# Arthroscopic coracohumeral ligament release for patients with frozen shoulder

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**Background**
Frozen shoulder (FS) is one of the most common musculoskeletal problems and has an incidence of 3–5% in the general population.
**Aim**
This study aimed to assess the effects and outcomes of arthroscopic coracohumeral ligament (CHL) release and L-shaped incision of the rotator interval (RI) for patients with FS.
**Patients and methods**
Arthroscopic CHL release and L-shaped incision of RI and subacromial decompression (SAD) were done. Assessment of pain, shoulder function, and range of motion scores were measured according to the The University of California - Los Angeles (UCLA) shoulder score.
**Results**
Arthroscopic CHL release and L-shaped incision of RI and SAD showed a significant improvement in pain, shoulder function, motion, and UCLA score.
**Conclusion**
Arthroscopic CHL release and L-shaped incision of RI and SAD is a good choice for FS treatment.

**Keywords:**
arthroscopic coracohumeral ligament release and L-shaped incision of rotator interval, frozen shoulder, function, pain; range of motion, UCLA

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## Introduction

Frozen shoulder (FS) has an incidence of 3–5% and up to 20% in those with diabetes [1]. Treatment of FS often involves the use of anti-inflammatory or locally injected corticosteroids. NSAIDs can be used to relieve symptoms [1].

Surgical treatment of FS should be only after conservative management has failed. Generally, patients should have participated in some form of physiotherapy for at least 3 months, and showed no progress [2].

Arthroscopic coracohumeral ligament (CHL) release is an excellent surgical option for addressing the shoulder with FS. The contracted structures are released to allow the return of range of motion (ROM) with manipulation, if necessary [2].

## Patients and methods

This study included 20 patients, and was carried out between October 2019 and March 2021. All cases were performed in the Department of Orthopedics of Benha University Hospital, Benha University. All patients underwent arthroscopic CHL release. Demographic distribution of the study subjects included 13 (65%) women and seven (35%) men, of which the mean age was 52 years (range, 40 and 65 years) and the mean follow-up period was 6 months. The patients who were selected for surgical treatment had remained unresponsive to conservative treatment for at least 3 months. The study was approved by the institutional ethics committee in the Orthopedic Department of Orthopaedic Surgery, Benha University, Egypt.

Conservative treatment included local injections, local and oral NSAIDs, home exercises, and physiotherapy programs designed for FS management.

Inclusion criteria: adult male or female, severe limitation of shoulder movement. Failure of conservative treatment for 3 months. Exclusion criteria: rheumatoid arthritis, acute infection, and vascular or neurological deficit affecting the shoulder.

## Preoperative evaluation

Clinical evaluation: a detailed sheet was obtained from all patients including personal history (age, sex,

occupation, and special habit of medical importance), history of present illness, the side affected, previous treatments, history, and medical comorbidities. Radiological evaluation using radiograph (anteroposterior view) and MRI was performed on all patients to exclude other pathologies.

We measured the pain, function, ROM, and motion scored using the UCLA score.

### Procedure

The procedure was carried out under general anesthesia. Patient position: beach chair. Portals: posterior, anterior, and lateral portals. Through lateral portal arthroscopic subacromial decompression (SAD) is done. Through the anterior portal CHL is clear and followed to the coracoid process then released was done then the anterior capsular was released. This was followed by the release of the anterior capsule. The posterior capsular release is done through the anterior portal if indicated. Finally, closure of the wounds is done (Fig. 1).

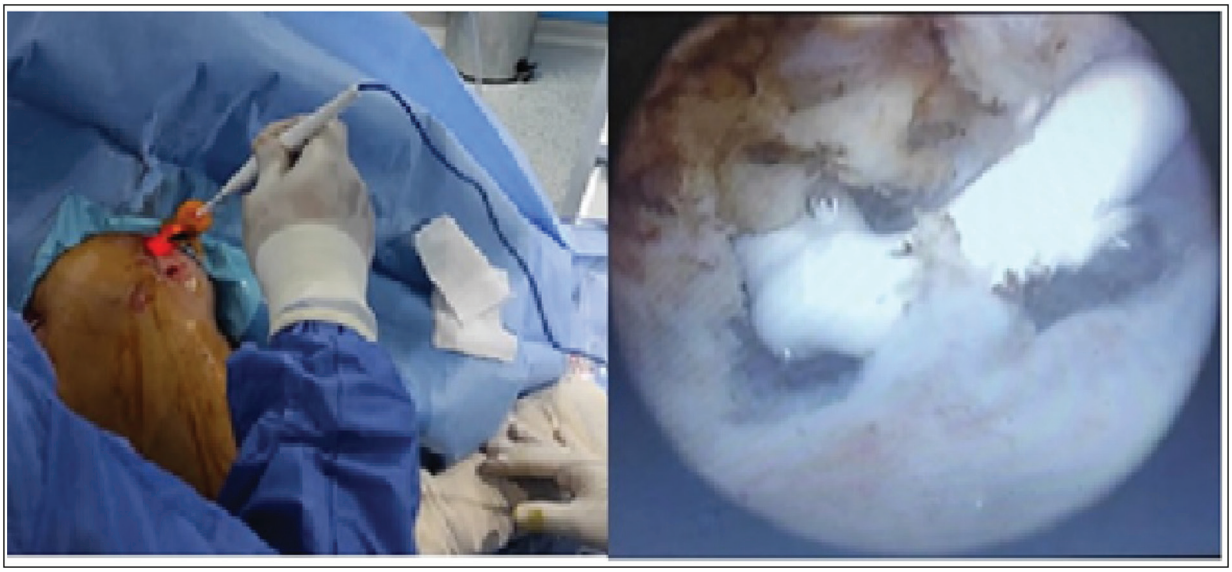
### Postoperative evaluation

All the patients were followed up for at least 6 months and their pain level, shoulder function, and ROM were measured (Fig. 2).

### Statistical analysis

The data was analyzed using the computer program SPSS (Statistical Package for the Social Sciences), version 16,

**Figure 1**



Intraoperative release of CHL and RI. CHL, coracohumeral ligament; RI, rotator interval.

**Figure 2**

Postoperative range of motion.

SPSS Inc. Released 2007. SPSS for Windows, Version 16.0. Chicago, SPSS Inc. The significance of difference was tested using analysis of variance to compare between more than two groups of numerical (parametric) data. *P* value less than 0.001 was considered statistically significant and *P* value more than 0.001 was considered statistically insignificant.

## Results

From the previous data, the study showed that there was a significant difference (*P*>0.001) in pain, function, ROM, motion, and UCLA scores between the diseased side and normal side (Table 1, Chart 1).

From the previous data, the study showed that there was a significant increase (*P*>0.001) in pain, function, ROM, motion, and UCLA scores after 6 months of follow-up after the operation on the diseased side (Table 2, Chart 2).

From the previous data, the study showed that there was no significant difference (*P*>0.001) in postoperative pain, function, ROM, motion, and UCLA scores after 6 months of follow-up, compared with the normal side (Table 3, Chart 3).

## Discussion

FS disease is a common and disabling shoulder condition. There is no common agreement on the diagnosis, mechanism, and treatment of shoulder stiffness. FS caused by diabetes mellitus is the most common musculoskeletal disease in diabetic patients [3].

It has been proved in many studies that diabetic patients generally have more limitations of joint motion than healthy people do. The reason for this correlation remains enigmatic. The change in the structure of collagen because of the glycosylation of collagen proteins causes biomechanical differences in diabetic patients. Moreover, the cell damage caused by the accumulation of the final product formed after the advanced glycosylation can explain this correlation.

The natural course of FS disease is characterized by three periods: painful, frozen, and thawing stages. Although the symptoms are relieved during these stages, motion limitation can sometimes remain. Some authors claim that this process may take 2–7 years [4].

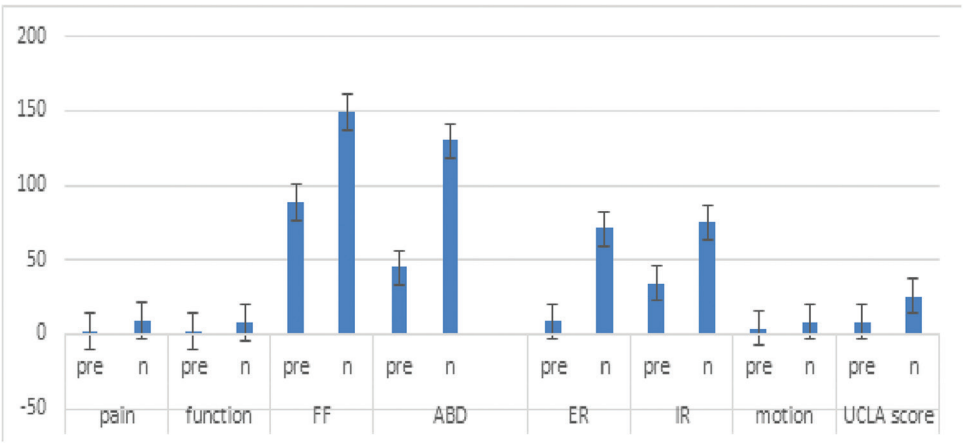
The painful period gets longer and cannot be tolerated by the patients. Conservative methods are initially used for the treatment of FS disease. The options for conservative treatment include physiotherapy, NSAIDs, and local steroid applications and none has an advantage over the other [5].

Surgical treatment is suggested where stiffness and loss of motion continue for 3 months despite

**Table 1 Difference in pain, function, range of motion, and UCLA scores in preoperative and normal shoulder**

| | Pain | | Function | | FF | | ABD | | ER | | IR | | Motion | | UCLA score | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pre | *n* | Pre | *n* | Pre | *n* | Pre | *n* | Pre | *n* | Pre | *n* | Pre | *n* | Pre | *n* |
| Mean | 2.3 | 9.2 | 2.05 | 7.95 | 88.5 | 149 | 44.75 | 129.75 | 8.7 | 70.5 | 34.45 | 75 | 4 | 8.3 | 8.35 | 25.45 |
| SD | 1.21 | 1.01 | 1.23 | 1.50 | 8.12 | 9.11 | 4.12 | 10.81 | 3.16 | 11.45 | 4.26 | 8.27 | 0 | 1.45 | 2.41 | 2.98 |
| *P* value | <0.001 | | <0.001 | | <0.001 | | <0.001 | | <0.001 | | <0.001 | | <0.001 | | <0.001 | |

**Chart 1**

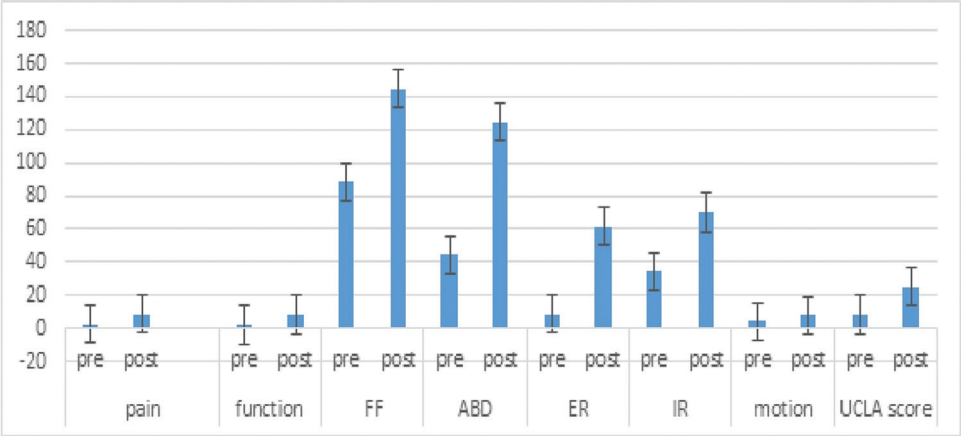



Difference in pain, function, ROM, and UCLA scores in preoperative and normal shoulder. ROM, range of motion.

**Table 2 Difference in pain, function, range of motion, and UCLA scores in preoperatively and postoperatively**

| | Pain | | Function | | FF | | ABD | | ER | | IR | | Motion | | UCLA score | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pre | Post | Pre | Post | Pre | Post | Pre | Post | Pre | Post | Pre | Post | Pre | Post | Pre | Post |
| Mean | 2.3 | 8.8 | 2.05 | 8.35 | 88.5 | 144.5 | 44.75 | 124.75 | 8.7 | 61.5 | 34.45 | 70 | 4 | 8 | 8.35 | 25.15 |
| SD | 1.21 | 1.005 | 1.23 | 1.18 | 8.12 | 8.87 | 4.12 | 6.38 | 3.16 | 7.62 | 4.26 | 9.17 | 0 | 0 | 2.41 | 1.49 |
| *P* value | <0.001 | | <0.001 | | <0.001 | | <0.001 | | <0.001 | | <0.001 | | <0.001 | | <0.001 | |

**Chart 2**

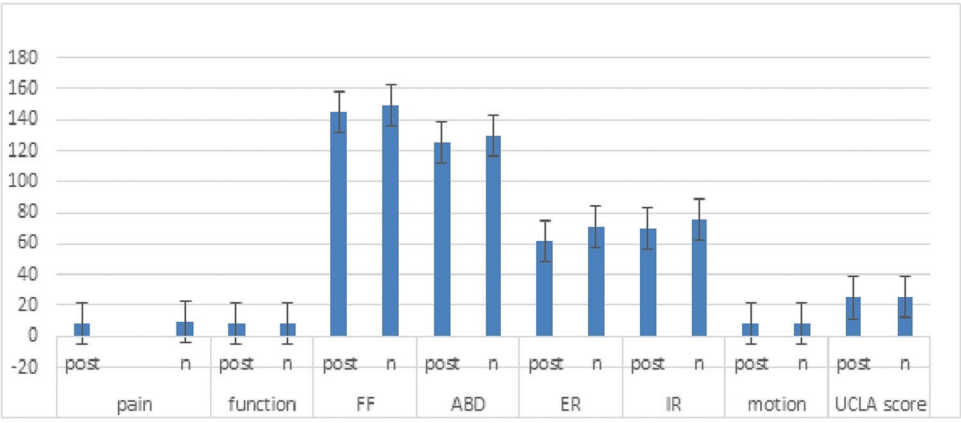



Difference in pain, function, ROM, and UCLA scores in preoperatively and postoperatively. ROM, range of motion.

**Table 3 Difference in pain, function, range of motion, and UCLA scores in postoperative and normal shoulder**

| | Pain | | Function | | FF | | ABD | | ER | | IR | | Motion | | UCLA score | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Post | *n* | Post | *n* | Post | *n* | Post | *n* | Post | *n* | Post | *n* | Post | *n* | Post | *n* |
| Mean | 8.8 | 9.2 | 8.35 | 7.95 | 144.5 | 149 | 124.75 | 129.75 | 61.5 | 70.5 | 70 | 75 | 8 | 8.3 | 25.15 | 25.45 |
| SD | 1.005 | 1.01 | 1.18 | 1.5 | 8.87 | 9.11 | 6.38 | 10.8 | 7.62 | 11.45 | 9.17 | 8.27 | 0 | 1.45 | 1.49 | 2.98 |
| *P* value | >0.001 | | >0.001 | | >0.001 | | >0.001 | | >0.001 | | >0.001 | | >0.001 | | >0.001 | |

**Chart 3**




Difference in pain, function, ROM, and UCLA scores in preoperative and normal shoulder. ROM, range of motion.

conservative treatment. During conservative treatment, the functional situation of the patient, personal characteristics, and compliance to treatment are evaluated. The treatment of FS in diabetic patients is more persistent than in nondiabetic patients [6].

Although successful clinical results have been reported with manipulation under anesthesia (MUA), pain and motion limitation might recur after the procedure. Griggs *et al.* [7] achieved a restricted ROM and less pain relief in diabetic patients after conservative

treatment. The manipulation of the shoulder joint or its hydraulic distension under anesthesia is the indirect tear of the capsule.

Some authors found that the regaining of pain relief and motion recovery was better in patients who had an arthroscopic release. In addition, clinical results with the arthroscopic direct evaluation of the shoulder joint and controlled release of the capsule have been reported [8].

These results show that arthroscopic CHL release results in a significant improvement in the range of movement and functional outcome in most patients with FS within 6 months of surgery.

Though the UCLA scoring system is generally used for the evaluation of shoulder arthroplasty, it might be used for the evaluation of other shoulder disorders. The shoulder's ROM is evaluated and objective parameters are more significant in the total score. Forward flexion, abduction, and external and internal rotation degrees are evaluated [9].

The interpretation of arthroscopic SAD findings in patients with FS can be difficult. Many comparison studies of patients who had acromioclavicular release (ACR) alone with patients who had both arthroscopic CHL and arthroscopic SAD showed that there was no significant difference in the range of movement or functional outcome postoperatively [10].

Various technical methods have been described for arthroscopic capsulotomy. While some authors prefer 360° capsulotomy, others emphasize that the release of the anteroinferior capsule is sufficient. Ogilvie-Harris and Myerthall [11] and Pollock *et al*. [12] had 79 and 83% successful results using arthroscopic anteroinferior capsulotomy.

In addition, Ogilvie-Harris and Myerthall [11] emphasized that dividing the intraarticular component of the subscapularis tendon improved external rotation.

The results of arthroscopic release may vary depending on the etiology. Pollock *et al* [12] reported a less favorable outcome in the FS of patients with diabetes than those who had idiopathic FS with the arthroscopic release.

Nicholson [13] performed total arthroscopic capsular release on 68 patients with five different etiologic reasons (41 patients with the postoperative syndrome, 17 idiopathic patients, 15 posttraumatic patients, eight diabetic, and eight primary impingement syndrome). The mean preoperative duration of symptoms was 7.3 months and the mean duration of the preoperative rehabilitation period was 3.7 months. There was a significant improvement in outcome scores and active ROM in all patients.

We performed arthroscopic CHL release and L-shaped incision of rotator interval (RI) in our patients. The release of the RI, CHL, and the anteroinferior capsule was done to obtain external rotation.Our results confirm that arthroscopic CHL release is a safe, reliable, and effective procedure that can quickly restore normal function in patients with FS.

Finally, we only assessed the functional outcomes following arthroscopic CHL, and other forms of treatment, such as MUA alone, were not evaluated. Several studies have reported good to excellent results at long-term follow-up after MUA alone for patients with resistant stiffness of the shoulder [14].

The cost of MUA is lower than that of acromioclavicular release, and it may well be that MUA is a more cost-effective procedure than acromioclavicular release for the treatment of contracture of the shoulder.

In summary, the results of this study demonstrate that arthroscopic CHL release is a very cost-effective procedure that can restore relatively normal function and improve quality of life in most patients with shoulder contracture within 6 months of surgery.

## Conclusion

Arthroscopic CHL release is an excellent tool for the treatment of FS and has become accepted in treating this process. The essential lesion is the thickened CHL and RI with the contracted capsule including the axillary pouch. These structures are treated by arthroscopic CHL and L-shaped RI release. The contracted structures released allow regain of normal ROM and better shoulder function with less pain.

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Nil.

#### Conflicts of interest

There are no conflicts of interest.

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