

Case report

Painful os acromiale: Conservative management in a young swimmer athlete

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Abstract

An os acromiale (OA) arises from a fusion failure of the anterior acromial apophysis. This case report presents the successful management of a painful OA associated to rotator cuff impingement in a competitive swimmer, based on ultrasonographic diagnosis and conservative management. Rest from sport activity, oral anti-inflammatory drugs and previous attempt of treatment of shoulder pain were ineffective. After two months of conservative treatment consisting of avoidance of swimming, local anti-inflammatory, physical therapy with ice, strengthening exercises with elastic bands to strengthen the scapular stabilizing muscles, rotator cuff and lowering humeral head muscles, the patient was pain free and all specific clinical tests for impingement syndrome (Neer, Hawkins, Whipple and Yocum tests) were negative. Digital compression of the OA site was not painful, and the Jobe and Palm-up tests were negative. The athlete returned to swim continuing the rehabilitation exercises, and the successful results were maintained at one year follow up. An unstable and symptomatic OA can be easily diagnosed with ultrasound exam. Rehabilitation for rotator cuff tendinopathies or/and bursitis can be a valid alternative to surgery.

Key words: Shoulder, acromion, deformities, swimming, echography, rehabilitation.

Introduction

An os acromiale (OA) originates from failure of fusion of the anterior acromial apophysis (Kurtz et al., 2006). The acromial apophysis derives from four separate sites of ossification: the basi-acromion, meta-acromion, mesoacromion, and preacromion (Figure 1). Complete union of all centres may occur as late as age 25 years. The great majority of OAs are of the mesoacromial type (Edelson et al., 1993; McClure and Raney, 1975; Nicholson et al., 1996; Sammarco, 2000). The frequency of os acromiale ranges from 1 to 15% of cases in different anatomical studies (Edelson et al., 1993; Nicholson et al., 1996) and radiographic (Grasso, 1992; Liberson, 1937), and bilateral involvement is reported in 41 to 62% of cases (Sammarco, 2000). Several ossification nuclei give origin to the three anterior acromial ossification centers, and, between 15 and 18 year of age, they unify into the meta-acromion, mesoacromion, and preacromion (Kurtz et al., 2006). Many young athletes engaged in overhead sports reach elite level at this age, and can result useful to diag-

nose the presence of os acromiale to plan a correct therapeutic path. The presence of an OA is typically ascertained with plain radiographs (Andrews et al., 1991; Edelson et al., 1993; Liberson, 1937), computed tomography (CT) (i2), Magnetic Resonance (MR) (Park et al., 1994), and at surgery (Mudge et al., 1984; Neer, 1972). We identified an OA with ultrasonography (Smith et al., 2008) in a young overhead athlete affected by impingement-like pain.

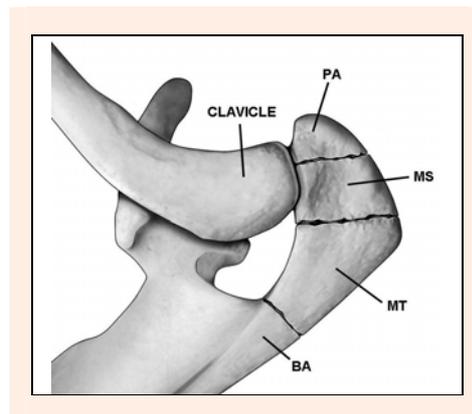


Figure 1. The centers of acromial ossification are classified in PA = preacromion, MS = mesoacromion, MT = meta-acromion and BA = basiacromion. The most frequent is MT.

This case report presents the results of successful management of a painful os acromiale associated with rotator cuff impingement in a competitive swimmer, based on ultrasonography diagnosis, a low cost and dynamic exam, and a specific conservative treatment.

Case report

A competitive, right-hand-dominant swimmer, aged 22, was referred with persistent shoulder impingement-like pain of several years' duration. He reported worsening of pain after back stroke and front crawl training, typically associated with overhead movement of the shoulders. Moreover, he did never report pain at night. He continued swimming tolerating his antero-superior shoulder pain for some years. He felt very limited in his competitive sport activity even if he had always performed self-treatment with long rest periods, general rotator cuff muscles exer-

cises associated to oral anti-inflammatory drugs with poor results.

Clinical and physical examination showed symmetric shoulders and absence of muscular hypotrophy or scapular dyskinesia. We found full range of motion in all directions, but associated to pain in overhead position in the right shoulder only, and absence of neurological compromise. Specific impingement tests as Neer, Hawkins, Whipple and Yocum were positive, digital compression of the OA site was painful, Jobe test for supraspinatus muscle was positive as were the palm-up test for long head of biceps, all only in the right shoulder.



Figure 2. The outlet radiographic view of the right shoulder shows with difficulty the presence os acromiale.

Preliminary standard plain radiographs (anteroposterior and lateral) (Figure 2) were interpreted as “negative for fracture; normal sub-acromial space”. Considering his pain, we thought to continue imaging examination with diagnostic ultrasonography interpreted by the SG author who had more than 20 years of experience performing musculoskeletal sonography (Siemens Sonoline Antares, with probe 5-13 Mhz.). Ultrasonographic examination showed thickening of the supraspinatus tendon and of the subacromial bursa (Mudge et al., 1984). The right acromioclavicular joint was normal, but adjacent to it was “another pseudo-joint” (os acromiale) surrounded by

hypertrophic changes of the tissues and little oedema. Digital pressure over the os acromiale site was painful. The acromial fragment and synchondrosis were easily identified, and the borders of the synchondrosis were hypertrophic.

The panoramic field of view (Siescape) allowed to visualise better the two OA fragments (Figure 3), and to identify the “real” acromioclavicular joint from the more narrow and without synovial membrane “pseudo” acromioclavicular joint. The tendon of the long head of the biceps showed presence of fluid around it (Figures 4). Power Doppler examination did not show visible signs in the subacromial bursa, rotator cuff, and in the synchondrosis. To exclude bilateral involvement, ultrasonographic examination was performed also in the left shoulder with negative result. To validate our findings, we performed an MRI of the right shoulder (axial and oblique coronal T1- and T2 and oblique sagittal T2-weighted images). This showed an unfused acromial apophysis with oedema around the synchondrosis site (Figure 5). Our patient underwent a targeted physical and rehabilitation programme to reduce pain, strengthen the rotator cuff muscles and lower the humeral head muscles. The athlete agreed to start a rehabilitation program consisting of (Figure 6):

- abstinence from swimming. Administration of local anti-inflammatory physical therapy with application of ice pack for twenty minutes, 3 times a day, every day for two months;
- strengthening exercises to strengthen the internal and external rotator muscles of the rotator cuff muscles by elastic bands fixed to wall bars with the patient standing and with elbow flexed at 90 degree closed to the body. The exercises were performed slowly, with 5 series of 15 repetitions for each session.
- strengthening exercises for lowering humeral head muscles with the elastic bands fixed to wall bars by slow return from 80 degrees of flexion of the shoulder and extended elbow, up to neutral position holding for 15 seconds final position, with 5 series of 15 repetitions for each session.

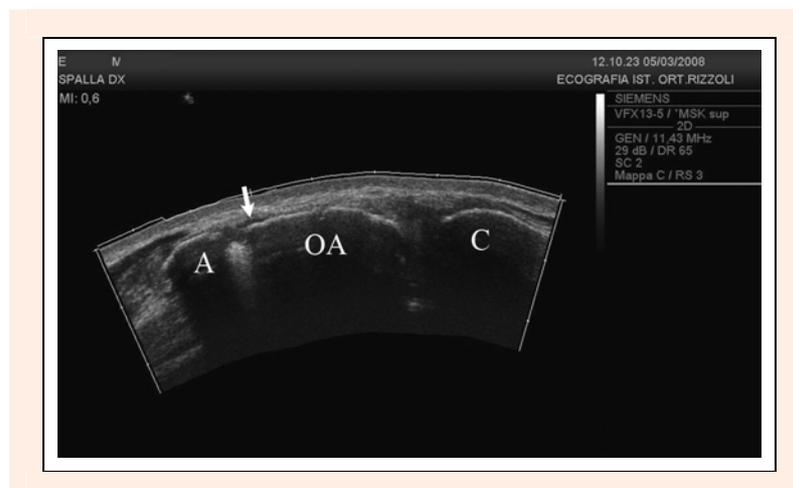


Figure 3. The US panoramic view identifies the two fragments of os acromiale (A=Acromion, OA= Os Acromiale, C=Clavicle), the “pseudo” acromioclavicular joint without synovial membrane (indicated by the white indicator) and the “real” acromioclavicular joint.



Figure 4. US transversal view shows the presence of liquid stratum around long head of humeral biceps.

- strengthening exercises for the scapular stabilizer muscles using light dumb-bells. The patient was standing with his arms at the side, elbow flexed 90 degrees, and moves his shoulders forward and backward, approaching the shoulder blades to the spine.
- strengthening exercises for the serratus anterior muscle standing 50 centimetres away from the wall and pushing his hands on the wall at shoulder level, flexing the elbows and returning to the starting position, with 5 series of 15 repetitions for each session.

At the end of these two months of conservative treatment, the patient was pain free, and all clinical tests for impingement syndrome (Neer, Hawkins, Whipple and Yocum tests) were negative. Jobe and palm up tests were negative. Ultrasonographic examination showed normal subacromial-deltoid bursa and no oedema around the acromial unfused site. Digital pressure on the OA site was still painful.

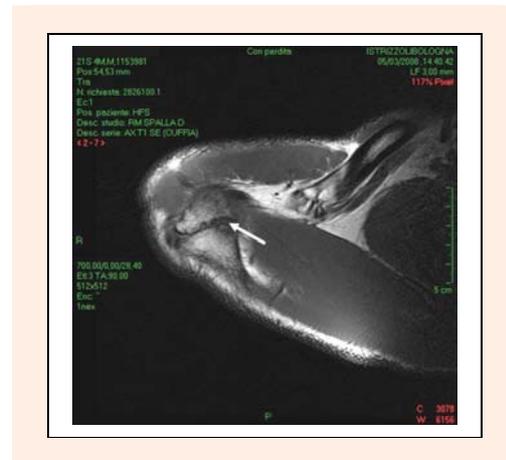


Figure 5. T2-weighted axial MRI scan examination shows clearly an unfused acromial apophysis with oedema around the synchondrosis site.

EXERCISE TABLE				
Muscles	Description	Repetition	Image 1	Image 2
Internal and external rotators	The patient uses elastic bands fixed to wall bars standing with the elbow flexed to 90° close to the trunk	5 sets of 15 repetitions each for each session		
Lowering humeral head	The patient uses elastic band fixed to wall bars returning slowly from 80 degrees of flexion of the shoulder and extended elbow, up to neutral position holding for 15 seconds final position	5 sets of 15 repetitions each for each session		
Scapular stabilizer	The patient uses light dumb-bells standing with his arms at the side, elbow flexed to 90°, moving the shoulders forward and backward, trying to move the scapulae in a lateral to medial direction towards the spine	5 sets of 15 repetitions each for each session		
Serratus anterior	The patient stands 50 centimetres from the wall pushing hands on wall at shoulder level, flexing elbows and returning to start position	5 sets of 15 repetitions each for each session		

Figure 6. Example of performed exercises (illustrated by a model).

The patient returned to his sport activity, and we suggested that he continued the above exercises three times a week, avoiding overhead exercises out of the swimming-pool. At one year follow-up, the patient reported full compliance to the exercise programme and complete absence of pain. All the clinical tests continued to be negative.

Discussion

Reports of unstable OA as a possible origin of impingement are copious. Sammarco (2000) found no studies providing evidence that the frequency of OA is higher in patients with shoulder pain than in the general population. However, trauma or repetitive microtrauma to the acromial joint, as in competitive swimmers, may reveal this condition. Ultrasound (US) imaging is a validated instrument for immediate and dynamic evaluation of shoulder disorders, especially rotator cuff impingement (Al-Shawi, 2008; Bureau, 2006; Iannotti et al., 2005). Barbiera et al. (2002) and Boehm et al. (2003) first introduced the use of ultrasonography in the evaluation of OA. They described the downward motion of the acromial fragment during active shoulder elevation, linking the os acromiale hypermobility to the pathogenesis of the rotator cuff tear. Smith et al. (2008) demonstrated that ultrasonography, given its dynamic capabilities, is useful in the evaluation of fragment hypermobility associated to pain reproduction guiding injection treatment. According to the previous authors and based on the presented clinical experience we suggest that, when an OA is not clearly evidenced by plain radiographs, or even as first choice exam, ultrasonography is a reliable means for early diagnosis. The satisfactory experience of Itoi and Tabata (1992) on conservative treatment in patients with rotator cuff tear, when administered in presence of preserved range of motion and muscles strength, encouraged us to subject our patient to a conservative treatment regimen aiming to reduce pain, strengthen the rotator cuff and lower the humeral head. The conservative program allowed fully recovery from pain even after one year of follow-up, and the return to sport after 2 months.

Conclusion

It is possible to formulate a diagnosis of unstable and symptomatic OA quickly and with low cost using ultrasonography. Rehabilitation using a conservative management regimen may represent, in responder patients, a valid alternative to surgery in athletic patients.

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Key points

- An os acromiale (OA) arises from a fusion failure of the anterior acromial apophysis.
- A correct diagnosis of OA associated to rotator cuff impingement can be performed by ultrasonographic exam.
- A conservative management of rotator cuff impingement syndrome, associated to OA, can be planned in athletic patients as a valid alternative to surgery.

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