Arthroscopic Capsular Release In Treating Patients With Primary Frozen Shoulder

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Abstract: Introduction: Primary frozen shoulder or idiopathic adhesive capsulitis is a painful, stiff shoulder of unknown etiology. Despite this knowledge of the pathology, there is no consensus on the most favorable method of managing the disease. Suggestions for management range from supervised neglect to corticosteroids, physiotherapy, manipulation, hydrodilatation and arthroscopic capsular release. **Aim of the work**: The aim of our study was to assess the effectiveness of arthroscopic capsular release in treating patients with primary frozen shoulder. **Patients and Methods**: twelve patients with fourteen primary frozen shoulder were treated with arthroscopic capsular release of the glenohumeral joint. Of the 12 patients, there were 4 men and 8 women; the right side was affected in 7 patients, the left side was affected in 3 patients, and two patient had bilateral affection. The mean age of the patients was 48.5 years (range 39–62 years). They were assessed preoperatively, post operatively regarding to pain, range of motion and activity level. **Results:** The mean duration of follow-up was 10 months. Pain was relieved in all patients. With respect to range of motion, the mean of external rotation at 0° improved by 72°, the mean forward flexion improved by 97°, the mean of abduction improved by 125°, and the mean of internal rotation at 0° increased by 7.5° points according to the constant shoulder score. The mean improvement was 57 points There were excellent score in 9 shoulders and good score in 5 shoulders. **Conclusion:** This study with strict inclusion and exclusion criteria has demonstrated that arthroscopic capsular release is a reliable treatment option for patients with idiopathic frozen shoulder. It was found to reliable not only in restoring motion but also in eliminating pain.
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1. Introduction

The term frozen shoulder was first used in 1934 by Codman[1], who described the common features of a slow onset of pain felt near the insertion of the deltoid muscle, inability to sleep on the affected side, and restriction in both active and passive elevation and external rotation. Idiopathic adhesive capsulitis, a painful, stiff shoulder of unknown etiology that is also referred to as a frozen shoulder. Pain and stiffness in the shoulder, passing through phases of pain, pain and stiffness, stiffness and resolution, and typically leading to a functional recovery after two to three years[2,3-7]. Although there is a functional recovery, Shaffer *et al.*[8] showed that up to 50% of patients continued to have mild pain or stiffness seven years after the initial symptoms as well as a deficit in shoulder range of motion compared with the contralateral shoulder. It has a prevalence of 2% in the general population[2] It affects more women than men and is most common between the ages of thirty-five and sixty-five years[9,10].

The pathology of frozen shoulder involves active fibroblastic proliferation in the capsule of the shoulder joint, accompanied by some transformation of fibroblasts to myofibroblasts yet with a normal radiological appearance[1,11,12] There is a decrease in intra-articular volume and capsular compliance so that glenohumeral motion is limited in all planes[13]. Despite this knowledge of the pathology, there is no consensus on the most favorable method of managing the disease. Suggestions for management range from supervised neglect to corticosteroids, physiotherapy, manipulation, hydrodilatation and arthroscopic capsular release[14]. Surgical interventions include open release, manipulation under anesthesia, arthroscopic capsular release, and combinations of open or arthroscopic capsular release with manipulation under anesthesia[2,4,6]. Arthroscopic capsular release was first described, as far as we know, in 1979 by Conti [15], and has been favored over manipulation under anesthesia as it is believed to allow a more controlled and complete release of the contracted capsule, to reduce the chance of fracture[7], and to provide more immediate improvement[8].

Aim of the work

The aim of our study was to assess the effectiveness of arthroscopic capsular release in treating twelve patients with primary frozen shoulder.

2. Patients and methods

Between June 2008 and October 2012, we performed arthroscopic capsular release for 12 patients with primary frozen shoulders in Zagazig University Hospitals.

Inclusion and Exclusion Criteria

The criteria for a diagnosis of primary frozen shoulder were (1) a painful stiff shoulder for at least four weeks; (2) restriction of passive external rotation

of at least 50% compared with the contralateral shoulder; (3) difficulty using the affected arm, with restriction of movement and loss of function; and(4) pain at night causing a sleep disturbance and inability to lie on the affected side[5,8].

The exclusion criteria included (1) evidence of glenohumeral joint arthritis at the primary procedure, (2) a full-thickness rotator cuff tear, (3) any fracture involving the shoulder girdle, (4) diabetes (5) previous surgery to the involved shoulder because the rehabilitation protocol is different from only capsular release. Arthroscopic capsular release was performed if there is no response to conservative treatment (NSAID, physiotherapy, local corticosteroid injection) for at least 3 months.

Of the 12 patients, there were 4 men and 8 women; the right side was affected in 7 patients, the left side was affected in 3 patients, and two patients had bilateral affection. The mean age of the patients was 48.5 years (range 39–62 years). The preoperative range of motion was examined and measured with the patient seated with scapular fixation.

Radiologic assessment

Plain radiographs were performed as a routine in all patients. Anteroposterior (AP) view and AP view in maximum abduction were performed; no significant finding was detected in AP view except for osteopenia in 3 patients.

MRI was not performed routinely in all patients but if other pathology was suspected to present. Five patients with primary frozen shoulder had already undergone MRI; the MRI showed indistinct edematous inferior capsule (axillary pouch) on T2WI on coronal and axial images, with thickening and increased signal on T2WI of rotator interval, with intact labrum and rotator cuff muscles.

Operative Procedure and Rehabilitation

Following general anesthesia, patients were positioned in the beach-chair position for arthroscopy. The passive shoulder motion was assessed as detailed above. Injection of adrenaline saline in the ratio of 1: 200 000 in the glenohumeral and infiltrate the entry root after sterilization of the operative field.

An arthroscopic capsular release was initiated by inserting an arthroscope into the glenohumeral joint via a standard posterior portal. An anterior portal was established under direct vision with use of a spinal needle lateral to the coracoid process. The portal was established just superior to the superior border of subscapularis. A spinal needle was utilized to ensure that instruments could access the inferior capsule and, if possible, the posterior capsule. Then, diagnostic shoulder arthroscopy was initially performed. In all patients, the typical findings of frozen shoulder were present, the joint volume was reduced, the rotator interval was filled with fibrotic tissue, Inflamed hypertrophied synovium and the intra-articular part of the long head of the biceps tendon showed inflammation without mechanical damage **(Fig.1)**. Through this opening using radiofrequency probe, the anterior and inferior capsule were cut lateral to the glenoid labrum. The tissue in the rotator interval was released to the anterior border of the long head of the biceps muscle and medially to the base of the coracoid process under direct vision **(Figs.2,3)**. We began the release superiorly with the coracohumeral and superior glenohumeral ligament. Thereafter, we continued the release until the coracoid and the conjoint tendon were visualized to insure that the coracohumeral ligament has been completely divided. Subscapularis tendon sheath was also divided to improve shoulder motion outcomes in persistent limited external rotation. Through the same anterior portal the inferior and posterior aspects of the capsule were released if there still limited internal rotation and abduction, to achieve a complete 360° release **(Fig.4)**. After the release, the arthroscope was removed, a gentle manipulation was performed, and shoulder motion was assessed. The portals were closed, and the shoulder was dressed with a soft bulky dressing. Postoperative analgesia was obtained by repeat lidocaine hydrochloride injection through interscalien root that was performed preoperatively **(Fig.5)** The extent of the release and the shoulder motion were recorded on a specifically designed, standardized form. Patients were discharged on the day of the surgery without a sling.

Postoperative rehabilitation

All patients were referred to physiotherapy from the second day postoperative where they started range of motion exercises. In addition, we learned the patients exercises to be performed at home.

All patients were followed up in the outpatient clinic at weekly interval for the first 4 weeks postoperative, then at monthly interval until the end of the follow-up period **(Fig 6)**. Results were evaluated according to the Constant shoulder score[16,17] (Table I).

Fig. 1:Iinflamed tissues in frozen shoulder

Fig.2: Anterior capsular release

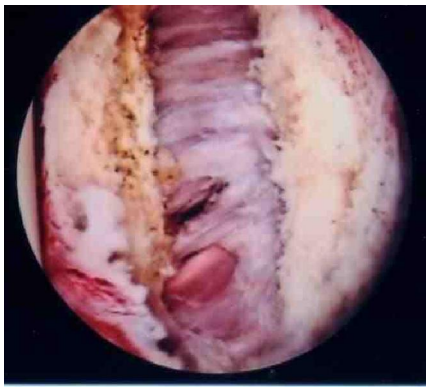

Fig. 3:Iinferior capsular release

Fig.4: Posterior capsular release

Fig. 5: Catheter for lidocaine hydrochloride injection through interscalien root

A 

Preoperative external rotation

B 

Preoperative abduction

C 

Preoperative internal rotation

D 

Early Postoperative rehabilitation

E 

Postoperative external rotation

F 

postoperative abduction

G 

Postoperative internal rotation

Fig.6 (case No. 4): Female patient 45 years old with primary frozen shoulder treated by arthroscopic capsular release

I: Preoperative and postoperative range of motion of left shoulder compared to the right side

Table 1:Constant shoulder score

Answer all questions, selecting just one unless otherwise stated

During the past 4 weeks.....

1. Pain

- Severe
- Moderate
- Mild
- None

2. Activity Level (check all that apply)

- Unaffected Sleep: yes / no
- Full Recreation/Sport: yes / no
- Full Work: yes / no

3. Arm Positioning

- Up to Waist
- Up to Xiphoid
- Up to Neck
- Up to Top of Head
- Above Head

4. Strength of Abduction [Pounds]

- 0
- 1-3
- 4-6
- 7-9
- 10-12
- 13-15
- 15-18
- 19-21
- 22-24
- >24

RANGE OF MOTION

5. Forward Flexion

- 31-60 degrees
- 61-90 degrees
- 91-120 degrees
- 121-150 degrees
- 151-180 degrees

6. Lateral Elevation

- 31-60 degrees
- 61-90 degrees
- 91-120 degrees
- 121-150 degrees
- 151-180 degrees

7. External Rotation

- Hand behind Head, Elbow forward
- Hand behind Head, Elbow back
- Hand to top of Head, Elbow forward
- Hand to top of Head, Elbow back -
- Full Elevation

8. Internal Rotation

- Lateral Thigh
- Buttock
- Lumbosacral Junction
- Waist (L3)
- T12 Vertebra
- Interscapular (T7)

Grading the Constant Shoulder Score (Difference between normal and Abnormal Side)

>30	Poor	21-30	Fair	11-20	Good	<11	Excellent

3. Results

All the twelve patients were available for follow up the mean duration of follow-up was 10 months (range 6-19 months). The ratio of right-side to left-side affection was 9 : 5. In all, 12 patients with 14 shoulders had severe pain affecting their sleep according to the constant shoulder score preoperatively, There was a marked improvement in pain postoperatively; 10 patients had no pain, whereas 2 patients with three shoulders had mild pain. With respect to range of motion, the mean of external rotation at 0°improved by 72°, the mean of flexion improved by 97°, the mean of abduction improved by 125°, and the mean of internal rotation at 0°increased by 7.5 points according to the constant shoulder score **(Table 2)**.

At the end of follow up period all patients were evaluated according The constant shoulder score. The mean improvement was 52 points There were excellent score in 9 shoulders and good score in 5 shoulders.

Table 2: Preoperative and postoperative mean range of motion

Mean range of motion	Preoperative	Postoperative
External rotation at 0	4°	76°
Forward flexion	70°	167°
Abduction	40°	165°
Internal rotation (constant shoulder score)	1.5 points	9 points

4. Discussion

Frozen shoulder is a disease that causes pain, affects daily activities negatively, and may restrict shoulder functions drastically[18]. It is a common problem that remains difficult to diagnose and difficult to treat [19]).

The natural history of frozen shoulder is ill understood but is not as benign as Codman suggested in 1934[1]. A number of studies[20-25] have evaluated the short-term results of nonoperative management of frozen shoulder. At two years, most patients who had non-operative treatment had significant improvement, but the shoulders were not normal.

This study has identified patients with arthroscopically proven frozen shoulder. The clinical diagnosis of frozen shoulder can be misdiagnosed as other conditions such as mild arthritis and stiffness secondary to rotator cuff disease. These secondary causes can only be excluded by arthroscopy[26]. Our study is mad with12 patients undergoing arthroscopic capsular release for isolated proven stage II (severe pain and stiffness) idiopathic frozen shoulder.

Night pain is a key component of frozen shoulder and the main indication for intervention. In this study, all patients stated that the surgery allowed them to have an uninterrupted night's sleep. The purpose of any intervention in stage II idiopathic frozen shoulder must be to shorten the natural history of the disease process. For an intervention to have any use it must show rapid improvement (pain free, sleeping and moving within 1–2 weeks) and there is no purpose in demonstrating improvement at one year's follow-up in a condition where the natural history is for subjective improvement in at least 50% of patients without any treatment[5,25].

With the advances in arthroscopic surgery, arthroscopic capsular release has been shown to be a useful tool in the treatment of resistant frozen shoulder. It is a minimally invasive method aimed at pathologic tissue; it allows precise and controlled release of the capsule and ligaments, reducing the potential complications of a more traumatic manipulation. Intensive and precise arthroscopic debridement of the inflamed tissue or other associate pathology and control of any potential hemarthrosis would relieve the postoperative pain significantly[27,28].

The CHL and rotator interval were recognized as the major affected area in frozen shoulder so the rotator interval and the anterior capsule should be released to restore passive external rotation and abduction[29-31].

Pearsall *et al.*[32] recommended releasing the intraarticular subscapularis tendon without significant morbidity. In our study we only released the subscapularis tendon sheath in cases in which the external rotation still affected after anterior capsular release. Although Many authors have recommended release of the posterior capsule, We did not routinely perform it except in 4 patients that still present limited passive internal rotation intra-operatively.

There was a marked improvement in pain post-operatively, with improvement in all range of movements in all patients with no associated postoperative complications.

This study confirmed that arthroscopic capsular release resulted in significant reduction in pain severity and frequency at the follow up period with no complications.

With continued significant improvement in overall shoulder function, relief of shoulder stiffness, and relief of difficulty in reaching behind the back or above the head. Another important finding was the continued significant relief in terms of the severity and frequency of pain with activity, at rest, and when trying

to sleep. These data are consistent with short-term outcome studies on arthroscopic capsular release for adhesive capsulitis[34, 35].

Potential complications of this arthroscopic capsular release include axillary nerve injury, infection, and iatrogenic chondral injury from the insertion of the arthroscope[36]. In the present study, these complications were not observed. No patient had iatrogenic arthritis.

In one study of Warner[33]in 23 patient and follow up period 24–64 months the mean improvement in constant shoulder score is 48 points which is near our results in which the mean improvement according to CSS is 52 points.

Our results is comparable to the study Abdelrahman and Morsi[37] with an average follow-up period of 6 months among 39 patients. with respect to pain improvement and improvement of movement in all directions and the final evaluation according to the constant shoulder score.

Conclusions

This study with strict inclusion and exclusion criteria has demonstrated that arthroscopic capsular release is a reliable treatment option for patients with idiopathic frozen shoulder It was found to reliable not only in restoring motion but also in eliminating pain. This is an effective procedure with minimal complications.

References

1. Codman EA. Tendinitis of the Short Rotators. In: Codman EA. The shoulder: Rupture of the Supraspinatus Tendon and Other Lesions in or about the Subacromial Bursa. Boston: Thomas Todd; 1934.
2. Tasto JP, Elias DW. Adhesive capsulitis. J Sports Med Arthrosc. 2007;15: 216-21.
3. Diwan DB and Murrell GA. An evaluation of the effects of the extent of Capsular release and of postoperative therapy on the temporal outcomes of adhesive capsulitis. J Arthroscopy. 2005; 21: 1105-13.
4. Warner JJ. Frozen shoulder: diagnosis and management. J Am Acad Orthop Surg. 1997; 5:130-40.
5. Hand C, Clipsham K, Rees JL and Carr AJ. Long-term outcome of frozen shoulder J Shoulder Elbow Surg. 2008; 17:231-6.
6. Galarraga B. Adhesive capsulitis of the shoulder: a review article. J CPD Rheumatol 2002;3:54-8.
7. Dias R, Cutts S and Massoud S. Frozen shoulder. BMJ. 2005;331:1453-6.
8. Shaffer B, Tibone JE and Kerlan RK. Frozen shoulder. A long-term follow- up. J Bone Joint Surg Am. 1992;74:738-46.
9. Hannafin JA and Chiaia TA. Adhesive capsulitis. A treatment approach. J Clin Orthop Relat Res. 2007;372:95-109.
10. Rodeo SA, Hannafin JA, Tom J, Warren RF and Wickiewicz TL. Immunolocalization of cytokines and their receptors in adhesive capsulitis of the shoulder. J Orthop Res. 1997;15:427-36.
11. Bunker TD and Anthony PP. The pathology of frozen shoulder. A Dupuytren-like disease. J Bone Joint Surg Br 1995; 77: 677–683.
12. Hand GC, Athanasou NA, Matthews T and Carr AJ. The pathology of frozen shoulder. J Bone Joint Surg Br 2007; 89: 928–932.
13. Lundberg BJ. The frozen shoulder. Clinical and radiographical observations. The effect of manipulation under general anesthesia. Structure and glycosaminoglycan content of the joint capsule. Local bone metabolism. J Acta Orthop Suppl Scand.1969;119:1-59.
14. Neviaser AS and Hannafin JA. Adhesive capsulitis: a review of current treatment. Am J Sports Med 2010; 38: 2,346–2,356.
15. Conti V. Arthroscopy in rehabilitation. J Orthop Clin North Am. 1979;10:709-11
16. Constant CR and Murley AH. A clinical method of functional assessment of the shoulder. J Clin Orthop Relat Res. 1987 Jan;(214):160-4
17. Fabre T, Piton C, Leclouerec G, Gervais-Delion F, Durandeau A. Entrapment of the suprascapular nerve. J Bone Joint Surg Br. 1999 May;81(3):414-9.
18. Ozbaydar MU, Tonbul M, Altun M and Yalaman O. Arthroscopic selective capsular release in the treatment of frozen shoulder. J Acta Orthop Traumatol Turc 2005; 39:104–113.
19. Jerosch J. Three hundred and sixty degrees arthroscopic capsular release in patients with adhesive capsulitis of the glenohumeral joint indication, surgical technique, results. J Knee Surg Sports Traumatol arthrosc 2001; 9:178–186
20. Rhind V, Downie WW, Bird HA, Wright V and Engler C. Naproxen and indomethacin in periarthritis of the shoulder. J Rheumatol Rehabil. 1982;21:51-3.
21. Rizk TE, Gavant ML and Pinals RS. Treatment of adhesive capsulitis (frozen shoulder) with arthrographic capsular distension and rupture. J Arch Phys Med Rehabil. 1994;75:803-7.
22. Buchbinder R, Green S, Forbes A, Hall S and Lawler G. Arthrographic joint distension with saline and steroid improves function and reduces pain in patients with painful stiff shoulder: results of a randomised, double blind, placebo controlled trial. J Ann Rheum Dis. 2004;63:302-9.
23. Buchbinder R, Hoving JL, Green S, Hall S, Forbes A and Nash P. Short course prednisolone

for adhesive capsulitis (frozen shoulder or stiff painful shoulder): a randomized, double blind, placebo controlled trial. J Ann Rheum Dis. 2004;63:1460-9.
24. Bulgen DY, Binder AI, Hazleman BL, Dutton J and Roberts S. Frozen shoulder: prospective clinical study with an evaluation of three treatment regimens. J Ann Rheum Dis. 1984;43:353-60.
25. Griggs SM, Ahn A and Green A. Idiopathic adhesive capsulitis. A prospective functional outcome study of nonoperative treatment. J Bone Joint Surg Am. 2000; 82:1398-407.
26. Harryman DT, Matsen FA and Sidles JA. Arthroscopic management of refractory shoulder stiffness. J Arthroscopy 1997; 13: 133–147.
27. Snow M, Boutros I and Funk L. Posterior arthroscopic capsular release in frozen shoulder. J Arthroscopy 2009; 25:19–23.
28. Chen J, Chen S, Li Y, Hua Y and Li H. Is the extended release of the inferiorglenohumeral ligament necessary for frozen shoulder? J Arthroscopy 2010;26:529–535.
29. Yamaguchi K, Sethi N and Bauer GS. Postoperative pain control following arthroscopic release of adhesive capsulitis: a short-term retrospective review study of the use of an intra-articular pain catheter. J Arthroscopy 2002; 18:359–365.
30. Harryman DT, 2nd, Sidles JA, Harris SL, Matsen FA, 3rd. The role of the rotator interval capsule in passive motion and stability of the shoulder. J Bone Joint Surg Am 1992; 74:53–66.
31. Pearsall AW4th, Osbahr DC and Speer KP. An arthroscopic technique for treating patients with frozen shoulder. J Arthroscopy 1999; 15:2–11.
32. Pearsall AW, Holovacs TF and Speer KP. The intra-articular component of the subscapularis tendon: anatomic and histological correlation in reference to surgical release in patients with frozen-shoulder syndrome. J Arthroscopy 2000; 16:236–242.
33. Warner JJ, Allen A, Marks PH and Wong P. Arthroscopic release for chronic, refractory adhesive capsulitis of the shoulder. J Bone Joint Surg Am 1996; 78:1,808–1,816.
34. Murrell GA and Warren RF. The surgical treatment of posterior shoulder instability. J Clin Sports Med. 1995;14:903-16.
35. Berghs BM, Sole-Molins X and Bunker TD. Arthroscopic release of adhesive capsulitis. J Shoulder Elbow Surg. 2004;13:180-5.
36. Weber M, Prim J, Bugglin R, Michel BA and Gerber H. Long-term follow up to patients with frozen shoulder after mobilization under anesthesia, with special reference to the rotator cuff. J Clin Rheumatol. 1995;14:686- 91.
37. Abdelrahman A and Morsi A: Arthroscopic rotator interval release for frozen shoulder Egyptian Orthopedic Journal 2014, 49:6–10.

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