Original Article

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Clinical Findings of Arthroscopic Release in Treatment of Primary Frozen Shoulder

A.R. Sadeghifar (MD)*[1], A. Saeedi (MD)[1], M. Daneshfar [1]

1. *Afzalipour Faculty of Medicine, Kerman University of Medical Sciences, Kerman, I.R.Iran*

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ABSTRACT

BACKGROUND AND OBJECTIVE: Frozen shoulder is a common condition, characterized by pain and restrictions in shoulder movements. Different non-surgical and surgical methods are used to overcome this condition. Given the high prevalence of frozen shoulder among the working class in communities, re-empowerment is essential for individuals' return to daily activities. Considering the contradictory results reported by previous research, further investigations are required in this area. Therefore, this study aimed to evaluate the clinical findings of arthroscopic release in treatment of primary frozen shoulder.

METHODS: This cross-sectional study was performed on all patients with primary frozen shoulder, referring to Bahonar and Shafa Hospitals of Kerman, Iran. These patients were candidates for surgery due to unsuccessful supportive treatment. First, American Shoulder and Elbow Surgeons (ASES) assessment form (score: 0-100) and Simple Shoulder Test (a 12-item questionnaire) were completed before surgery. Then, all patients underwent arthroscopic release and examinations. The assessment forms were completed again within 3 and 12 months after surgery.

FINDINGS: Overall, 15 patients with the mean age of 50.57±12.01 years were included in this study. There was a significant difference in the mean score of SST before (10.21±0.98) and after (10.98±1.05) surgery (p=0.034). Also, patients' performance at 12-month follow-up significantly improved, compared to the three-month follow-up (p=0.014). There was a significant difference in the mean scores of ASES test before and after surgery (p=0.007). Also, the mean score of ASES test was higher at 12-month follow-up, compared to the three-month follow-up (p=0.019).

CONCLUSION: Overall, arthroscopic release could help relieve pain and improve the range of shoulder movements in patients. Moreover, it could help patients return to their daily activities and regain their productivity. In fact, this technique facilitates simultaneous diagnosis and treatment of shoulder joint problems.

KEY WORDS: Frozen Shoulder, Arthroscopic Release, American Shoulder and Elbow Surgeons, Simple Shoulder Test.

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Introduction

Frozen shoulder is a debilitating condition and a common cause of physician referral. The prevalence of frozen shoulder has been estimated at 16-34% in the general population (1). The most common cause of chronic shoulder pain is high level of activity in individuals. Moreover, shoulder impingement syndrome is the most common problem of shoulder, with a prevalence rate of 24-

***Corresponding Author: A.R. Sadeghifar (MD)**
Address: Afzalipour Faculty of Medicine, Kerman University of Medical Sciences, Kerman, I.R.Iran
Tel: +98 34 32231969
Email: sadeghifar@kmu.ac.ir

65%. In frozen shoulder, inflammation and stiffness of connective tissues, surrounding the glenohumeral joint of the shoulder, lead to restricted motions of the shoulder. This condition can affect head movements, as well. Frozen shoulder has been reported in individuals with different occupations, affecting their physical performance and daily activities (2, 3).

Frozen shoulder or adhesive capsulitis is a painful and debilitating condition of unknown etiology, with a prevalence rate of 2% in the general population. This condition is more common in individuals within the age range of 40-60 years, i.e., peak years of human activity. Frozen shoulder is a chronic problem, which may last up to two years; in some cases, this condition may persist for even ten years (2).

Frozen shoulder is defined as painful stiff shoulder, with abduction less than 90°, external rotation of less than 50% in the unaffected shoulder and internal rotation beneath the sacral vertebrae (4). In addition, primary frozen shoulder refers to restricted active and passive movements of the shoulder on all sides, with an unknown cause. Although this condition is self-limited, some patients do not regain normal movements even after long periods (5).

Various techniques are available for the treatment of frozen shoulder. Some of these techniques include supportive therapy, use of medications, stretching exercises, injection of medications and fluid, manipulation and surgical procedures for releasing extra-articular and intra-articular adhesions. The goal of treatment is to return patients to their daily pain-free activities and normal range of motion.

Both surgical and non-surgical methods are used for the treatment of frozen shoulder (4). However, as various studies have indicated, there is no treatment of choice for frozen shoulder. In this regard, the results of a systematic review on 989 patients showed no significant difference between arthroscopic release and manipulation under anesthesia in the treatment of frozen shoulder (6). However, a major advantage of arthroscopic release is the ability to indentify intra-articular pathology (7). Given the high prevalence of frozen shoulder among the working class in communities, re-empowerment is essential for individuals' return to daily activities. Considering the contradictory results reported by previous research, further investigations are required. Therefore, this study aimed to evaluate the clinical findings of arthroscopic release treatment of primary frozen shoulder.

Methods

This cross-sectional study was performed on patients with unexplained primary frozen shoulder, who were unresponsive to physiotherapy or medications during April 2012-May 2013. In our study, frozen shoulder was defined as painful stiff shoulder, with limitations in active and passive range of shoulder motions, accompanied by shoulder abduction less than 90°, external rotation of less than 50% in the unaffected shoulder and internal rotation beneath the sacral vertebrae (4). Patients with secondary frozen shoulder, caused by trauma or medical conditions such as diabetes, were excluded from the study. The study sample consisted of all patients with primary frozen shoulder, referring to the clinics of Bahonar and Shafa hospitals in Kerman, located in southeast of Iran. In total, 20 patients were enrolled in this study. All subjects were clinically examined and underwent surgery. In total, 15 patients were followed-up within 3- and 12-month intervals. First, the American Shoulder and Elbow Surgeons (ASES) assessment form and Simple Shoulder Test (SST) were completed for all patients. In addition, clinical tests were applied in this study. In the next step, all patients underwent shoulder arthroscopy in the beach-chair position during general anesthesia. The surgery was performed, using the posterior portal in diagnostic shoulder arthroscopy. Then, the anterior portal was located in the anterior soft spot, using a *co-ablation wand* (ArthroCare Corporation, USA) to release the shoulder capsule and ligaments. After full release of anterior and posterior capsules, range of motion in the shoulder was measured. If full range of motion was not regained, arthroscopic examination was re-performed. X-ray examination was carried out after surgery to evaluate possible dislocations. Then, all patients were examined and ASES form and SST were completed again within 3 and 12 months after surgery.

Data collection tools: SST is a 12-item, shoulder-specific scale, used to evaluate twelve motions of

the shoulder (Cronbach's alpha=0.78) (8). In case more than two items of SST are left unanswered, the results are not considered valid; in our study, all completed questionnaires were valid. It should be mentioned that maximum and minimum scores of SST are twelve (best function) and zero (worst function), respectively. In the present study, ASES, which is an assessment form consisting of five sections, was completed by physicians. This instrument was developed in 1994 by the American Shoulder and Elbow Surgeons in order to accurately assess the functions of shoulder and elbow (9). In the first section of this form, the questions are related to patients' daily life. In other sections, range of shoulder motion, symptoms, shoulder function and performance are evaluated. Finally, shoulder score index (SSI) is calculated as follows:

SSI=(10-Visual Analog Scale pain score)×5+(5.3)× cumulative Activities of Daily Living (ADL) score

The scores range between 0 and 100, and higher scores indicate better function of the shoulder. Finally, all data were entered to SPSS version 18. T-test, repeated measures ANOVA and Tukey's post-hoc test were used for data analysis. P-value less than 0.05 was considered statistically significant.

Results

According to the obtained results, 6 (42.7%) and 9 (57.3%) patients were male and female, respectively. The mean age of participants was 50.57±12.01 years. As the results indicated, the mean SST score was 10.21±0.98 before surgery. After surgery, the scores were reported to be 10.85±1.14, and 10.98±1.05 at 3- and 12-month follow-ups, respectively. The mean SST score was significantly lower before surgery, compared to post-surgery scores (p=0.034).

Also, the mean SST scores were higher at 12 months after surgery, compared to the three-month follow-up (p=0.014) (table 1). The mean score of ASES was calculated to be 58.36±7.14 before surgery. However, the scores increased to 79±7.11 and 85.52±7.01 after surgery within 3- and 12-month intervals, respectively. The comparison between ASES scores before and after surgery showed a significant difference in the scores (p=0.007) (table 1). Also, the mean score of SST was higher at 12-month follow-up, compared to the three-month follow-up (p=0.019) (table 1).

Table 1. The mean SST and ASES scores before and after surgery

Tools / Time	ASES Mean±SD	SST Mean±SD
Before surgery	58.36±7.15	10.24±0.99
Three months after surgery	79.11±7.11	10.86±1.14
Twelve months after surgery	85.52±7.02	10.99±1.05
p-value	0.007	0.034

Discussion

As the results of the present stud indicated, patients with frozen shoulder, undergoing arthroscopic release, showed significant improvements in clinical assessments within three and twelve months after surgery. Consistent with our findings, in a study by Sheridan et al., the majority of patients were female (10). The results of a systematic review, assessing 989 patients, showed no significant difference between arthroscopic release and manipulation under anesthesia (6). Moreover, according to a study by Berghs et al., the Constant score increased from 21 to 72 after arthroscopic release, representing a significant improvement in shoulder performance (11). Additionally, in congruence with our study, pain reduction was reported in studies by Lafosse et al. (12) and Fuchs et al. (13). Based on the Visual Analog Scale, pain score (as one of ASES parameters) decreased from 7 to 1.6 in the study by Lafosse and colleagues; in our study, the score decreased from 8 to 2. In the present study, based on SST and ASES scores, the performance of patients improved after arthroscopic release within three and twelve months, respectively; this indicates the persistent, constant improvement in patients' condition. This finding was in accordance with other previously conducted research (12). A study by Waszczykoski et al., performed on 30 patients with frozen shoulder, showed that arthroscopic release significantly improved the range of motions and function in primary and secondary frozen shoulder (14-17). Our findings were also similar to the results reported by Waszczykoski and colleagues. Additionally, according to a study by Snow et al., arthroscopic release led to a significant improvement in 48

patients with frozen shoulder, who were unresponsive to physiotherapy or protective therapy (15). Moreover, Akpinar and colleagues evaluated the efficacy of arthroscopic release in the management of frozen shoulder.

This study was performed on 16 patients with frozen shoulder. As the findings indicated, arthroscopic release was introduced as a safe and effective method for the treatment of frozen shoulder (16). Also, Ozbaydar and colleagues evaluated 16 patients with frozen shoulder, treated by arthroscopic selective capsular release. As the results indicated, patients who had not responded to protective therapy, were effectively treated by arthroscopic release (5). Overall, various studies have evaluated different methods for the treatment of frozen shoulder. In this regard, Rookmomeea et al. by assessing different treatment methods found no definite, effective treatment, and none of the applied methods were preferable to others (17).

Additionally, Musil et al. by evaluating 26 patients, who had not responded to protective therapy, showed that arthroscopic release is the treatment of choice. As the results indicated, arthroscopic release is a safe method, which can significantly improve the range of shoulder motions with minimum side-effects (18). Also, many studies have shown that arthroscopic release is an effective technique for the treatment of frozen shoulder. This technique also leads to decreased level of pain and improved function of the shoulder in the short run.

Limitations: The main limitation of this study was motivating patients to participate in the study. We tried to encourage the patients by describing the objectives and results of the study. Other shortcomings of this study were evaluation of patients at only one single center, limited sample size and absence of a control group.

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