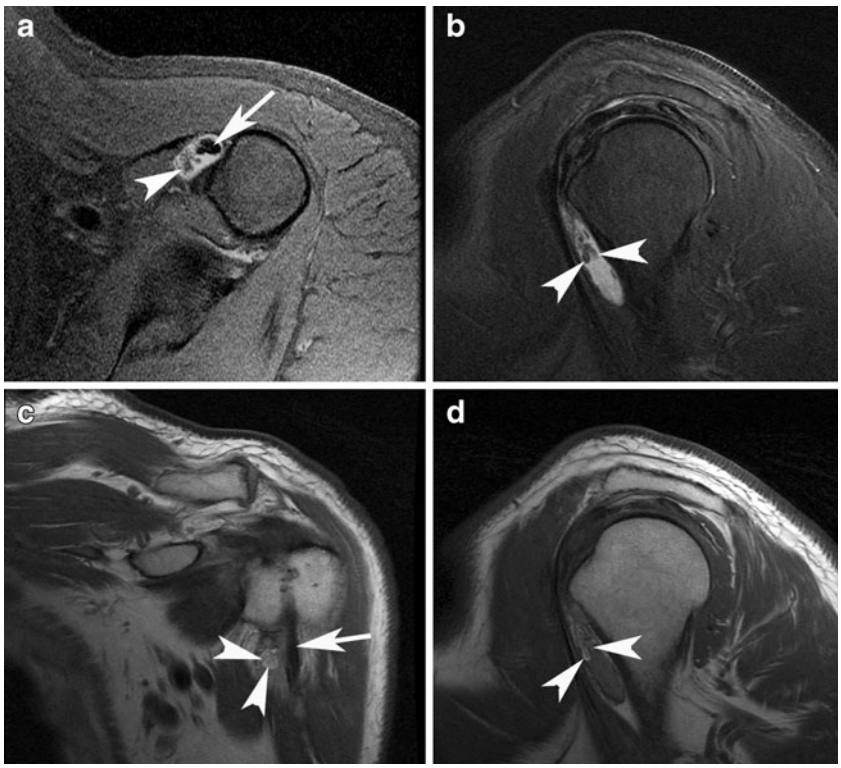

Fig. 1 Lipoma arborescens of the biceps tendon sheath. Axial PD with fat-saturation image (**a**) at the level of the surgical neck of the humerus demonstrates frond-like tissue extending from the synovium with signal characteristics consistent with fat (*arrowhead*) adjacent to the biceps tendon (*arrow*). Sagittal T2 with fat saturation (**b**) and T1-weighted coronal (**c**) and sagittal (**d**) images through the biceps tendon sheath demonstrate fluid and lobulated fat (*arrowheads*) within the biceps tendon sheath, adjacent to the biceps tendon (*arrow* in **c**). Note is made of acromioclavicular osteoarthritic changes

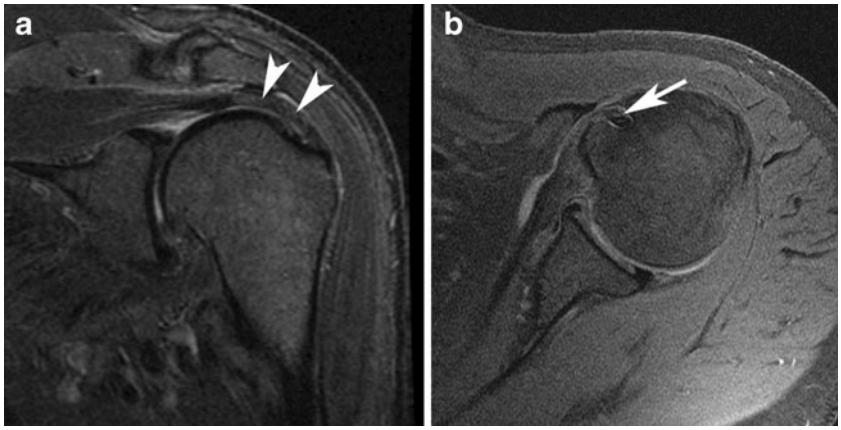

Fig. 2 Coronal STIR (**a**) and axial PD with fat-saturation (**b**) images show that the lipoma arborescens is isolated to the tendon sheath, without an intraarticular component. Tendinopathy of the supraspinatus tendon (*arrowheads*) and biceps tendon (*arrow*) is noted

pseudomasses [3]. Knowledge of the typical MRI features enables an early diagnosis to be made so that the suggested treatment, a synovectomy, can be performed [1]. MR imaging allows a specific diagnosis, especially using the T1 and fat-suppressed sequences [3]. The imaging findings are considered pathognomonic [17] and include a frond-like mass arising from the synovium with signal intensity similar to that of fat on all pulse sequences, joint effusion, and lack of magnetic susceptibility artifact, indicating lack of hemosiderin [19, 24]. Chaljub et al. reported the absence of enhancement of lipoma arborescens on intravenous administration of contrast [25]. Chae et al. reported enhancement of hypertrophic synovium indicative of chronic synovitis, in association with lipoma arborescens [17]. Prominent bony erosions have been reported in one case, although it should be noted that erosive changes are not typical because of the soft fatty nature process [17]. Knowledge of the MR appearance helps to confidently differentiate lipoma arborescens from other intraarticular lesions.

The differential diagnosis includes pigmented villonodular synovitis (PVNS), synovial chondromatosis, rheumatoid arthritis, and synovial hemangioma. PVNS typically shows decreased signal intensity on all pulse sequences with susceptibility on gradient echo sequences, secondary to the presence of hemosiderin [7]. The MR appearance of synovial chondromatosis is variable depending on the amount of synovial proliferation and calcified nodule formation. Noncalcified lesions are decreased to intermediate signal intensity on T1-weighted sequences and increased signal intensity on T2-weighted sequences. Calcified nodules are demonstrated as small areas of decreased signal intensity on all sequences. Intraarticular bodies with mature fatty marrow show low signal peripherally (calcification) and fat signal intensity centrally on all sequences [21]. Chronic rheumatoid arthritis may demonstrate synovial proliferation with fibrosis, which demonstrates intermediate signal intensity on T1 and T2 sequences [7]. The typical MR appearance of synovial hemangioma consists of a lobulated intraarticular mass that is intermediate in signal intensity on T1-weighted images, and marked hyperintensity on T2-weighted images, likely reflecting pooling of blood within vascular spaces [21]. Synovectomy is curative with recurrence of lipoma arborescens being uncommon [21].

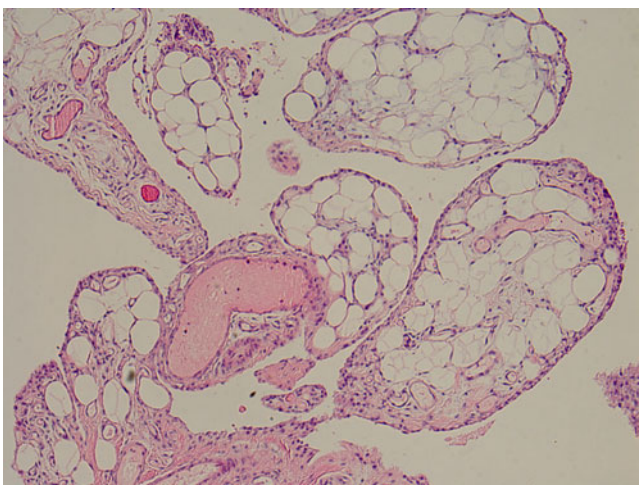

Fig. 3 Photomicrograph of excised synovium showing synovial villi infiltrated by fat. Hematoxylin and eosin (H&E) stain

Conclusions

Lipoma arborescens (or synovial lipomatosis) is a rare benign, synovial proliferative process. We report the first case involving the biceps tendon sheath. Knowledge of the MRI features of this entity allows for a confident, specific diagnosis, which can prevent further work-up and delayed treatment.

Conflict of interest No conflict of interest.

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