Subdeltoid Lipoma Arborescens Combined With Rotator Cuff Tears

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Abstract

Lipoma arborescens, a rare benign intra-articular lesion, is characterized by lipomatous proliferation of the synovium in which the subsynovial tissue is replaced by mature adipocytes. Subdeltoid bursa is a rare location for lipoma arborescens, and only a few cases have been reported in the literature. This article reports 2 cases of subdeltoid lipoma arborescens combined with rotator cuff tears, and the possible relationships between subdeltoid lipoma arborescens and rotator cuff tears are discussed. The intra-articular villous proliferations on fat-suppressed T2-weighted magnetic resonance imaging appeared as yellowish-white lipomatous villous proliferations on arthroscopy, and finger-like lipomatous proliferation of the synovium, where the subsynovial connective tissue is replaced by mature adipocytes, on histology. Although further evidence would be necessary, the bony proliferations, in addition to bone-to-bone abrasion and inflammatory processes, may contribute to the relationship between subdeltoid lipoma arborescens and rotator cuff tears. Because this is a rare disease in a rare location, no established treatment guidelines are available for lipoma arborescens in subdeltoid bursa. For the current patients, arthroscopic excision of the lipoma arborescens and concomitant rotator cuff repair were prescribed after more than 6 months of conservative management. All patients had symptom relief and were satisfied with their results. Paying special attention to the radiologic and arthroscopic characteristics of the lipoma arborescens will help physicians and surgeons to achieve a more accurate diagnosis and effective treatment strategy, especially in patients with concomitant rotator cuff tears.

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lipoma arborescens, a rare benign intra-articular lesion, is characterized by lipomatous proliferation of the synovium in which the subsynovial tissue is replaced by mature adipocytes. It most commonly involves the knee joint, but other locations, including the shoulder, elbow, wrist, and hip, have also been reported. Subdeltoid bursa is a rare location for lipoma arborescens, and only a few cases have been reported in the literature.

Patients with subdeltoid lipoma arborescens presented with chief complaints of swelling and a mass, as well as modest pain. The current authors report 2 cases of histologically identified subdeltoid lipoma arborescens combined with rotator cuff tears.

**Case Reports**

**Patient 1**

A 66-year-old woman was referred to the authors’ hospital because of right shoulder pain that had persisted for approximately 1 year. The pain was not relieved through nonsteroidal anti-inflammatory drugs and physical therapy at the local hospital. Her medical history was unremarkable, and no history of trauma was reported. On physical examination, mild swelling was noted on the lateral aspect of the right shoulder. The range of motion was within normal limits, with 170° of forward elevation, 70° of external rotation at the side, and internal rotation at the back reaching the level of the seventh thoracic vertebra. A mild decrease of external rotation power was observed compared with the intact left shoulder. The lateral Jobe’s test and the Neer/Hawkins impingement test were positive. All other joints were normal. No laboratory abnormalities were found.

Magnetic resonance imaging (MRI) revealed a full-thickness defect in the supraspinatus tendon. Severe degeneration with significant wear was noted at the superior subscapularis tendon, rotator interval, and anterior infraspinatus tendon. A large-sized acromial spur (bony proliferation under the acromion) was also noted (Figure 1A).

Within the distended subacromial subdeltoid bursa, a large effusion was observed with multiple villous projections having isointensity with subcutaneous fat on all pulse sequences, which were visualized as dark lesions with fat suppression (Figure 1B). On arthroscopy, moderate bursitis and synovitis in the subacromial space were observed. The subacromial subdeltoid bursa contained yellowish-white lipomatous villous projections (Figure 2A). In addition, a medium-sized rotator cuff tear (17 mm in the anteroposterior dimension and 13 mm in retraction) was noted (Figure 2B). After arthroscopic synovectomy, bursectomy, and rotator cuff repair, complete excision of the lipoma arborescens was confirmed by inspection.

**Patient 2**

A 64-year-old woman presented with a 10-month history of left shoulder pain and a tingling sensation of her wrist. Cervical radiographs and magnetic resonance imaging performed at an outside hospital were significant for intervertebral disk protrusion and left neural foraminal stenosis on the C5-C6 level. Traction therapy and prescribed medication from...
a local primary care center did not help. Four cervical injections relieved her paresthesia, but the pain in her shoulder was not relieved. She was referred to the authors’ hospital for further evaluation of the shoulder pain. Her medical history was unremarkable, and no history of trauma was reported.

Physical examination at the authors’ institution revealed slight swelling of the left shoulder. Range of motion was within normal limits, with 160° of forward elevation, 70° of external rotation at the side, and internal rotation at the back reaching the level of the seventh thoracic vertebra. Her left shoulder showed a mild decrease of external rotation and abduction power compared with that of the intact right shoulder. The lateral Jobe’s test was negative, but the Neer/Hawkins impingement test was positive. No laboratory abnormalities were found.

Magnetic resonance imaging of her left shoulder revealed a large amount of effusion in the subacromial subdeltoid bursa and villous proliferation with a signal intensity of fat. In addition, her left shoulder had a partial-thickness tear on both the articular and bursal sides of the supraspinatus, with underlying tendinopathy and a moderate-sized acromial spur (bony proliferation under the spur acromion). No evidence of bone abnormality was noted.

On arthroscopy, moderate bursitis and synovitis were observed, and the subacromial subdeltoid bursa contained yellowish-white lipomatous villous proliferations (Figure 4A). A near complete supraspinatus tear was noted (Figure 4B). After arthroscopic synovectomy, bursectomy, and rotator cuff repair, complete excision of the lipoma arborescens was confirmed by inspection.

Histological examination of the proliferative synovial tissue showed lipomatous proliferation of the synovium, in which the subsynovial connective tissue was replaced by mature adipocytes.

**DISCUSSION**

Lipoma arborescens is a rare benign intra-articular lesion of unknown etiology. Pathologically, it is not a true neoplasm, but rather a hyperplastic process with infiltration of the proliferating mature adipocytes. The etiology is not yet proven, but possibilities include neoplastic, inflammatory process, or reactive changes to trauma. It was previously described in association with degenerative joint disease and rheumatoid arthritis. The knee joint is the most common location reported, especially on the suprapatellar pouch.

Lipoma arborescens in the shoulder joint has been rarely reported. Only a few cases have previously reported lipoma arborescens involving the subdeltoid bursa. Other locations reported within the shoulder include 3 cases of the glenohumeral joint. Most patients presented with chief complaints of swelling or a mass in association with modest pain.

Interestingly, most cases of subdeltoid lipoma arborescens reported concomitant rotator cuff tears. These presentations are consistent with the current cases. Among the 4 cases of subdeltoid lipoma arborescens associated with rotator cuff tears in the literature, Dawson et al reported a full-thickness tear of the supraspinatus tendon, and Teusink et al reported a partial-thickness tear involving less than 50% of the supraspinatus tendon. In addition, Weston noted that the rotator cuff tendon was completely eroded in its lateral part.

Although the causal relationship between the lipoma arborescens and the rotator cuff tears will require further investigations, a relationship seems to exist between lipoma arborescens and rotator cuff tears. Lipoma arborescens in the subdeltoid bursa has been correlated with bone proliferations. The bony proliferations in the acromion (acromial spur) or greater tuberosity were correlated with impingement syndrome and rotator cuff tears. Thus, the lipoma arborescens may have contributed to the development of a rotator cuff tear.
but that most published cases of the lipoma arborescens in the subdeltoid bursa are associated with rotator cuff tears may imply that the lipoma arborescens in the subacromial subdeltoid space creates a rotator cuff tear-prone environment.

On the contrary, bone-to-bone abrasion or inflammatory processes caused by the rotator cuff tears may have contributed to the lipomatous process. Lipoma arborescens has been associated with joint inflammation and has been correlated with inflammatory cytokines, such as tumor necrosis factor alpha or matrix metalloproteinase III. These inflammatory processes may cause the lipomatous metaplasia of synovium or bursa in subacromial subdeltoid space. Eyreich et al. suggested that the lipomatous metaplasia occurred as a consequence of chronic inflammation. However, further investigations would be necessary to determine the causal relationship between the lipoma arborescens and the rotator cuff tears.

Magnetic resonance imaging of lipoma arborescens in the subdeltoid bursa has previously been described as intra-articular villous proliferations of the synovial membrane with a signal intensity of fat. Histology has been used to confirm the diagnosis of lipoma arborescens, but magnetic resonance imaging alone often provides sufficient evidence. The lesion has high signal intensity on T1-weighted images, a signal intensity similar to that of subcutaneous fat on T2-weighted images, and a low signal intensity on fat-suppressed images and does not enhance with gadolinium. Differential diagnoses for the magnetic resonance imaging findings include simple synovial lipoma, synovial chondromatosis, and pigmented villonodular synovitis. Simple synovial lipoma would have isointensity with subcutaneous fat on all pulse sequences, but the solitary round intra-articular mass can be distinguished from the villous appearance of lipoma arborescens. Synovial chondromatosis may show fatty marrow inside, but the ossified nodules will be characteristic. Pigmented villonodular synovitis may have a villous appearance but will have a low signal intensity on T1- and T2-weighted images and enhances with gadolinium.

No specific guidelines exist for the treatment of lipoma arborescens in the subdeltoid bursa because only a few cases have been reported; however, most authors recommended open or arthroscopic excision of the symptomatic lipoma arborescens and concomitant rotator cuff repair. Fortunately, surgical excision by partial synovectomy is successful in managing presenting symptoms, and recurrence is uncommon.

In the current article, arthroscopic excision of the lipoma arborescens and concomitant rotator cuff repair were prescribed after more than 6 months of conservative management without improvement of the patients’ symptoms, including pain and swelling around the shoulder. Because more than 6 months of conservative treatments failed to improve the patients’ symptom, only the rotator cuff repair with subacromial decompression could be indicated to decrease the pain and weakness and, ultimately, to increase the patients’ quality of life. The excision of the lipoma arborescens was performed to relieve the discomfort and swelling, which could have been caused by the lipoma arborescens, as well as to acquire a better view to perform the rotator cuff repair. The excision of the lipoma arborescens itself would be helpful in relieving discomfort and swelling, which may be caused by the lipoma arborescens. In addition, it was performed for better visualization during rotator cuff repair and for pathologic confirmation. Furthermore, because the authors believe that a lipoma arborescens could possibly be related to rotator cuff tears, excision of the lipoma arborescens during rotator cuff repair could be a reasonable surgical plan. After the arthroscopic treatment, both patients had symptom relief and were satisfied with their results.

**Conclusion**

These cases of subdeltoid lipoma arborescens may indicate a significant relationship between subdeltoid lipoma arborescens and rotator cuff tears. Paying extra attention to the radiologic and arthroscopic characteristics of the lipoma arborescens would be advisable in the evaluation and treatment of rotator cuff tears. Being familiar with the characteristics of the lipoma arborescens will be helpful for an accurate diagnosis and treatment strategy, especially in patients with concomitant rotator cuff tears.

**References**


