

# MRI Findings In OS Acromiale Associated With Rotator Cuff Tear

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## Abstract

Os acromiale is one of the rare causes of rotator cuff tears and impingement syndrome. Most of the cases with persistent os acromiale are asymptomatic, however an unstable os acromiale can lead to obliteration of fat space between the humeral head and acromion leading to impingement syndrome and rotator cuff tears. Possibility of this entity should always be kept in mind while performing MR imaging for impingement syndrome and rotator cuff tears as its identification can affect the management. MRI is the choice of investigation for evaluation of rotator cuff tear.

## INTRODUCTION

Os acromiale is an accessory ossification center of the acromion. Os acromiale, can decrease the volume of the subacromial space and lead to impingement syndromes in some cases (1,2,3). Os acromiale is usually unilateral but may be bilateral in approx. half of these cases(4). Os acromiale has been evaluated with plain radiography but the MR findings are less reported.

## CASE REPORT

A young male of 37yrs presented with intermittent shoulder pain and difficulty in initiation of abduction with no history of trauma. Pain was more pronounced during abduction & there was limited range of motion, weakness and clicking of the shoulder. Local tenderness over the shoulder was also observed by the orthopedician. No signs of instability was found and a clinical diagnosis of impingement syndrome was made and MR examination was requested to rule out impingement and rotator cuff tear.

Dedicated MRI of the right shoulder of the patient in this study was performed using dedicated circularly phased array 'loop' coil on 1.5T magnet. STIR, Spin echo & gradient echo (MEDIC) sequences were used to obtain T1W & T2W images.

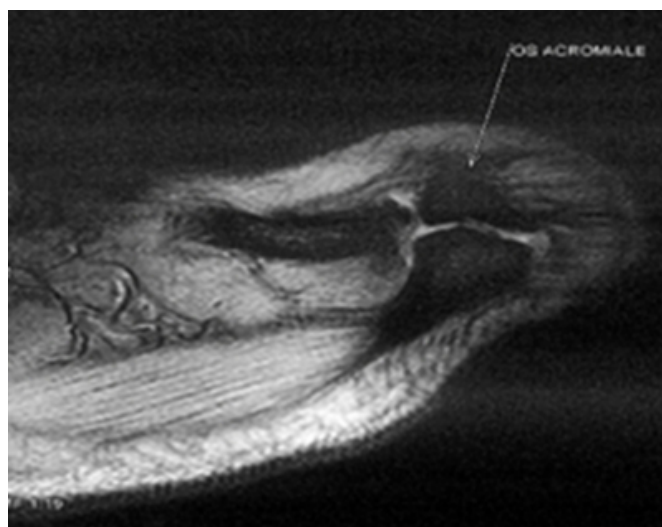
MR images revealed presence of an unfused bony ossicle lateral to the lateral end of clavicle, best appreciated on axial images (Fig.1) suggesting os acromiale. Type 3 acromion was seen on sagittal images with an anteroinferior hook (Fig.2) reducing the space between humerus and acromion

leading to impingement of the supraspinatus tendon.

Complete tear of the supraspinatus tendon of the rotator cuff was seen on STIR Coronal & MEDIC sagittal images (Fig.4 & Fig.5) as absence of the tendon at the site of insertion of supraspinatus tendon, with retraction of musculotendinous junction( Fig. 3).

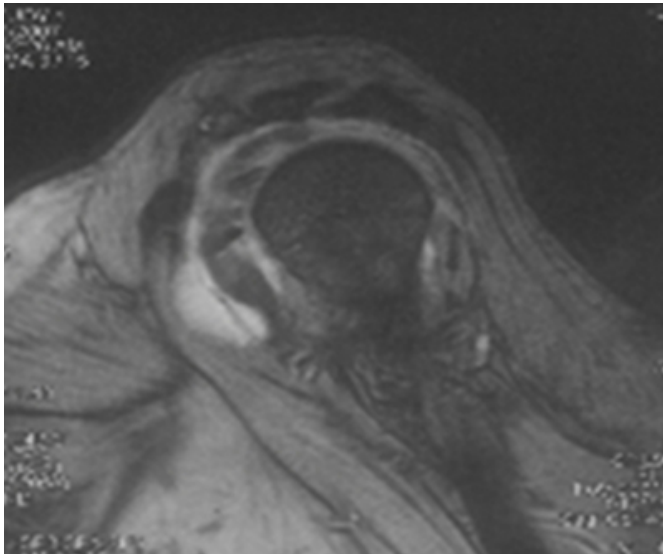
## Figure 1

Figure 1: Axial Gradient Echo Image (MEDIC) : revealed an unfused lateral most ossification center of acromion, best appreciated on upper most axial sections suggestive of os acromiale.



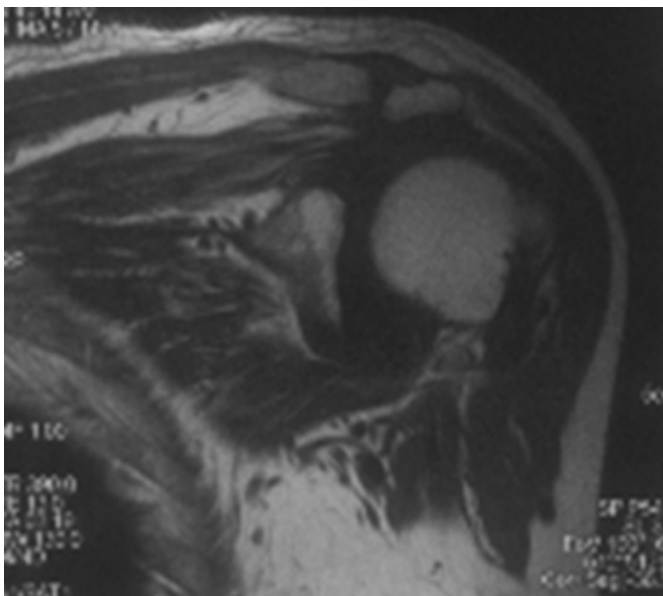
**Figure 2**

Figure 2:MEDIC Sagittal image: Type 3 acromion is seen on sagittal images with an anteroinferiorly projecting hook impinging on the supraspinatus tendon.



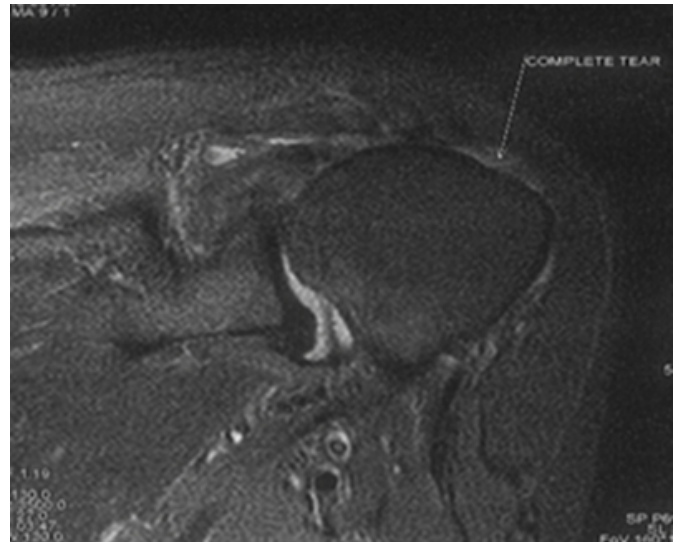
**Figure 3**

Figure 3: T1W Coronal Image: There is retraction of musculotendinous junction of supraspinatus medial to the acromioclavicular joint and fatty infiltration of muscle fibres of supraspinatus- indirect signs of complete rotator cuff tear



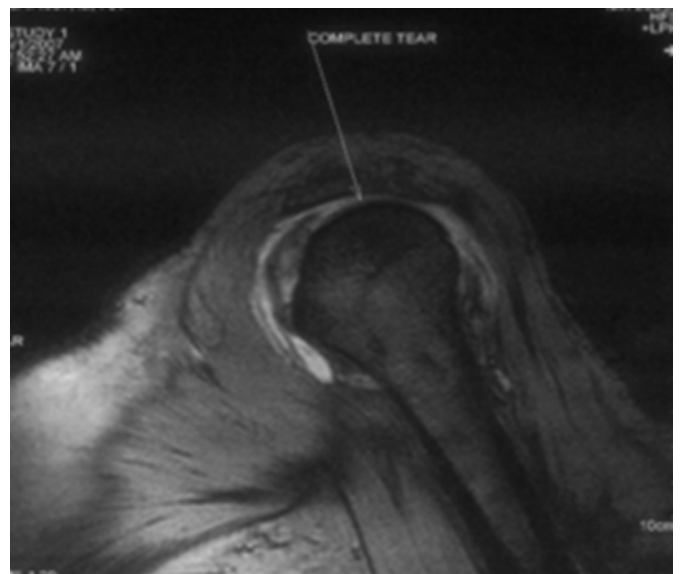
**Figure 4**

Figure 4: STIR Coronal Image:Complete thickness tear of the supraspinatus tendon is seen.



**Figure 5**

Figure 5:MEDIC Sagittal Image: Fibers of supraspinatus tendon are not visualized suggesting complete tear with extension of fluid in the subacromial –subdeltoid bursa.



## DISCUSSION

Impingement syndrome is caused by the compression of the structures that lie between the humeral head and the acromion process. These structures include the rotator cuff tendons, long head of biceps brachii tendon, subacromial bursa, coraco-humeral ligament and glenohumeral joint capsule. Impingement syndrome can be caused by acute trauma or chronic overuse. However, the most common cause of impingement is from an anatomical variation in the

contour of the coracoacromial arch that leads to mechanical wear and tear<sup>(5,6,7)</sup>.

An unfused acromial epiphysis, called os acromiale, can also decrease the volume of the subacromial space and lead to impingement syndromes in some cases<sup>(1,2,3)</sup>.

Os acromiale results due to failure of fusion of one of the outer ossification centers of the acromion to its more medial part. At the age of approximately 15 years, 3 separate ossifying centers are present in the acromion, the pre-acromion, meso-acromion, and meta-acromion. Typically by the age of 25 years, these centers have fused. The most common sight of fusion failure is at the meso-acromion. Os acromiale occurs in 1-15% of shoulders and is bilateral in 50% of these<sup>(1,11)</sup>.

The shape and size of the acromion are due to fusion of the three ossification centers called metaacromion, mesoacromion and preacromion which are recognizable at 18 years ( at this time another nucleus , the basi-acromion has fused completely with the spine of the scapula). Subsequently the metaacromion fuses to the scapula , while the preacromion and mesoacromion fuse at first to each other and then from the twenty first to twenty second years onwards to other portions of the scapula and the entire process is completed in the mid twenties. If these ossification centers persist we can recognize different types of os acromiale –

(i) Os Acromiale Commune: the most frequent type, due to failed fusion between the metaacromion and mesoacromion

(ii) Os Acromiale terminale: a consequence of failed fusion between the preacromion and mesoacromion<sup>(4,8,9)</sup>

Seven types of os acromion have been described by some authors depending on the site of failure of fusion however the most common is due to non fusion of the mesoacromion with the metacromion<sup>(10)</sup>. Os acromiale articulates with the clavicle by means of acromioclavicular joint while it articulates with the acromion by the interacromion joint. It has been associated with rotator cuff disease, primarily rotator cuff tears. Impingement syndrome without rotator cuff tearing has been less commonly described <sup>(11)</sup>. Incidental asymptomatic os acromiale may be found in shoulder MRI but due to its instability it predisposes to rotator cuff tears. Supraspinatus is the most commonly affected tendon in impingement and tears.

When the deltoid muscle contracts, it can cause inferior displacement of an unfused acromion fragment, thus

impinging the rotator cuff<sup>(12,13)</sup>. Furthermore, abnormal motion of the unstable segment at the fibrous union site may cause pain and rotator cuff tearing<sup>(14)</sup>.

Detection of the Os acromiale at MR images is best accomplished most reliably by using an axial sequence that includes the acromion. Plain radiograph can also identify the os acromiale as unfused lateral center of acromion but MRI remains the investigation of choice for diagnosis of impingement and rotator cuff tear with os acromiale<sup>(10)</sup>.

The differential diagnosis include fracture of the acromion and fracture of the acromial end of the clavicle. When there is history of trauma a bone fragment with irregular edges justifies the diagnosis of fracture since os acromiale has regular edges and the margins of the interacromial joint are usually sharp<sup>(4)</sup>.

The optimal treatment for symptomatic os acromial remains controversial. Typically treatment for os acromiale begins with the conventional conservative treatment for impingement syndrome <sup>(3)</sup>. Rest, ice, and NSAIDs can reduce inflammation in the shoulder and decrease the symptoms. If symptoms persist, ultrasound or electrical stimulation may be employed to decrease the swelling in the subacromial space <sup>(3)</sup>. Steroid injections may also alleviate the symptoms<sup>(15)</sup>. Jerosch et al.<sup>(15)</sup> found that an injection of cortisone decreased a patient's pain and increased her range of motion. If conservative management has failed over a period of 6 weeks to 6 months, surgical intervention may be warranted<sup>(3,16)</sup>. Hutchison et al have suggested that arthroscopic acromial decompression is not a solution to impingement syndrome caused by an unstable Os acromiale. And this emphasize that pre-operative recognition of the presence of an os acromiale is essential so that surgeon can choose the best approach to decompression<sup>(17)</sup>.

## CONCLUSION

The os acromiale should be kept in mind while looking for the cause of shoulder impingement and rotator cuff tears. It can be seen in many asymptomatic cases but the recognition of os acromiale in cases of rotator cuff tears and impingement can help the surgeon select the appropriate course of action for the management.

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