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Bilateral Acromial Apophysitis Incidentally Discovered in a Weightlifting Adolescent: A Case Report

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ABSTRACT

We report the case of a 15-year-old adolescent with no significant past medical history, who presented to the emergency department with right shoulder pain following an a trauma. Because the reported injury mechanism was considered high-energy, plain radiographs — which were largely unremarkable — were supplemented with a CT scan. Imaging incidentally revealed bilateral involvement of the acromial apophysis, consistent with bilateral acromial apophysitis. A detailed history subsequently revealed regular, repeated free-weight barbell training, including overhead press movements. The patient was managed with activity modification and rest from the causative activity, with a favorable course. This case illustrates an atypical presentation — bilateral and related to weightlifting rather than throwing — of a rare and still sparsely documented entity in adolescents, and highlights the value of a thorough sports history whenever an unexpected radiological finding is encountered in a young athlete.

KEYWORDS

acromial apophysitis, acromion, adolescent, weightlifting, pediatric trauma

MAIN ARTICLE

INTRODUCTION

The acromion develops from several distinct secondary ossification centers — the pre-acromion, meso-acromion, meta-acromion, and basi-acromion — which typically appear around age 14-15 and fuse progressively, with complete fusion of the acromial complex generally not achieved until 18 to 25 years of age, depending on the series. (1,2) The deltoid and part of the trapezius insert directly onto this apophysis, making it a classic site of traction apophysitis in the adolescent athlete, comparable to the tibial tuberosity (Osgood-Schlatter disease) or the calcaneus (Sever disease). (3)

Acromial apophysitis, described as a traction injury of the acromial growth cartilage related to repeated, vigorous deltoid contraction, is a rare entity, reported mainly in young throwing athletes, with pain localized to the tip of the acromion, worsened by movement and relatively absent at rest. (3,4) A radiologically related entity, acromial apophysiolyis — painful, edematous nonfusion of the acromial ossification centers in patients under 25 years of age — has been found in approximately 2.6% of patients aged 15 to 25 years evaluated for shoulder pain, with throwing identified as a risk factor. (5) Bilateral presentations, and presentations related to activities other than throwing such as resistance training, remain exceptionally rare in the literature.

We report a case of bilateral acromial apophysitis incidentally discovered on imaging obtained for a minor shoulder trauma, in an adolescent who practiced barbell weight training — a mechanism not previously described, to our knowledge, for this specific location.

CASE PRESENTATION

A 15-year-old adolescent with no relevant past medical history presented to the emergency department with right shoulder pain following a trauma initially considered of moderate severity. Clinical examination revealed localized tenderness without gross deformity or distal neurovascular deficit.

Plain radiographs of the right shoulder showed no clear abnormality. Given the traumatic context and an injury mechanism judged to be high-energy, a CT scan of the shoulder was obtained as a complementary study. This revealed irregularity and widening of the acromial growth cartilage, symmetrically present on both the right and left sides, consistent with bilateral

acromial apophysitis, without evidence of an acute displaced fracture or displacement of any ossification center. (Figure 1)

Given this unexpected finding — inconsistent with an isolated unilateral traumatic mechanism — a detailed history was obtained. The patient then reported a repeated practice of free-weight barbell exercises, particularly overhead press movements heavily engaging the deltoid, over a prolonged period prior to admission, without reported specialized supervision. There was no history of throwing sports, endocrine or metabolic disease, or medication use that could predispose to bone fragility.

Management consisted of brief analgesic immobilization, temporary cessation of weight training and overhead shoulder-loading activities, and scheduled clinical follow-up.

DISCUSSION

During adolescence, the acromial apophysis represents a site of relative mechanical weakness against the repetitive traction exerted by the deltoid and trapezius. (1,3) Unlike proximal humeral epiphysiolysis in throwers, where the dominant load is rotational shear transmitted to the humeral physis during the late cocking phase of throwing,(6) acromial apophysitis reflects a pure traction mechanism: vigorous, repeated contraction and relaxation of the deltoid during overhead pressing movements is considered the main contributing factor.(3)

In the case presented here, the bilateral, symmetric nature of the finding, in an adolescent with no history of throwing, is consistent with a symmetric overuse mechanism related to free-weight resistance training, particularly overhead press or vertical pressing movements that intensely and repeatedly load the deltoid on both sides. Previously reported cases of acromial apophysitis concern almost exclusively young throwing athletes with unilateral, dominant-side involvement.(3,4) This bilateral, weightlifting-related case broadens the spectrum of causative mechanisms potentially implicated in this entity, although a single case cannot establish formal causality.

From a diagnostic standpoint, this case highlights a common pitfall: plain radiographs may be normal or show only subtle sclerosis and irregularity of the acromion, which can be difficult to distinguish from ongoing physiological ossification in adolescents. (1,2) It was the high-energy mechanism — which prompted CT imaging — that led to the incidental discovery of the bilateral involvement. MRI remains the reference standard when the diagnosis is clinically

suspected, typically showing edema and widening of the growth cartilage between acromial ossification centers, particularly between the meso-acromion and meta-acromion.(1,5)

The main differential diagnosis in this traumatic context remains an acute avulsion fracture of an acromial ossification center, as well as a pre-existing os acromiale, a common anatomical variant (approximately 2-8% of the population) corresponding to persistent nonfusion of an ossification center beyond the normal age of fusion. (1,2,7) Distinguishing active apophysitis from a physiological fusion variant relies on the presence of peri-apophyseal edema on MRI and correlation with clinical symptoms.

This case also underscores the value of systematically and thoroughly reviewing an adolescent's sports and training habits, even in the setting of acute trauma care. An unusual radiological finding, particularly if bilateral, should prompt investigation for a chronic overuse cause even in the absence of a previously reported functional complaint. From a prevention standpoint, the growing popularity of resistance training among adolescents — particularly overhead pressing movements — supports increased awareness among young athletes, parents, and coaches regarding appropriate load progression, correct technique, and qualified supervision, to limit excessive traction stress on an acromial cartilage that is still undergoing fusion.

In the absence of appropriate management, persistent loading of an injured apophysis theoretically carries a risk of prolonged or permanent nonfusion, with development of a symptomatic os acromiale, an entity associated with an increased risk of subacromial impingement and rotator cuff tears in adulthood. (1,2,7) Although this risk is mainly documented in throwing-related presentations.

CONCLUSION

Bilateral acromial apophysitis is a rare entity that can be discovered incidentally during imaging obtained for an unrelated reason. This case highlights a causative mechanism not previously described for this specific location — repeated deltoid traction during free-weight resistance training — distinct from the mechanism classically reported in throwing athletes, and emphasizes the importance of a thorough sports history whenever an atypical shoulder radiological finding is identified in an adolescent. Greater clinician awareness of this presentation could facilitate earlier diagnosis and appropriate prevention among young weight-training athletes.

FIGURES:

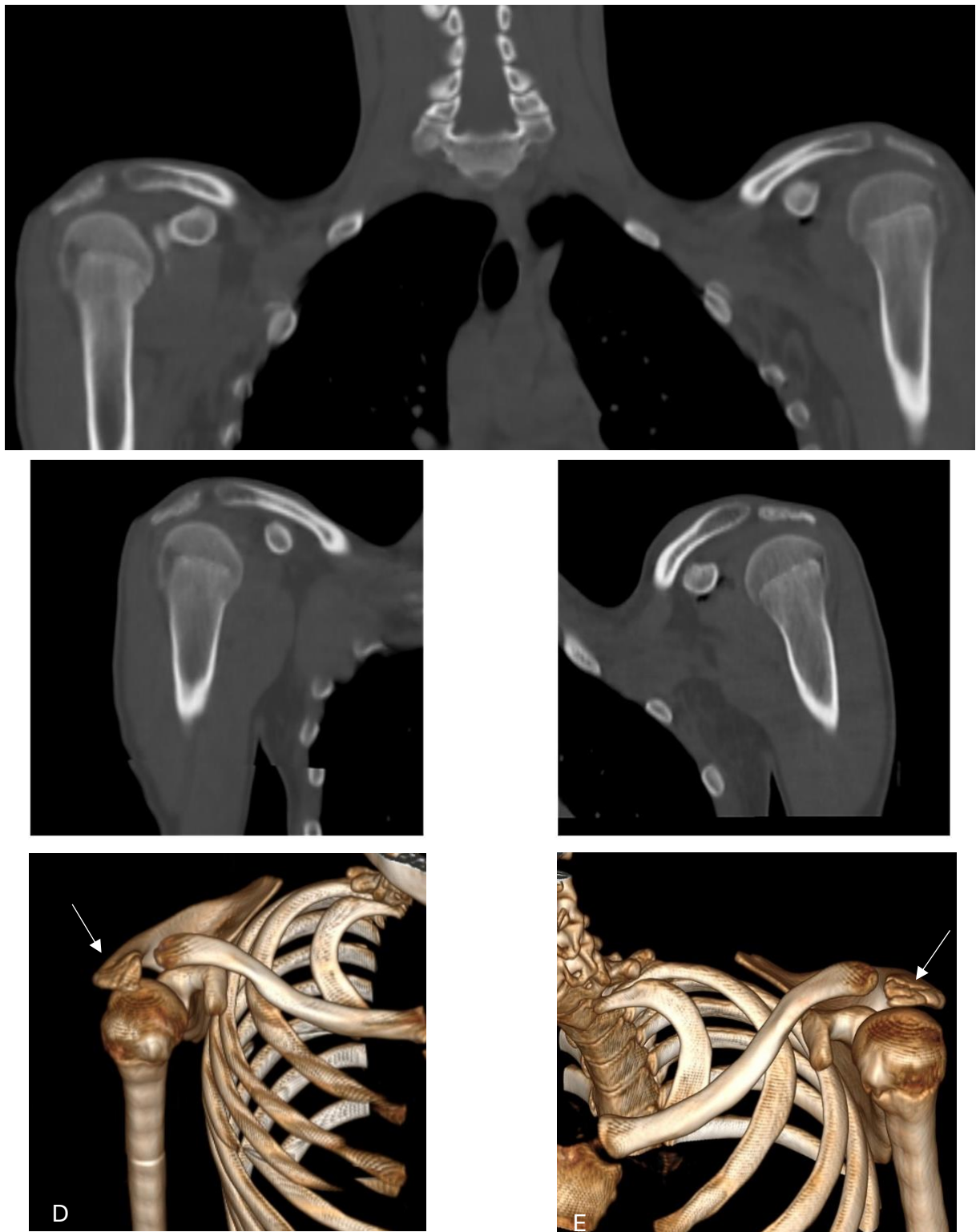


Figure 1: Bilateral shoulder CT demonstrating symmetric irregularity and widening of the acromial growth cartilage (arrows). (A) Coronal bone-window CT. (B, C) coronal views of the right (B) and left (C) shoulder. (D, E) 3D volume-rendered reconstructions of the right (D) and left (E) shoulder.

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