TECHNICAL NOTE

Interstitial Tear of the Subscapularis Tendon, Arthroscopic Findings and Technique of Repair

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Abstract

Tears of the subscapularis tendon have been significantly recognized as a source of shoulder pain and dysfunction in the past decade, thanks to arthroscopic evaluation of the shoulder and biomechanical and anatomical studies of the tendon. Current classification of subscapularis tendon tear is based on insertion site of the tendon. Recently, a classification for non-insertional types of subscapularis tendon tear has been published. Interstitial tear of subscapularis tendon has not been described in classifications available in the literature. This report describes significant interstitial tear of the subscapularis tendon. This tear looks normal in superior, bursal and articular sides. Then its specific arthroscopic findings as "Air bag sign" and repair technique of the pathology is explained.

Keywords: Interstitial tear, Partial tear, Subscapularis tendon

Introduction

During the past decade, tears of the subscapularis tendon received significantly more recognition as a source of shoulder pain and dysfunction (1). The current classification system of subscapularis tears focuses on involvement of the tendinous insertion (2,3). Recently, non-insertional pathology of the subscapularis tendon has been described (4).

Although interstitial tear has been described as a type of partial thickness rotator cuff tear, interstitial tear of the subscapularis tendon has not been described in the current classifications (5). Interstitial subscapularis tendon tear is a kind of insertional tear that can be easily noticed on magnetic resonance imaging [Figure 1]. Although superior, bursal and articular sides of the tendon insertion are intact [Figure 2], there is a specific arthroscopic finding for the significant interstitial tears of subscapularis tendon. The arthroscopic finding and repair technique of the lesion are described in this technical note paper.

Technique

First we looked at the subscapularis tendon insertion on the humerus using posterior portal as entry portal. Normally it is expected that the insertion becomes visible when patient's arm is rotated internally because the tendon moves to anterior and medial and the insertion would be clearly seen [Figure 3]. When there is a significant interstitial tear and the arm is rotated internally, the thin articular side of the tendon does not obey the rest of the intact tendon and bulges posteriorly toward the arthroscopic lens. Therefore, the insertion of the tendon is covered and not visible [Figure 4]. We call this bulging of the articular side of the tendon "Air bag sign" because it bulges toward the face of the arthroscopic lens and hits the humeral head like a car air bag.

In order to repair the pathology, firstly, we shaved the thin articular side. Consequently, it is converted to a partial articular surface tendon avulsion lesion (PASTA) of the subscapularis tendon [Figure 5A]. The insertion site was prepared and the anchor suture was inserted from anterior portal. Then, we used a lasso suture passer to pass the suture from the articular part of the tear, which is retracted medially [Figure 5B]. At the next step, through using a bird beak and inserting it from the

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Table 1. Current Classification of Subscapularis Tendon Tear

Type	Lafosse classification	Fox classification
I	Partial lesion superior one third	Partial- thickness tear
II	Complete lesion superior one third	Complete tear upper 25%
III	Complete lesion superior two -thirds	Complete tear upper 50%
IV	Complete lesion with head centered and fatty degeneration<stage3	Complete rupture
V	Complete lesion with eccentric head and fatty degeneration>stage3	-

bursal side just adjacent to the insertion of the tendon, the suture which has been passed from articular side in the previous step, was retracted from bursal side [Figure 5C]. We passed two different strands of the suture anchor in this manner, and two other strands just from bursal side of the tendon. In this way, when the knots are fastened, the torn part of the tendon is pulled laterally to the insertion site and the intact bursal part of the tendon is not shortened [Figure 5D]. As Biceps sling and medial wall of the bicipital groove looked normal, Biceps tenodesis was not necessary.

Result

The Arm was immobilized for four weeks in sling swathe shoulder immobilizer. Passive external rotation of the shoulder started after four weeks up to 30 degrees and gradually increased 15 degrees every two weeks. Active external and internal rotation started after eight weeks and strengthening exercises started after 12 weeks. Within six months follow up; the patient had no pain or restriction at motion including external rotation.

Discussion

Although subscapularis tendon tear is less common in comparison with other rotator cuff tears, it seems to have been underestimated (6). Because of recent attentions to subscapularis tendon, new types of such tendon's lesions have been identified and described (1). Lafosse and colleagues described a five-type classification of subscapularis tendon lesions according to anatomic data and arthroscopic lesion-related findings (2). Fox and colleagues described a four-type classification system, which is almost equal to the first four types reported in Lafosse classification (3) [Table 1]. Both of these classifications are based on the insertion site lesions.

Dierckman and colleagues described non-insertional tendinopathy of the subscapularis and divided them into

Table 2. Yoo and Rhee Subscapularis Tendon Tear Classification

Type	Extension of Subscapularis Tendon Tear	Others
I	Fraying or longitudinal split of subscapularis leading-edge tendon	
IIA	<50% subscapularis tendondetachment in first facet	Concealed lesionincluded
II B	>50% detachment in first facetwithout complete disruptionof lateral band Concealedlesionincluded	Concealed lesionincluded
III	Entire first facet with completedisruption of lateral band (full-thickness tear of upperone third of subscapularissuperior-inferior length)	
IV	Up to second facet tear; firstand second facets are exposedwith much more medialretraction of the tendon, whichis approximately a two-thirdstear of the entire subscapularissuperior-inferior length (theentire tendinous portion)	
V	Complete subscapularis tendo tear involving the muscular portion	

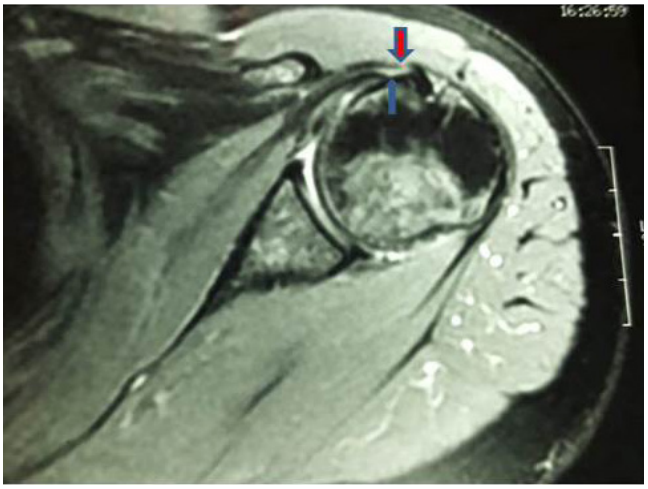

Figure 1. MRI showing interstitial tear of subscapularis tendon insertion with intact articular (blue arrow) and bursal (red arrow) side.

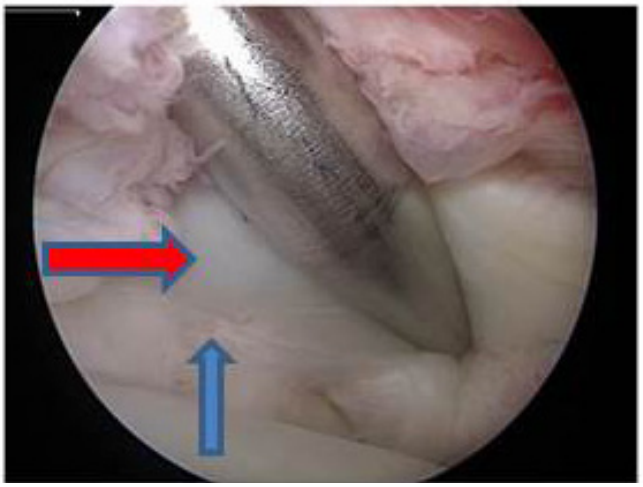

Figure 2. Despite significant interstitial tear, superior (red arrow) and articular (blue arrow) side of subscapularis tendon is intact.

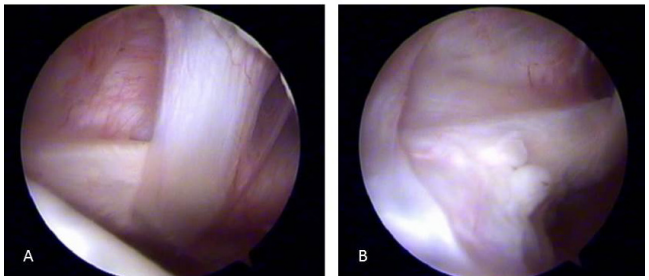

Figure 3. View of a normal subscapulartendon insertion. A: in neutral position of arm, B: when arm is internally rotated the tendon moves away from humeral head.

three categories. None of them involved insertion site of the subscapularis tendon (1). Burkhart and colleagues described two type of occult tear of subscapularis tendon, which could be considered as partial bursal side tear and partial articular side tear of the subscapularis tendon (7).

Snyder and colleagues described frayed upper edge subscapularis with impingement (FUSSI) lesion which is fraying of the upper border of the subscapularis tendon and is often associated with subacromial impingement (8). Recently, Yoo and colleagues described a new classification based on 3-Dimensional anatomic foot print [Table 2]. They used the term "concealed intratendinous subscapularis tear" and classified it in type 2 (9). It was noted that concealed intratendinous subscapularis tendon tear is seen only from the bursal

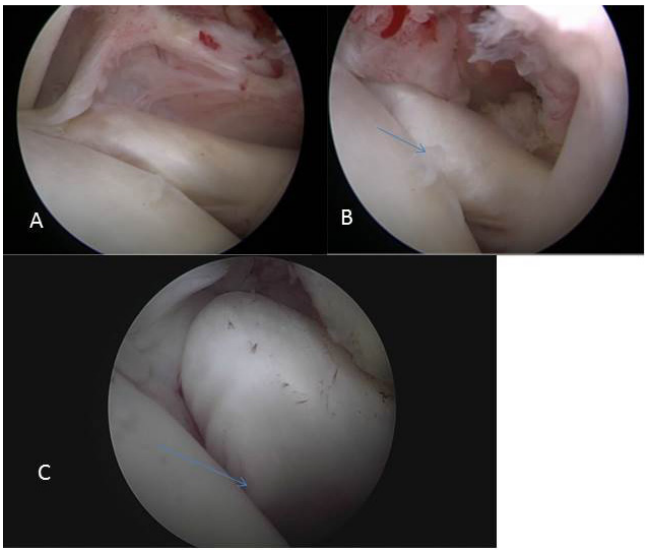

Figure 4. Interstitial tear of subscapularis tendon. A: when arm is in neutral position. B: when arm is internally rotated, the articular side of the tendon bulges and hits the humeral head. C: closer view of Air bag sign.

approach, after removing the biceps away from the groove. It looks like occult tear of subscapularis tendon described by Burkhart and colleagues.

In our studies, we noticed a significant interstitial tear of the subscapularis tendon, which had not been described

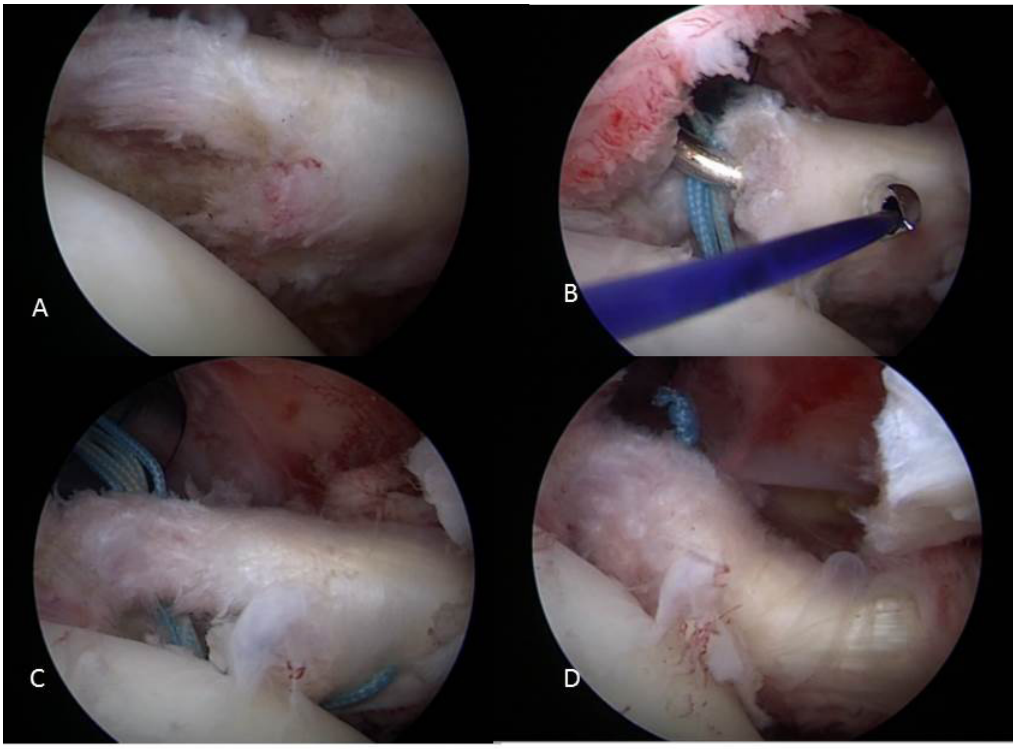

Figure 5. Step by step technique of repair of the interstitial tear of subscapularis tendon.

in any classification, as a cause of shoulder pain. It is a kind of insertional tear in which the superior part of the tendon, articular side and bursal side looks normal but there is a specific sign of significant interstitial tear, which we called it "Air bag sign". To the best of our knowledge, this kind of tear has not been reported. This report described our preferred repair technique of this lesion, which leads to no significant shortening and restricted external rotation of the shoulder. Biceps tenodesis is not necessary for this type of intratendinous tear as biceps sling and medial wall of the intertubercular groove looks normal.

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