Case 17738

Eurorad

Unilateral distal clavicular osteolysis in an amateur bodybuilder

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Section: Musculoskeletal system
Area of Interest: Musculoskeletal bone Musculoskeletal joint Musculoskeletal soft tissue Musculoskeletal system
Imaging Technique: MR
Imaging Technique: Ultrasound
Special Focus: Athletic injuries Case Type: Clinical Cases
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Patient: 29 years, male

Clinical History:

A 29-year-old amateur bodybuilder is referred with right shoulder pain for two weeks, worsening during training. There is no history of trauma. The right shoulder shows a normal range of motion, but O'Brien's compression test is positive. There is tenderness upon palpitation of the acromioclavicular joint.

Imaging Findings:

Digital radiograph and ultrasound of the shoulder are performed for a suspected rotator cuff tendinopathy. Periarticular osteopenia and cortical irregularity in the distal clavicle with a mild joint effusion in the acromioclavicular joint is found (Figs. 1a, 1b and 2). Subsequent magnetic resonance (MR)-imaging shows marked bone marrow oedema in the right distal clavicle with a hypertrophic acromioclavicular (AC) joint capsule (Fig. 3). Side-to-side comparison to the left confirms unilateral bone marrow oedema with bone erosions and subchondral cortical thinning of the pathological right side, thus confirming unilateral disease (Fig. 4a and 4b).

Discussion:

Distal clavicular osteolysis (DCO) is a self-limiting pathology most caused by overuse injury. The pathogenesis is debated, but likely involves subchondral microfractures caused by repetitive activity with compression of the distal clavicle [1]. Stress-induced DCO is most often seen in weightlifters or athletes who are engaged in strenuous training of the upper extremity in which the AC-joint is subjected to forces as if it were a weight-bearing joint, sometimes leading to bilateral DCO [2]. DCO is also seen in overhead athletes and workers [3].

Clinical findings are non-specific and include tenderness to palpation of the AC-joint, elicited pain with cross-body adduction but a normal range of motion [4]. Patients complain of vague anterior shoulder girdle pain: increased at night following intense weightlifting during the day, relieved with decreased activity [5].

Digital radiographs are not sensitive to detect DCO in the early stage of the disease. Initial findings are subtle, such as periarticular osteopenia or loss of subchondral cortex. In the progressive lytic stage, cortical thinning, irregularity and erosions in the distal clavicula can be seen, while the acromial surface remains normal [5]. For early diagnosis, both MR-imaging and bone scintigraphy are far more sensitive. MR-imaging typically shows high signal intensity to muscle in the distal clavicle on T2- or PD-fat suppressed sequence, correlating with bone marrow oedema. This may also be present in the articular part of the acromion, but less pronounced [6]. Other MR findings include the same radiographic features, but also capsular thickening and joint effusion of the AC joint [6]. In the early stage, bone

Initial treatment is mostly conservative, including activity modification and nonsteroidal anti-inflammatory drugs (NSAIDs), often successful after 3-6 months. Long-term sequelae on MRI include widening of the AC joint and AC joint osteoarthritis. In severe cases, resection of the distal clavicle has demonstrated acceptable clinical outcome [5, 6].

The radiologist should be aware that DCO affects a certain population such as weightlifters and should be included in the differential diagnosis in case of atraumatic shoulder pain. Key for the diagnosis are subtle changes ondigital radiograph, which can be magnified by comparative incidences, followed by MRI or bone scintigraphy to confirm the diagnosis. Comparative MRI will be helpful to exclude bilateral DCO.

Written informed patient consent for publication has been obtained.

Differential Diagnosis List: Unilateral distal clavicular osteolysis, Distal clavicular osteolysis (post-traumatic vs overuse) , Rheumatoid arthritis , Septic arthritis , Corticosteroid induced arthropathy , Neoplasm

Final Diagnosis: Unilateral distal clavicular osteolysis

References:

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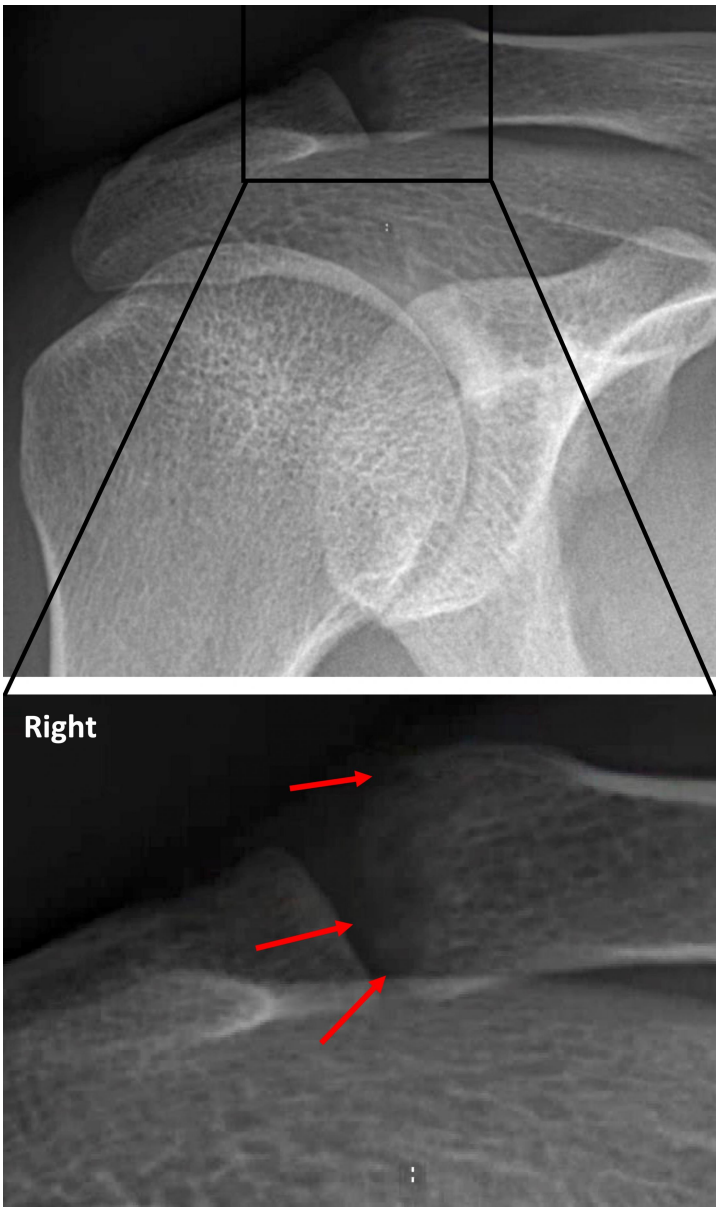
Nevalainen MT, Ciccotti MG, Morrison WB, et al (2016) Distal clavicular osteolysis in adults: Association with bench pressing intensity. Skeletal radiology 45:1473–1479 (PMID: 27550324)
Schwarzkopf R, Ishak C, Elman M, et al (2008) Distal clavicular osteolysis: A review of the literature. Bulletin of the NYU Hospital for Joint Diseases 66:94–101 (PMID: 18537776)
Haupt HA (2001) Upper extremity injuries associated with strength training. Clinics in sports medicine 20:481–490 (PMID: 11494836)
DeFroda SF, Nacccca C, Waryasz GR, Owens BD (2017) Diagnosis and management of distal clavicle osteolysis. Orthopedics 40:119–124 (PMID: 27925640)
Roedl JB, Nevalainen M, Gonzalez FM, et al (2015) Frequency, imaging findings, risk factors, and long-term sequelae of distal clavicular osteolysis in young patients. Skeletal Radiology 44:659–666 (PMID: 25560997)

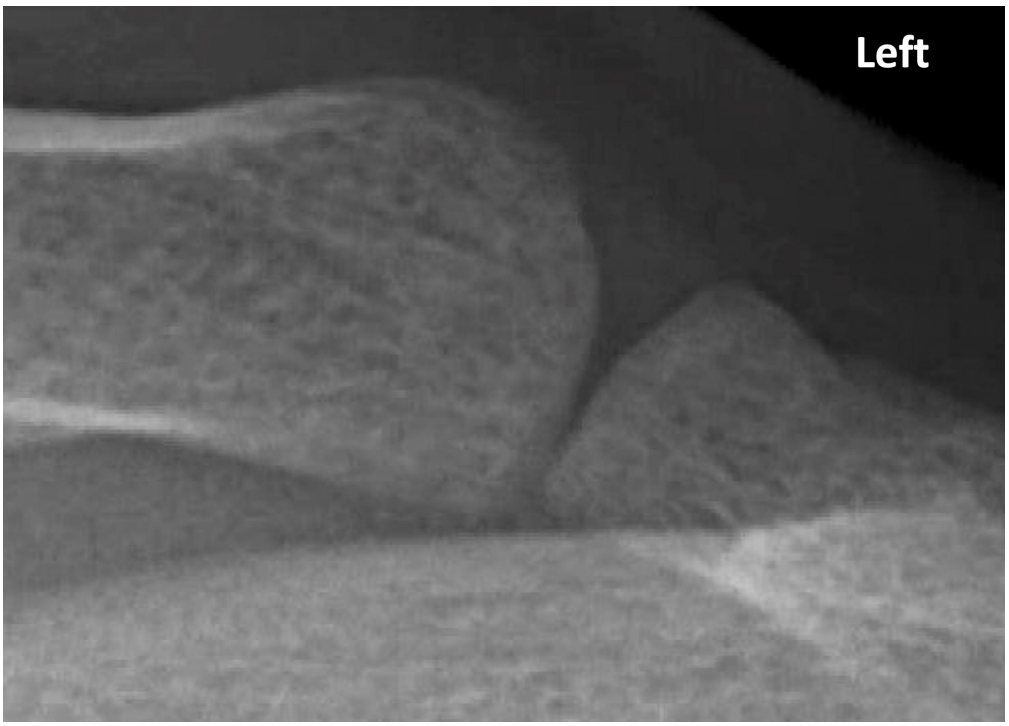
Figure 1

a



Description: Radiograph image of the right shoulder with enlarged view of the acromioclavicular joint. Description: Notice the periarticular osteopenia and the irregular articular surface (red arrows) of the distal clavicle in the pathologic right side **Origin:** © Department of Radiology, AZ Jan Palfijn Ghent, East-Flanders, Belgium, 2022

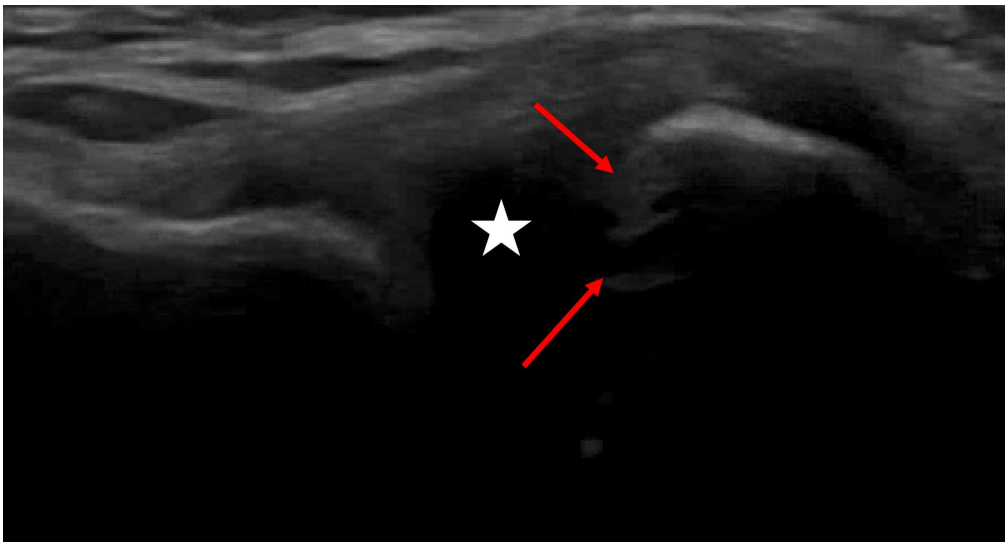
b



Description: Comparative radiograph image of the left acromioclavicular joint. Description: Normal bone cortex of the distal clavicle. Side-by-side comparison allows for easier detection of the subtle pathologic changes on the right **Origin:** © Department of Radiology, AZ Jan Palfijn Ghent, East-Flanders, Belgium, 2022

Figure 2

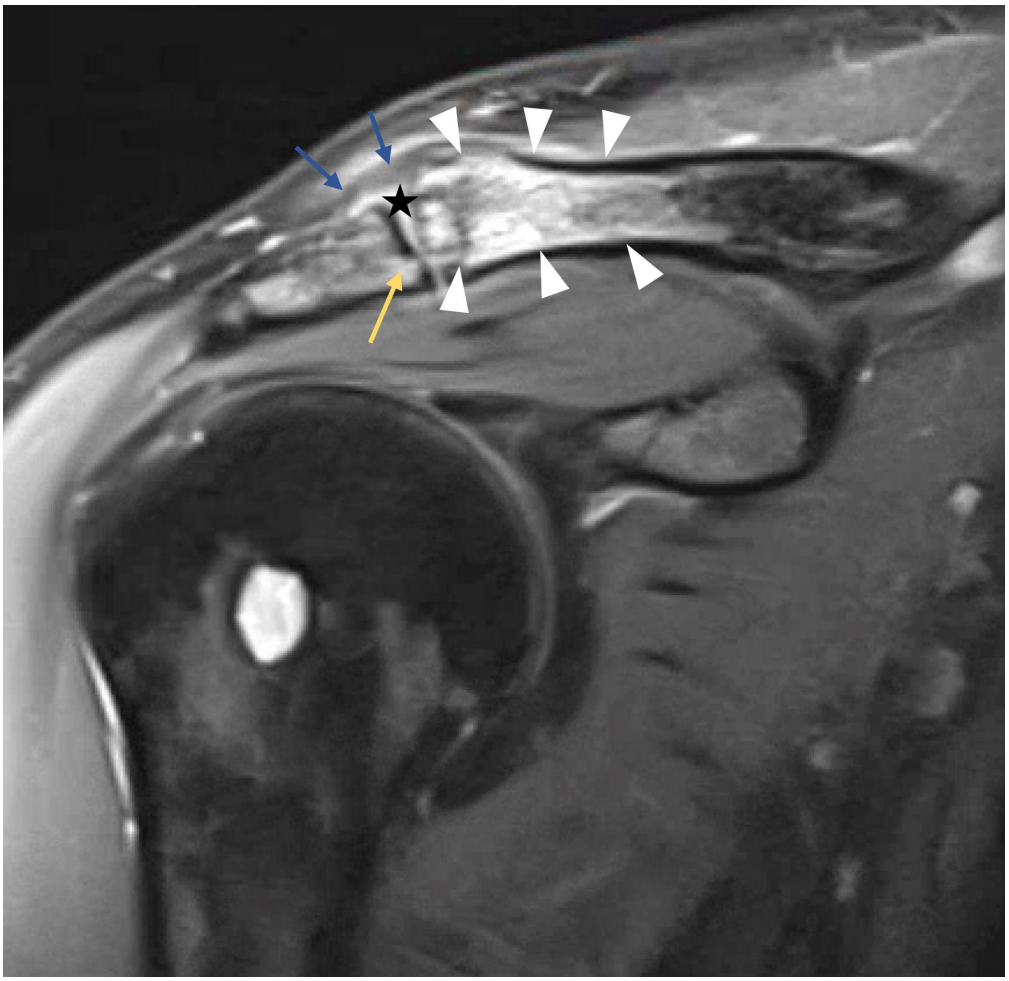
a



Description: Mild joint effusion (asterisk) and the same cortical irregularities of the distal clavicle (red arrows) is found **Origin:** © Department of Radiology, AZ Jan Palfijn Ghent, East-Flanders, Belgium, 2022

Figure 3

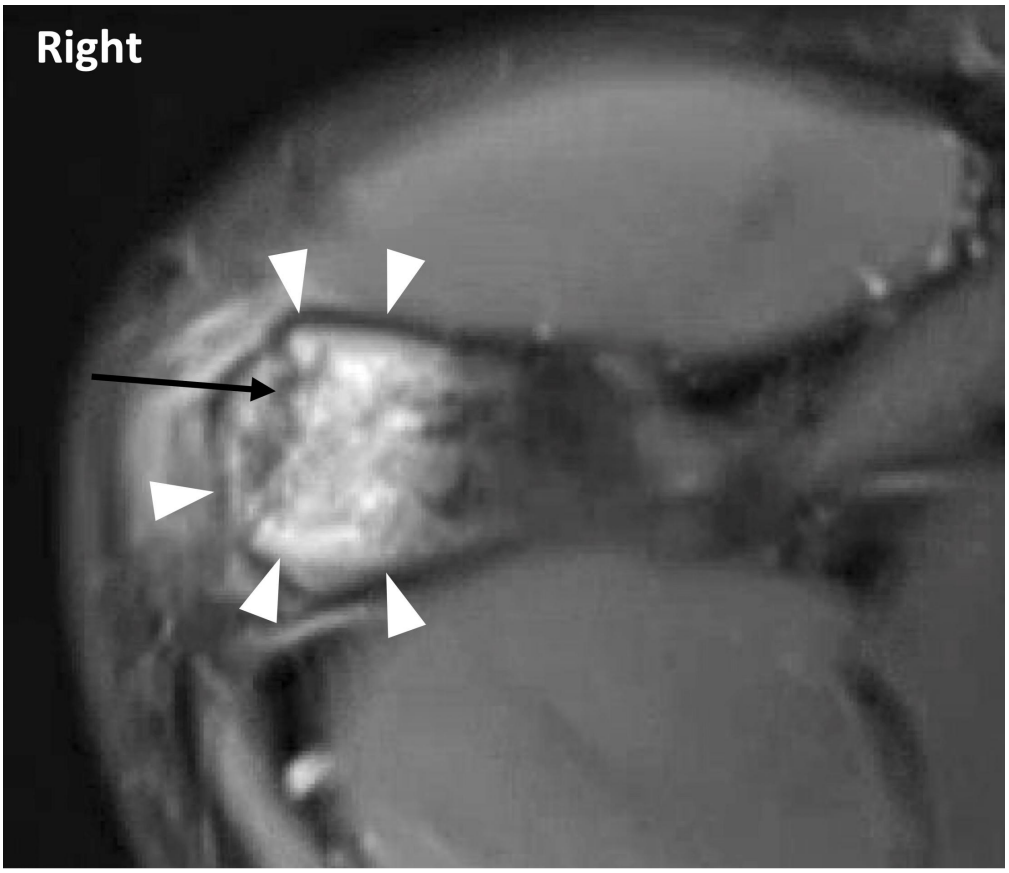
a



Description: Marked bone marrow oedema in the distal clavicle (arrowheads) and to lesser extent the acromion (yellow arrow). An edematous acromioclavicular joint capsule is seen (blue arrow) with mild joint effusion (asterisk) **Origin:** © Department of Radiology, AZ Jan Palfijn Ghent, East-Flanders, Belgium, 2022

Figure 4

a



Description: Fat-saturated magnetic resonance protondensity-weighted image of the right acromioclavicular joint. Description: Notice the subchondral cortical thinning (arrow) and bone marrow edema (arrowheads) in the distal clavicle **Origin:** © Department of Radiology, AZ Jan Palfijn Ghent, East-Flanders, Belgium, 2022

b

Description: Comparative fat-saturated magnetic resonance protondensity-weighted image of the left acromioclavicular joint. Description: Normal red bone marrow in the left clavicle, thus excluding bilateral disease **Origin:** © Department of Radiology, AZ Jan Palfijn Ghent, East-Flanders, Belgium, 2022