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Clinical Findings of Arthroscopic Release in Treatment of Primary Frozen Shoulder

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Abstract

Background: Frozen shoulder is a common condition, characterized by pain and restriction 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 to return to their 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 (SST) (a 12-item questionnaire) were completed before surgery. Then, all the patients underwent arthroscopic release and examinations. The assessment forms were completed again 3 and 12 months after surgery.

Results: Overall, 15 patients with the mean age of 50.57 $\pm$ 12.01 years were included in this study. There was asignificant difference in the mean score of SST before (10.24$\pm$0.98) and after (10.99$\pm$1.05) surgery (p=0.034). In addition, patients' performance at 12-month follow-up significantly improved compared to the 3-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). In addition, the mean score of ASES test was higher at 12-month follow-up compared to the three-month follow-up (P = 0.019).

Conclusions: 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.

Keywords: Frozen Shoulder, Arthroscopic Release, American Shoulder and Elbow Surgeons, Simple Shoulder Test

1. Background

Shoulder pain is one of the complaints leading patients to visit the doctor's office. The prevalence of shoulder pain in community has been reported 16% to 34% (1). The most common cause of chronic shoulder pain is overuse problems. Among this, the shoulder impingement syndrome is one of the most common problems with the prevalence of 24% - 65% that is seen in many of overhead movements, sport activities, or daily life and many professions (2, 3). Frozen shoulder as one of the most common shoulder diseases is an orthopedic problem with overall prevalence of about 2% of the population. It has a higher incidence between the ages of 40 - 60 years meaning the efficient years of life with long-term engagement about 2 - 3 years and even sometimes up to 10 years (2). Frozen shoulder is painful stiff shoulder with symptoms of abduction less than 90°, external rotation less than 50% relative to the contralateral side, and internal rotation less than sacral vertebrae (4). Primary frozen shoulder syndrome is applied for description of active and passive movement restrictions in all directions without any reason. Although it is considered a self-limited disease, some patients have not achieved normal movement in long-term follow-up (5). In treatment of these patients, several treatments including supportive care, pharmaceutical treatment, stretching exercises, injection of solutions or medications for joint expansion, and surgical manipulation for release of joint adhesions are used. The goal of treatment of this disease is to return to normal range of motion and pain relief. Treatment of this disease is achieved by both surgical and nonsurgical ways (4). In studies and assessments performed until now, no advantages have been mentioned for many different therapeutic methods. In a systematic review on 989 cases, there was no difference between arthroscopic release and manipulation under anesthesia (6). Another advantage of arthroscopy is inspection of possible joint pathology (7). In addition, in this study, clinical tests were used. Considering the impor-

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tance and prevalence of this problem in activist groups of society and the need for faster return to sports and normal life activities and due to very diverse results of research, this study aimed to evaluate the clinical results of arthroscopic release of primary frozen shoulder.

2. Methods

This cross-sectional study was performed on patients with primary frozen shoulder due to unknown cause who had not responded to six months of conservative treatment (physiotherapy, NSAIDS, one or two injections). Frozen shoulder was defined as a painful stiffness in the shoulder with active and passive abduction less than 90°, external rotation less than 50% relative to the contralateral side, and internal rotation less than sacral vertebrae (4). Patients with secondary frozen shoulder due to trauma and medical problems such as diabetes were excluded.

All patients with primary frozen shoulder referring to Bahonar and Shafa hospitals of Kerman University of Medical Sciences from April 2012 to May 2013 underwent clinical examination. Among 20 eligible patients undergoing operation, 15 patients attended follow-up. First, ASES and shoulder test simple standard forms were filled for them. Then, they underwent arthroscopic release surgery. All surgeries were done by the senior author as follows: the patient underwent diagnostic shoulder arthroscopy under general anesthesia in the beach chair position and posterior portal. Then, anterior portal was defined at anterior soft spot area and shoulder capsular, and ligament release was performed using co-ablation wand (Arthrocare company-USA). We released the rotator interval contractures. All capsular ligaments included coracohumeral ligament, anterior capsule, superior, middle, and anterior-inferior glenohumeral ligaments, and posteroinferior capsule. After completing the release, shoulder range of motion was assessed to be fully gained. If it was not perfect, arthroscopic examination would be performed again. After surgery, X-ray was applied to evaluate the possible dislocation. Then, patients underwent formal shoulder physiotherapy for 10 sessions. In subsequent visits, patients re-examined 3 months and 12 months later and then, ASES and Simple Shoulder Test forms were filled for them.

SST questionnaire: simple shoulder test (SST) questionnaire (Cronbach's alpha coefficient = 0.78) consists of 12 questions that actually evaluate 12 shoulder's functions (8). Failure to respond to two or more questions of this questionnaire is unacceptable and then the questionnaire is worthless. In this study, all the completed questionnaires were valuable. Maximum score in this questionnaire is 12 indicating the best function and the minimum is zero indicating the worst function.

American Shoulder and Elbow Surgeons (ASES) questionnaire: This questionnaire was designed and developed in 1994 by Orthopedic Surgeon Association for accurate assessment of shoulder and elbow function (9). The questionnaire was filled out by a physician and includes five sections; in part I, the patient answers questions about his/her daily life and in the others, range of motion, symptoms, shoulder power, and shoulder function are evaluated by physician's examination. At the end, shoulder score index is calculated as follows. The questionnaire score varies from 0 to 100 and the higher score implies less function deficit and disability.

ASES Score = (10 - visual analog scale pain score) x5 + (5/3) x cumulative activity of daily living (ADL) score.

Finally, the data were entered into SPSS 18 and analyzed using paired t-test, repeated measures ANOVA, and Post-Hock (Tukey B) test. $P < 0.05$ was considered significant.

3. Results

In this study, 9 patients (57.3%) were female and 6 (42.7%) were male. The mean age of the participants was 50.57 ± 12.01 years. The mean score of SST questionnaire was 10.24 ± 0.98 before surgery while it was 10.86 ± 1.14 and 10.99 ± 1.05 respectively 3 months and 12 months post-operatively. The mean score of evaluation before surgery was significantly less than the mean scores after surgery ($P = 0.034$) (Table 1). The mean scores obtained 3 and 12 months after surgery also showed a significant difference for SST questionnaire, so that the mean score was higher at the time point of 12 months after surgery ($P = 0.014$) (Table 1). The mean score was 58.36 ± 7.15 before surgery while it was 79.11 ± 7.11 and 85.52 ± 7.02 respectively 3 and 12 months after surgery.

In comparison, the mean scores of the questionnaire after surgery were significantly higher than the score before surgery ($P = 0.007$) (Table 1). For the ASES questionnaire, we found that the mean score 12 months after surgery was significantly higher than the mean score 3 months after surgery ($P = 0.019$).

4. Discussion

This study indicated that patients with primary frozen shoulder that had been treated with arthroscopic release showed significant improvements in follow-up and clinical evaluations. In a similar study conducted by Sheridan et al., most patients were female (10). In a systematic review on 989 patients, there was no priority for arthroscopic release to the manipulation under anesthesia (6). In Berghs et al. study, the constant score increased from 21 to 72 after arthroscopic release that was considered a significant

Table 1. Mean ASE and SST Questionnaire Score at the Different Periods of the Study

Questionnaire Time	SST Mean ± SD	P Value	ASES Mean ± SD	P Value
Before surgery	10.24 ± 0.99	0.034	58.36 ± 7.15	0.007
3 months after surgery	10.86 ± 1.14	0.034	79.11 ± 7.11	0.007
12 months after surgery	10.99 ± 1.05	0.034	85.52 ± 7.02	0.007

functional improvement (11). In Lafosse et al. and Fuchs et al. studies, pain relief was seen, as observed in our study (12, 13). In Lafosse et al. study, pain relief changed from 7 to 1.6 based on VAS. In this study, the results of ASES and SST questionnaires showed improved function after arthroscopic release that represents both primary significant improvement after 3 months and sustainable results due to improvement progression after one year (12). These results are similar to those obtained in studies conducted by other researchers. In a study conducted by Waszczykoski et al. on 30 patients suffering from frozen shoulder, after a 2-year follow-up, it was seen that arthroscopic release improved significantly shoulder range of motion and function in primary and secondary frozen shoulders (14-17). Our study obtained similar results. In Snow et al. study on 48 patients who had not responded to physiotherapy and conservative treatment, a significant improvement was observed after arthroscopic release in patients with frozen shoulder (15). Akpinar et al. study on 16 patients with frozen shoulder showed that arthroscopic release is a safe and effective method in the management of frozen shoulder (16). In Ozbaydar et al. study on 16 patients with frozen shoulder who had arthroscopic selective capsular release, it was seen that patients not responding to conservative treatment were treated effectively by this method (5). In Rookmomeea et al. study, after review of different methods of frozen shoulder treatment in various articles, no definitive and effective method was recognized (17). In another study by Musil et al. on 27 patients with frozen shoulder, they found that arthroscopic release is the preferred treatment in patients who do not respond to conservative treatment. It was also seen that the range of motion significantly improved with minimum complications (18). Based on these results, shoulder arthroscopic release is a valuable technique in the treatment of primary frozen shoulder that results in either pain relief or functional improvement in short-term.

4.1. Limitations

Obtaining consent from patients to participate in this study was one of the major limitations that tried to be resolved by explaining the goals and results. The other drawbacks of this study are limited number of patients and lack of control group.

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