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Short term results of arthroscopic repair of subscapularis tendon tear

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Abstract

Background: Despite being the largest rotator cuff tendon of the shoulder, the function and clinical relevance of subscapularis pathology has been largely ignored in the literature. Although many studies have focused on subscapularis tears recently, majority of them reported techniques for open repair. The advent of arthroscopy and arthroscopic repair techniques has opened new frontiers in the diagnosis and repair of torn rotator cuff tendons, including the subscapularis. In this article, we review short-term results of arthroscopic subscapularis repair.

Method: Ten patients with subscapularis tendon tear of the rotator cuff were studied prospectively including 8 men and 2 women with an average age of 49.7±12.8 years and an average delay in treatment of 23.3 months. Clinical outcomes, including the UCLA score were assessed in all patients after 3 months of the surgery.

Results: 6 patients were followed regularly for more than 6 months, while other 4 patients had a follow-up period of more than a year. The pain score improved from 1.75 to 9 and the UCLA score from 8.8 to 30.6.

Conclusions: Arthroscopic repair of subscapularis tendon tear results in significant subjective and objective improvement and high levels of patient satisfaction.

Keywords: Arthroscopy, rotator cuff, shoulder.

Introduction

The subscapularis is the largest muscle in rotator cuff but the tearing and repair of its tendon has been ignored. The subscapularis as the most important anterior muscle of rotator cuff, modulate the strength of infraspinatus and teres minor and its tearing muddle the balance in latitudinal axis of shoulder and decreases the function of shoulder. Therefore, repair of its tearing could considerably affect shoulder's function. These patients usually remember a trauma to upper extremity in abduction and external rotation position, which has not compelled them to search medical care and they usually complain a chronic shoulder pain and pain in below shoulder level activities. Its incidence has been reported much lower than other tearings while recent studies on cadaver showed an incidence almost the same as supraspinatus tears [1]. In arthroscopic evaluation, in 27% of cases, subscapularis tear is seen which was isolated or accompanied by other disorders [2]. Although arthroscopic repair has been mentioned in some recent studies, open repair of tendon has been done in most of the cases [3]. Arthroscopic repair of subscapularis has been limitedly studied

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but showed excellent results [4]. In this study, we evaluated the short-term results of arthroscopic repair of subscapularis, which was isolated or in combination with other lesions.

Methods

This descriptive prospective study was done in Taleghani, Milad, Sasan and Pars hospitals in Tehran, Iran, from January 2006 until March 2007. In this study, 10 patients 8 men and 2 women) investigated with mean age of 49.7±12.8 years (range: 25-63), whose subscapularis tear diagnoses were confirmed by physical examination and MRI study. The criteria to enter the study were subscapularis tearing confirmed by physical examination and MRI study, patients' request or demand for providing maximum function and strength of the shoulder, patients' acceptance for relatively long rehabilitation period, and also failure to non-surgical procedures including physical therapy and steroid injection. The criteria to exclude from the study were previous attempts for treatment of rotator cuff tears, moderate to severe osteoarthritis of the shoulder, a history of infection at the site of surgery, and presence of over-anticipated limitation of motion due to other lesions. All patients were referred to our center and none had a history of surgery; therefore, all of them were included in the study.

The radiographic examinations for antero-posterior, lateral, and axillary views were performed to assess superior migration. Having known that the normal space of 9-17 mm between the acromion process and the head of humerus [4], a lower measure was considered for superior migration. Two diagnostic tests, lift-off and Napoleon were carried out in all patients. In lift-off test, the patient was asked to put the injured hand behind his back and try to lift it away from the back by rotating his shoulder anteriorly. Inability to perform the test was considered as positive and a successful movement as a negative result [5,6]. Many patients could not perform the test on the ground of pain. In Napoleon test, we asked the patient to put his hand on his belly and press, while his wrist was in the straight position. If his wrist was flexed to 30 degree, test was negative, flexion between 30 to 60 degree considered as moderate, and flexn over 90 degree, as positive. To confirm the diagnosis, MRI study was done in all patients. The fat degeneration was not accunted for any degree as a contraindication for surgery [7]. Although Gerber believes that it is necessary to operate patients as soon as possible [8], we have not considered the onset time of the symptoms, because repair could be effective even after 6 years to prevent tenodesis effect [9]. Patients who had at least one positive diagnostic test and a positive MRI, along with pain and limited motion were defined as a case of subscapularis tendon tear, which makes them eligible to be included in the study. All patients were given UCLA scores [2], consisted of 5 categories: 10 score for pain, 10 score for shoulder function, 5 scores for range of motion, 5 scores for strength of elevation, and 5 scores for patient's self-satisfaction [10].

First, a diagnostic arthroscopy was carried out in a beach chair position from a posterior portal with arthroscopic pump pressure of 60 mm-Hg. To facilitate visualization of tearing site, internal rotation and abduction maneuver were done just in case [10,11], because it could separate the intact fibers from tearing site and provide a better opportunity to visualize the lesion. The shape of the articular capsule limits the available space anteriorly; thus, if this tendon is repaired following the repair of other tendons, anterior space will be more limited because of the repair procedure itself, which results in edema [12,13]. Therefore, subscapularis tendon was repaired after diagnostic arthroscopy, but before repairing of other lesions to avoid the delayed shoulder edema. Four portals were employed in the operation, following the principles [14]: standard posterior portal for visualization, anterior portal to pass Anchor suture, antero-lateral portal (ante-

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rior to the biceps tendon) to release subscapularis and antero-lateral portal (posterior to the biceps tendon) for suture traction.

Patients could leave hospital the same day or the day after operation. The shoulder was immobilized for 6 weeks by a sling, which was used all the time except for exercises and bath time. The exercise comprised active flexion and extension of the elbow, which were started immediately after the operation; however, in patients with biceps tenodesis, extension was limited in the last degree. Moreover, passive external rotation limited to the natural position should be immediately started in the first 6 weeks. After 6 weeks, sling was removed and external movements were started in all directions, including above the head and internal and external rotation of the shoulder. Isotonic movement was not started until the 12th week. Patients were examined after 2 weeks of the surgery, followed by one month, 2 months, 3 months, and every 3 months afterwards. They were then evaluated by the UCLA scoring system, so that their improvement could be compared with the pre-operative scores. By the end of the study, 6 patients were followed regularly for more than 6 months, while other 4 patients had a follow-up period of more than a year. In the UCLA scoring system, total score was 35thus; the scores 34-35 were considered as excellent results, 28-33 satisfactory, and 21-27 unsatisfactory, while 20 or less demonstrated bad results. Inasmuch as the limited number of cases in this study, we have not classified patients into complete and incomplete tears or isolated and accompanied lesions.

Results

Three out of 10 patients had isolated lesions and seven accompanying lesions. One of the patients had Bankart lesion and 6 of them rotator cuff tears. One case had a biceps tendonitis, on which tenodesis was performed. A past trauma experience in the shoulder of one patient caused dislocation and Bankart lesion; however, rest of the patients had no history of trauma. In physical examination, lift-off test could not be performed in 6 patients because of the pain. 4 patients underwent the test with a positive result in 3 of them and a negative in one. Napoleon test result was moderate in 9 cases and positive in just one case, with no negative result insight. The mean delay for treatment after the onset of the symptoms was 23.3 months. In simple radiographs, superior migration of the head of humerus was seen only in 3 patients. The mean UCLA score and the mean score for pain were 8.8 and 1.75, respectively before the surgery, and improved to 30.6 and 9, post-operatively (Table 1). Finally, according to the UCLA scoring system, 2 patients had an improvement to the excellent level, 5 to good and 3 to moderate levels (Table 2).

Discussion

Considering the fact that subscapularis muscle is an internal rotator of the shoulder, its weakness may not only cause limited active internal rotation, but also imbalance in muscle strength. Mean age of these patients vary in different studies. In our patients, the mean age was 50 years, comparable with those of the open procedure studies by Fuchs et al [3] and Ozbaydar et al [15] with 59 and 63, respectively. Hav-

Scores	Pre-operation	Post- operation
UCLA	7.5	30.6
Pain	1.75	9
Active forward flexion	1.75	4.5
Function	1.5	9.5
Strength of forward flexion	1	3.5
Self-satisfaction	1.5	4

Table 1. Shoulder's function before and after the surgery

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Cases	gender	Age	Physical exam		Accompanying lesions	Delay of treatment (month)	Follow up period (month)	UCLA
			Lift off	Napoleon				Pre-Op
1	Male	54	Positive	Middle	-	26	12	10
2	Male	48	NF	Middle	RCL	19	12	6
3	Male	46	Positive	Middle	RCL	16	12	7
4	Male	51	NF	Middle	RCL	23	12	15
5	female	63	NF	Middle	RCL	60	9	5
6	Male	25	Positive	Positive	Bankcard	11	6	12
7	Male	54	NF	Middle	RCL, BCT	19	6	7
8	Male	57	Negative	Middle	RCL	25	6	9
9	female	50	NF	Middle	RCL	18	6	7
10	Male	49	NF	Middle	-	16	6	10

RCL: Rotator cuff lesion, BCT: Biceps tendonitis, NF: Not feasible

Table 2. Characteristic and finding of the patients.

ing a younger population in our country and limited number of cases in this study suggested that the mean age of our patients would be less than that of the mentioned studies.

The moderate Napoleon test was in 9 cases, indicated the possibility of partial tearing of the subscapularis tendon; however, a positive case, perhaps due to complete tearing of the tendon, was recorded in this study. Most of our cases were unable to perform lift-off test and one-third of our cases had superior migration of the head of humerus, which were compatible with the arthroscopic results of Stephen et al [4]. Superior migration of the head of humerus could be easily found with simple radiographs in our study. Fuchs et al [3] reported excellent results of open repair of isolated subscapularis tendon tearing; whereas, our results of arthroscopic repair were comparable to their study. However, Fuchs et al [3] had not calculated the total scores of UCLA, and only pain scores and daily function were evaluated. Pain score improved from 5 to 11.8 [range: 0-15] in the study performed by Stephen et al [2], quite close to the findings by Fuchs et al [3], which demonstrates a better improvement in our results, raised from 1.75 to 9 (range: 0-10), before and after the surgery. In the study by Ozbaydar et al [15], UCLA score increased from 11.3 to 25.8, before and after the operation; meanwhile, our patients had a better improvement from 7.5 to 30.6.

When comparing our results to those of previous reports, it seems that arthroscopic repair of subscapularis tendon tearing is more effective for improving pain and function in the short term. Although in studies like the one by Sakurai et al [1], all the tearing comprised half of the tendon thickness, most of these tearings obviously were in articular side and may remain undiagnosed during open surgery, while they would be detected more easily and precisely through arthroscopy. Overall, the results of open repair, in the best situation, which is an isolated tearing, are equal to the results of arthroscopic surgery. Besides, less invasive arthroscopic repair would decrease the complication rate and tissue edema. However, the arthroscopic procedures are difficult and the training period is relatively long. On the other hand, a well-trained orthopedic surgeon could reduce the time and the complications of the surgery remarkably and make the patient more satisfied by applying a less invasive procedure.

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