The Geyser sign associated with AC joint cyst
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Clinical History:

A 87-year-old woman presents with a 4 week history of spontaneous, painless and progressive left shoulder swelling. Physical examination showed a lump on the superior aspect of the shoulder with no evidence of inflammatory signs. Preserved shoulder motion.

Prior medical history included osteoarthritis, rheumatoid arthritis and left shoulder pain.

Imaging Findings:

Conventional radiographs showed a soft-tissue mass cranial to the clavicle with central multiple small lucencies and a widened AC joint.

Ultrasound revealed a well-described mass, superior and medial to the acromioclavicular (AC) joint, heterogeneously hypo-echoic with numerous gas artefact images within. No Doppler signal.

MRI showed a full thickness tear of supraspinatus tendon with retraction of the supraspinatus muscle. A soft-tissue mass arising from the glenohumeral joint through the rotator cuff tear and the widened AC joint into the subcutaneous tissue, cranial to the clavicle, was identified (the Geyser sign). Associated muscle atrophy was observed.

The mass had a complex cystic appearance showing intermediate signal intensity on T1 weighted images and heterogeneously high signal intensity on T2 weighted images. After intravenous contrast medium administration peripheral enhancement of the mass was observed. All sequences showed small areas with low signal intensity within the soft tissue mass suggesting gas bubbles.

Discussion:

Acromio-clavicular joint (ACJ) cyst is a rare entity, mostly associated as a complication of a massive chronic full thickness rotator cuff tear. Patients tend to be elderly, with significant osteoarthritis of the shoulder [1-4]. The pathogenesis is not entirely understood [4, 5]. It is believed that it has a mechanic aetiology. After a massive rotator cuff tear, the humeral head migrates towards the acromion and therefore impacts repeatedly against the under-surface of the ACJ. This phenomenon produces a capsular joint tear and finally permits the extravasation of synovial fluid from the glenohumeral joint through the osteoarthritic ACJ into the subcutaneous tissue. This chronic process results in cyst formation and therefore progresses until a visible bump develops [1-6].

The patients’ main complaint is a unilateral painless focal mass on top of the shoulder. Clinical examination usually
reveals an evident subcutaneous freely mobile mass, over the ACJ rotator cuff tear, in most cases functionally compensated [6].

Conventional radiograph should be the first line of imaging, showing degenerative changes in the glenohumeral joint, associated with soft tissue swelling over the widened ACJ, variable in size and with smooth margins, compatible with a pseudotumour [2-6].

MRI has shown to be an excellent option for excluding a malignant tumour, depicting the cyst and confirming a massive rotator cuff tear. It is also useful to depict the diagnostic pearl called the "Geyser sign" non-invasively, an original fluoroscopic arthrographic finding showing an extravasation of contrast from the glenohumeral joint into the subacromial-subdeltoid bursa through the ACJ, finally extending into the subcutaneous tissue [1-4].

Few cases are reported in the literature, consequently there is limited consensus in its management, varying widely from conservative to surgical [6, 7, 8]. Surgical treatment should be considered to treat the underlying pathology, in most cases the rotator cuff tear, followed by cyst removal, in order to avoid cyst recurrence and improve symptoms [5-7].

In conclusion, ACJ cyst is a rare mechanical complication of a degenerative and massive rotator cuff tear in elderly patients, potentially misdiagnosed as a tumour. Imaging, especially MRI, should be performed to exclude malignancy and make an accurate diagnosis, identifying the "Geyser sign" when present. The aim of the treatment should be primarily to repair the rotator cuff tear, to avoid ACJ cyst recurrence and subsequently to treat the ACJ cyst.

**Differential Diagnosis List:** ACJ cyst associated with massive degenerative rotator cuff tear., Soft tissue-tumours, Haematoma

**Final Diagnosis:** ACJ cyst associated with massive degenerative rotator cuff tear.

**References:**


Description: Widened ACJ and a supraclavicular soft tissue mass (arrows) with gas bubbles inside (arrowhead). Origin: LUMC, Department of radiology, Leiden, The Netherlands
Description: A & B: Ultrasound of the lesion reveals a complex and extensive cystic lesion with gas artefacts and negative Doppler flow. Origin: Department of radiology, LUMC, Leiden, The Netherlands
Figure 3

Description: Relation of the cyst with the widened ACJ (arrows). Origin: Department of Radiology, LUMC, Leiden, The Netherlands.
Figure 4

Description: C: T1. D: T2. E: T2 (SPIR). F: T1 FS Gd.

The communication of the cyst with the glenohumeral joint, through the ACJ into the subcutaneous tissue is depicted, peripheral enhancement and multiple gas bubbles. Origin: Department of Radiology, LUMC, Leiden, The Netherlands.