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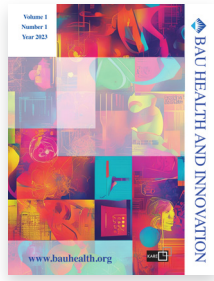

Review

The Role of Acromioplasty in Partial Rotator Cuff Tears

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Abstract

Partial rotator cuff tears are a common pathology of the shoulder joint and often present with different clinical presentations. This condition can present with a range of symptoms, from no symptoms at all to pain and loss of function that may impact daily activities. Although the term "partial tear" is commonly used, it is important to note that there are three different types of tears: Bursal surface tears, articular surface tears, and intratendinous tears. In the surgical treatment of partial tears, it is important to determine the type of tear and plan the operation accordingly. Rotator cuff repair or debridement can be performed as surgical treatment, and acromioplasty can be performed in addition to these methods. There are differing opinions in the literature about the role of acromioplasty in treating all three types of tears. While some studies suggest that including acromioplasty in cuff repair or debridement could improve clinical outcomes and decrease re-rupture rates, other studies argue that acromioplasty does not provide any benefits for partial tears. This article reviews the role of acromioplasty in the treatment of partial rotator cuff tears.

Keywords: Acromioplasty, arthroscopy, partial rotator cuff tear, shoulder joint.

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The acromioclavicular arch and the superior rotator cuff overlap anatomically and friction occurs between them during shoulder motions which the subacromial bursa tries to reduce. In some cases, this can be the main mechanism by which the supraspinatus tendon gets degenerated or injured.[1,2]

Acromioplasty is a procedure that has been used for a long time for pathologies around the acromion, especially for subacromial impingement, and its frequency has increased over the years.[3,4] This method is generally used to decompress the subacromial space in patients with subacromial impingement but can also be used to provide secondary benefits in patients with rotator cuff pathology.[5–7] In cases of rotator cuff injury, acromioplasty can be performed either with the debridement of damaged tendon fragments for tears not large enough to require repair to prevent progression of the tear or be accompanied by cuff repair to prevent friction under the acromion and reduce the incidence of re-rupture.[8–14] On the other hand, some studies have indicated that acromioplasty has no preventive effect on tear progression and does not alter the re-tear incidence after cuff repair.[15–19] Therefore, the

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role of acromioplasty in the treatment of rotator cuff tears, especially for partial tears, is controversial.

Some studies about acromioplasty and partial tears use the term "partial tear" only, but in fact, this pathology consists of three different tear types. Depending on the location of the tear, these may be articular-sided tears, bursal-sided tears, or intratendinous tears.[20,21] Both etiologically and pathophysiologically, these tears have different characteristics. For this reason, the role of acromioplasty in partial tears should be evaluated according to their subtypes separately. Although there have been many studies on the treatment of these tear types, there is no consensus in the literature as to whether or not acromioplasty should be performed. The aim of this article is to review the use of acromioplasty for partial rotator cuff tears.

Characteristics and Classification of Partial Tears

A partial tear of the rotator cuff, although often asymptomatic in the population, may cause pain and functional impairment that can have a significant impact on the patient's daily life. Partial tears may cause more pain than full-thickness tears due to the high tension on the remaining intact fibers.[22,23] In cadaver studies, the prevalence of partial rotator cuff tears ranges from 13% to 32%.[24,25] The pathogenesis involves both intrinsic and extrinsic mechanisms.[26] Intrinsic mechanisms involve degenerative tears related to age and forces acting on tendons, while extrinsic mechanisms include subacromial impingement, acute trauma, glenohumeral instability, and internal impingement.[26] The most commonly used method for classifying partial tears is the Ellman classification.[20] In this classification, tears are evaluated according to their location and depth. They are classified according to their location as articular surface, bursal surface, and intratendinous tears. In terms of depth, tears <3 mm are defined as grade 1, those between 3 and 6 mm as grade 2, and those > 6 mm as grade 3. Tears larger than 6 mm are also classified as tears of more than 50% of the thickness.

Articular-sided Tears

Articular surface tears are 2–3 times more common than bursal surface tears.[22,24] These lesions were also referred to as partial articular supraspinatus tendon avulsion lesions by Millstein and Snyder.[27] There are three main treatment options: Debridement with or without acromioplasty, transtendinous arthroscopic repair, or completion of the tear then repair. In these tears, the supraspinatus footprint is an important indicator for the surgical procedure. Therefore, during surgery, debridement should be performed until the intact portion of the tendon is reached and the exposed footprint should be measured with a probe. The common approach is to repair the tendon if there is an exposed footprint of more than 6 mm.[28]

Intratendinous Tears

The incidence of intratendinous tears has been reported in the literature in the range of 4.7–55%.[22,24,29] The main reason for this difference is thought to be the ability to perform more detailed examinations in cadaver studies compared to arthroscopic examinations in which only the surface of the tendon is visible.[30] These tears usually occur as a result of shearing forces between the layers of the tendon. To determine its location arthroscopically, the defective tendon can be palpated with a probe to assess whether or not the probe penetrates. If there is penetration, the defect can be debrided and converted to a bursal or full-thickness tear so that repair can be performed.[31]

Bursal-sided Tears

Bursal tears are less common than articular tears, but they are clinically very important as patients often suffer more pain than with the other partial tear types.[22,32] It has been reported that the most significant factor in the etiology of these tears is subacromial impingement.[22] Thus, these patients often have coracoacromial ligament (CAL) degeneration, which is a sign of subacromial impingement.[33] CAL degeneration was classified according to the Royal Berkshire Hospital Classification as described by Levy et al.[34] This system of classification groups the pathological process into four grades. A CAL with its usual appearance is graded 0, slight fraying is graded 1, major fraying is graded 2, and if the bare bone is visible under the CAL, it is graded 3. Although there is no standard procedure, it is recommended that acromioplasty should be performed in patients with grade 2 or higher, and repair is recommended for bursal tears >50%, similar to articular tears.[35]

The Role of Acromioplasty in Partial Tears

Acromioplasty can be performed as a primary treatment along with debridement or as an adjunct to rotator cuff repair for tears. Long-term follow-up of cases in which it was used as the main treatment demonstrated no progression of tears and good clinical results.[6,36] However, there is some opposition to the use of this method as a primary treatment for partial tears.

In studies that have divided partial tears into tears on the bursal side and tears on the articular side, there are different opinions regarding the decision to perform acromioplasty. There are publications suggesting that bursal-sided tears are associated with subacromial impingement and that acromioplasty may be beneficial in these cases.[30,37] In addition, studies that have performed repair and acromioplasty

together for bursal-sided tears have also shown good results.[13,14,38] Acromioplasty has also been recommended for bursal-sided tears in the presence of CAL degeneration, which is an indicator of subacromial impingement.[33] Studies of articular-sided tears have suggested that acromioplasty may provide good results both as a primary treatment and in combination with tendon repair.[8–10]

Although these studies of partial tears report positive results with acromioplasty, there are also studies suggesting that acromioplasty is not effective. In their study, Kartus et al.[19] examined the long-term clinical and ultrasound outcomes of patients with partial tears who underwent rotator cuff debridement and acromioplasty. They concluded that acromioplasty did not prevent the progression of rotator cuff degeneration in either articular-sided or bursal-sided tears. Bruchmann et al. and Ranalletta et al.[39,40] reported that treatment of bursal-sided tears with repair alone, without acromioplasty, resulted in good outcomes. Koh et al.[41] have recommended against the routine use of acromioplasty for bursal-sided tears and suggested that minimal acromioplasty should only be performed in patients with osteophytes. Their study suggests against the routine use of acromioplasty for bursal-sided tears and instead recommends minimal acromioplasty only for patients with osteophytes. For bursal-sided tears, acromioplasty is recommended as an important treatment approach, whereas for articular-sided tears without obvious subacromial impingement findings, the literature has suggested that rotator cuff repair may be sufficient.[42]

Another question is whether acromioplasty prevents the progression of subacromial impingement to rotator cuff tear. Hyvönen et al.[43] have shown that acromioplasty in patients with subacromial impingement syndrome does not prevent the development of tears in the long term. In another study of patients with subacromial impingement syndrome, there was no significant difference in the development of rotator cuff damage between patients who underwent acromioplasty, and those who had exercise therapy.[16]

Subacromial Impingement and Acromioplasty

Subacromial impingement is one of the most common causes of shoulder pain.[44] This pathology is caused by the compression of the subacromial bursa and rotator cuff tendons between the coracoacromial arch of the scapula and the humeral head when the arm is elevated. In 1972, Neer first described subacromial impingement syndrome and described three stages.[45] It is described as the development of chronic bursitis in the early stages, partial or full-thickness tears of the supraspinatus tendon in the advanced stages, and the addition of tears in the remaining parts of the rotator cuff and biceps tendon problems in the final stages.

Another important factor in this impingement is the morphological structure of the acromion. Bigliani and Morrison classified the acromion into three types: Type 1 is flat, type 2 is curved, and type 3 is a hook-shaped acromion.[46] A fourth type was later described as a convex type.[3] Of these, especially type 3 has been shown to be associated with rotator cuff tears.[47,48]

It is thought that the protrusions and bone growths that occur in the acromion are the result of calcifications that develop at the attachment point of the CAL.[45] This calcification is particularly related to the tensile forces on the ligament, which are especially pronounced during shoulder abduction.[49] A cadaver study investigating the contact and stress between the subacromial arch and the rotator cuff has shown that subacromial contact and tension in the CAL occur during all shoulder motions. As a result of this, it has been indicated that degenerative changes and bone protrusions may develop.[50]

The acromion and associated pathologies are often treated with acromioplasty, which is performed with bursectomy and release of the CAL. After subacromial bursectomy, the morphology of the acromion, the condition of the rotator cuff, and the degree of degeneration of the CAL can be determined. The degree of degeneration of the CAL is important for the decision to perform acromioplasty, as excessive degeneration is thought to favor impingement syndrome.[33]

The subacromial distance is normally reported to be 10.1±1.5 mm, whereas in subacromial impingement, the distance is reduced to 6.8±1.0 mm.[51] The purpose of acromioplasty is to relieve impingement in this area by resecting the anterior part of the acromion to the level of the acromioclavicular joint. In addition to the classic anterior acromioplasty, it has been suggested that excessive lateral extension of the acromion may also lead to rotator cuff damage, and in such cases, a lateral acromioplasty should be performed.[52–54] However, there are studies that oppose this and suggest that excessive lateral extension is not associated with rotator cuff pathologies.[55,56]

Conclusion

Although many studies have been conducted on the use of acromioplasty for partial rotator cuff tears, there is still no consensus in the literature. In this regard, there is a need for further research that particularly focuses on the separate analysis of articular and bursal-sided tears. For now, our current practice in these pathologies is primarily to assess the presence of CAL degeneration, which is commonly seen in bursal side tears, and then perform acromioplasty if degeneration is present.

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