SHORT TERM RESULTS AFTER ARTHROSCOPIC SYSTEMATIC CAPSULAR RELEASE OF ADHESIVE CAPSULITIS

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ABSTRACT

Background: Adhesive capsulitis of the shoulder, also referred to as frozen shoulder, is a condition characterized by the spontaneous onset of shoulder pain and the global limitation of both active and passive ranges of motion. Arthroscopic release for frozen shoulder resulted in a persistent reduction in pain severity and frequency as well as in improvements in shoulder range of motion.

Aim of the study: The aim of this study was to evaluate the clinical improvement after use of arthroscopic capsular release in shoulder adhesive capsulitis postoperative surgery and to assess the rate of post operative complications.

Patients and methods: This was a prospective cohort study. A total of 18 Egyptian patients with Frozen shoulder recruited and treated by Arthroscopic capsular release, before each consultation (preoperative evaluation and 1 week, 6 weeks, 12 weeks, and 24 weeks of follow-up), each patient was asked to complete a standardized questionnaire evaluating shoulder pain and function. We assessed range of motion compared with the opposite side and assessed the post-operative complications during follow up.

Results: With a median age of 51.1±5.91 and a maximum age of 65, males accounted for 38.9 percent and females 61.1 percent. Duration of disease was distributed as 11.93±4.10 with minimum 8 and maximum 24 months, regard site 44.4% were right and 55.6% were left, and 55.6% were affected in their dominant hand. Activity level significantly increased from 11.77±2.64 to 18.66±1.08. Pain (constant score) significantly increased from 5.94±1.43 to 13.44±2.66 (i.e pain decrease). Only 4 cases had complication 22.2% (1 case with infection and Three cases stiffness). Eleven cases with excellent (61.1%) followed by good (22.2%) then Fair 11.1% and only one poor with 5.6%.

Conclusion: Arthroscopic treatment is effective in adhesive capsulitis of the shoulder, resistant to conservative treatment with low rate of post-operative complications.

Key words: Arthroscopic Capsular Release, Adhesive Capsulitis of Shoulder.

I. INTRODUCTION:

Adhesive capsulitis of the shoulder, also referred to as frozen shoulder, is a condition characterized by the spontaneous onset of shoulder pain and the global limitation of both active and passive ranges of shoulder motion. Although the exact etiology of adhesive capsulitis is still unknown, some refer to: Systemic diseases as, Diabetes, Hyperthyroidism, Hypothyroidism, Cardiovascular disease, T.B, Parkinson’s disease, Hyperlipidemia, Hypoadrenalism, COPD. And Traumatic causes as, post shoulder surgery, Rotator cuff tear, Calcified tendinitis.

Adhesive capsulitis has a prevalence ranging from 2% to 4% in orthopedic outpatients clinics. This condition is more common in female, starting in middle age with a peak onset at 55 years (ranging from 45 to 60 years).
The primary goal of management is to control pain and restore or improve shoulder range of motion. Physical therapy combined with a home exercise program is considered the basis of management. (4)

Adhesive capsulitis tends to occur in 3 consecutive clinical stages. The first stage (Freezing stage) is characterized by pain and limitation of shoulder movement. The pain characteristically increase at night. During the second stage (Frozen stage), patients experience a gross reduction in all glenohumeral movements, most significantly external rotation. The final recovery stage (Thawing stage) involves spontaneous improvement in range of movement. The entire process will often resolve after approximately 2 years; however, pain and a limitation in range of motion may persist indefinitely. (5)

Non-operative treatments of adhesive capsulitis include some medications as analgesia and anti-inflammatory drugs, physical therapy, and intra-articular steroid injections. Although these treatments may reduce pain, they have not been shown to accelerate the recovery. (6)

Operative treatment for adhesive capsulitis include, Manipulation under anesthesia, open release, and arthroscopic release. Arthroscopic release of the rotator interval, tight (MGHL) middle glenohumeral ligament and the tight intra-articular structures may restrict pain and improve the range of movement. However iatrogenic shoulder instability could complicate this procedure. (7)

Arthroscopic release for frozen shoulder resulted in a persistent reduction in pain severity and frequency as well as in improvements in shoulder range of motion as many as 7 years after arthroscopic release (range, 5-13 years). Several other studies have shown good outcomes more than 1 year after capsular release for adhesive capsulitis. Capsular release can, however, result in iatrogenic instability. (8,9)

We aimed at this study to evaluate the clinical improvement after use of arthroscopic capsular release in shoulder adhesive capsulitis postoperative surgery and to assess the rate of post operative complications.

II. PATIENTS AND METHODS:

2.1 The current study was conducted as a prospective cohort study. A total of 18 Egyptian patients with Frozen shoulder recruited and treated by Arthroscopic capsular release. They were collected from Orthopedic Department Zagazig University hospital during the period from 2-2021 to 8-2021 treated by Arthroscopic capsular release after obtaining the approval of the institutional review board (IRB) of Zagazig University.

2.2. A consent form approved by the committee of human rights in research in Zagazig University was obtained from each participant before the study initiation.

2.3. Patients who were included in this study had adhesive capsulitis of the shoulder and admitted to surgery for an arthroscopic capsular release, idiopathic frozen shoulder {With no history of major trauma, infection, or surgery around the affected shoulder}, with painful limitation of both active and passive range of motion of the shoulder, and patients who were not responding to non-operative management.

2.4. All patients who had post-surgical and post traumatic shoulder stiffness, patients who had shoulder pathology as, osteoarthritis, rheumatoid arthritis, T.B, and tumor or avascular necrosis had been excluded from the study.

2.5. The patients who met the inclusion criteria and were suitable candidates for the study have been subjected to:

1. Complete history taking:
Name, age, sex, causes and duration of symptoms, any previous treatment or surgical intervention, any medical comorbidity and medication

2. Thorough clinical examination.

3: laboratory investigations: Liver and kidney function tests; a viral screen; and Coagulation studies (PT/PTT). Random blood sugar and Completed blood picture were done.
4: **Radiological evaluation:** Plain X-ray shoulder joint and AP, lateral views, and MRI shoulder.

5: **Surgical technique:**

B Preoperative antibiotic prophylaxis: broad spectrum antibiotics in the form of intravenous cephalosporin were administered during induction of anesthesia.

A. **Anesthesia:**

General anesthesia or combined GA with interscalen block according to the anesthesia specialist.

**Figure (1): Basic requirements of this technique**

The whole procedure was represented in seven steps:

B. **Step 1: Position the Patient**

The patient was placed either in the lateral decubitus position or in the beach-chair position, depending on one’s preference and facility.

In our study we use beach chair position: The patient was placed under anesthesia before the final positioning. With the patient in the beach chair position.

**Beach chair position (figure 2):**

Either general anesthesia, interscalene block, or a combination can be used. The head is either secured in a commercially available head holder or secured with tape to the operating table. A roll of towels is placed behind the medial scapula to stabilize the shoulder joint. The trunk is flexed to approximately 45°. The legs are lowered, and the knees are flexed to 30°. The arm is positioned in about 20°–30° of abduction. The operative arm is left free or placed in a commercially available holder, and the eyes and different parts of the head are secured, or they are covered. The healthy arm is put on an arm board, or set in a sling. In the event that a “beach chair” working table is utilized, a bit of the back of the table can be evacuated to reach the back shoulder.
Figure (2): Beach chair position

Patient preparation:
The whole extremity was scrubbed from the fingers to the base of the neck, including the axilla and side of the chest. The patient was then draped leaving only the affected arm exposed from the base of the neck to below the elbow.

Step 2: Portal Placement
Created a standard posterior viewing portal, an anterior portal, and a lateral portal for approaching the glenohumeral joint and the subacromial space.

Basic arthroscopic portals and anatomic landmarks are marked out prior to the procedure (figure 3A and B). Anatomic landmarks include the acromion, clavicle, AC joint, and coracoid process.

Figure (3) Portal locations are marked on the right shoulder. A = posterior portal, B = lateral portal, C = the anterior portal, D=coracoid, E=clavicle, F=acromion

Posterior Portal
Created a standard posterior viewing portal. The posterior portal is the first portal made during the arthroscopy that allows adequate visualization of the entire glenohumeral joint.

One hand is placed on top of the shoulder with the thumb in the “soft spot” posteriorly and the index finger on the coracoid anteriorly. This provides the correct orientation for entry.

Enter between the infraspinatus and teres minor muscles.
A small vertical incision was made 2 to 3 cm inferior and 1 to 2 cm medial to the posterolateral corner of the acromion. For correct access to the glenohumeral joint, aimed the direction of the trocar toward the coracoid process (Fig. 3-B). After the introduction of the trocar through the capsule, a popping sensation could be felt as the joint is entered. In a patient with severe stiffness, it is somewhat difficult for the trocar to enter the glenohumeral joint. Feeling the trocar tip placed between the humeral head and glenoid allowed the correct placement of the portal within the glenohumeral joint. After proper placement of the trocar, diagnostic arthroscopy was performed.

Routine diagnostic glenohumeral arthroscopy was performed, and pathological changes on the biceps, synovium, labrum, capsule, ligaments, and rotator cuff were recorded. Fig (4).

Fig (4). Diagnostic arthroscopy is performed on the right shoulder with posterior viewing portal showing capsulitis and capsular thickening. 1, humeral head; 2, subscapularis; 3, glenoid.

**Anterior Portal**

- An anterior portal was created by either an outside-in or an inside-out technique.

- The outside-in technique was performed under the visualization of the arthroscope from the posterior portal. Introduced an 18-gauge spinal needle 1 to 2 cm inferomedial to the anterolateral corner of the acromion just lateral to the tip of the coracoid process. Care was taken to avoid damaging the brachial plexus and the axillary vessels which located inferomedially. Placing the anterior portal too inferiorly may damage the musculocutaneous nerve and cephalic vein.

- The inside-out technique was performed by advancing the arthroscope toward the rotator interval just below the biceps tendon across the glenoid. Holding the cannula firmly, withdraw the arthroscope and inserted a switching stick through the posterior portal. As advancement of the stick leads to skin tenting, a small stab incision was made at the tip of the stick, which enables the stick to pass through the skin incision. Insert a cannula over the stick and gently advance it until the capsule is penetrated.

Figure(5) Anterior Portal

**Lateral Portal**

- A lateral portal was used to approach the subacromial space. Usually, it is used as a working portal for addressing the acromio-clavicular joint pathology including resection of the distal end of the clavicle and acromioplasty. However, in the case of shoulder stiffness, it is used as a viewing portal for the visualization of the coracoid process and the superoanterior portion of the subscapularis.
- A skin incision 2 cm was made lateral to the anterolateral edge of the acromion. Prior insertion of the spinal needle is helpful for the appropriate placement of the portal. Placing the portal too inferiorly may damage the axillary nerve, as it lies approximately 3 cm distal to the anterolateral margin of the acromion.

**Step 3: Remove Rotator Interval Tissue**

Begin the capsular release with the rotator interval and the middle glenohumeral ligament using a 3.0-mm 90° electrocautery device through the anterior portal.

After removing the interval tissue, the process superiorly started with resection of the superior glenohumeral ligament and coracohumeral ligament. The removal of tissue continued until the vertically oriented fibers of the coracoacromial ligament and conjoined tendon were visualized.

**Figure (6).** Arthroscopic images of right shoulder demonstrate completed 360° capsular release from the posterior viewing portal (A) anteriorly and (B) inferiorly. (C) The posterior release is viewed from the anterior portal. 1, humeral head; 2, subscapularis; 3, glenoid; 5, long head of the biceps tendon.

**Step 4: Release the Anterior Capsule**

Started the anterior capsular release below the long head of the biceps tendon origin and preserve the glenoid labrum.

- The middle glenohumeral ligament was resected or divided without damaging the subscapularis tendon.

- The hypertrophied capsule dissected carefully without injuring the subscapularis.

- To avoid damage to the subscapularis, the tip of the electrocautery device faced the articular side during the process continued the capsular release down to the 7 o’clock (right) or 5 o’clock (left) position, involving both the anterior and posterior bands of the inferior glenohumeral ligament.
Figure (7). Capsular release is performed on a right shoulder. The steps of the release are shown. (A) A posterior viewing portal is used with an anterior working portal to begin by releasing the rotator interval with a radiofrequency (RF) device. (B) The rotator interval is released from the biceps tendon to the superior edge of the subscapularis tendon and down to the coracoid. (C) The anterior superior capsule is released above the biceps without damaging the underlying supraspinatus. (D) The RF and shaver are used to then release the anterior capsule lying posterior to the subscapularis until the subscapularis muscle is visualized. (E, F) At the inferior position, we use an arthroscopic basket, which we find provides a more precise release to decrease potential damage to the nearby axillary nerve. The camera is switched to view from anteriorly in order to complete the posterior release. (G) The shaver and RF are used to complete the posterior superior capsular release. (H) The RF device is used to continue the posterior release inferiorly. (I) We prefer to use a basket to complete the most inferior capsular release.

1, humeral head; 2, subscapularis; 3, glenoid; 4, coracoid; 5, long head of the biceps tendon; 6, anterior superior capsule beneath the supraspinatus; 7, anterior inferior capsule; 8, posterosuperior capsule; 9, posterior capsule; 10, posterior inferior capsule.

Step 5: Release the Inferior Capsule

As the electrocautery device may not reach the inferior portion of the inferior glenohumeral ligament, switch the working portal to the posterior portal for an easier approach to the inferior portion.

- After switching the portal, use the anterior portal as a viewing portal and the posterior portal as a working portal. From the posterior portal, the approach to the posterior portion of the inferior capsule is much easier.

- Starting from the previously released anterior capsule, extend the process to the 7 o’clock (right shoulder) and 5 o’clock (left shoulder) position of the inferior capsule. The release should be extended over the posterior band of the inferior glenohumeral ligament.

- To avoid axillary nerve damage, perform the capsular release just off the glenoid rim without violating the glenoid labrum, the closest distance between the axillary nerve and the glenoid, ranging from 10 to 25 mm, was with the arm in the neutral position, and the greatest distance was with the arm in abduction-neutral position. Therefore, we believe that axillary nerve damage can be prevented if the electrocautery tip stays within 10 mm of the glenoid rim. Also, the electrical conduction of the electrocautery discharge through the local tissues will stimulate the axillary nerve when it is in proximity so that damage can be prevented prior to direct injury.

Step 6: Release the Coracohumeral Ligament.

Begin this procedure with the camera in the lateral portal viewing the anterior portion of the subdeltoid space.
• Use the anterior portal as a working portal. Using the electrocautery device, find the base of the coracoid process. The part of the coracohumeral ligament that originates from the coracoid process and extends to the rotator interval is mostly removed during the process of rotator interval tissue removal. However, the coracohumeral ligament also extends over to the superior part of the subscapularis muscle and covers a broad area of the anterior surface of the subscapularis.

• For the complete release of the coracohumeral ligament, thoroughly examine and debride the anterior and superior portion of the subscapularis.

• Concomitant pathologies such as partial tear of the articular surface of rotator cuff and biceps lesions were simultaneously addressed.

• After fishing, insertion of drain, stitching the wound and dressing applied.

**Step 7: Postoperative Rehabilitation**

Postoperative Protocol,

The patient is placed into a standard arm sling and discharged on the same day of surgery to home. Range of motion is immediately encouraged. The sling is discontinued on postoperative day 1. Outpatient physical therapy begins on postoperative day 1.

The goal for the patient is to achieve an immediate range of motion by performing active-assisted and passive range-of-motion exercises, including pendulum circumduction or the pulley exercise.

• Active-assisted and passive range-of-motion exercises can be started on the first postoperative day. If a simultaneous rotator cuff repair or reconstruction is performed, only gentle passive range-of-motion exercise is recommended, with the application of an abduction brace. For such patients, we also recommend that pulley exercises be started four weeks after the surgery.

• The patient is instructed in a home-based exercise program and is encouraged to perform the exercises at least three times daily. Starting on the first day after the operation, pendulum circumduction, including gentle passive range-of-motion exercise, is done within a painless range. Pulley exercises are prescribed to increase flexion after one week. When the passive shoulder range of motion is restored to 90% of the normal range, isometric exercises in all planes are recommended.

• It is important that the range-of-motion exercises of the shoulder joint should not exceed the pain threshold of the patient. If the motion exercises are done forcibly with pain felt in the shoulder joint, there is a new tendency for stiffness to occur. Therefore, absence of pain may be considered as an indication that adequate physiotherapy is being received.

• Advanced muscle strengthening exercises using dumbbells. We recommended that the patient continue to perform all of these exercises regularly until the last visit at six months. No limit is imposed on the use of the shoulder within a tolerable extent.

**Follow up:**

Before each consultation (preoperative evaluation and 1 week, 6 weeks, 3 months, and 6 months of follow-up), each patient had been assessed clinically for range of motion and for post-operative complication occurrence.

**2.6. Statistical analysis:**

Data collected throughout history, basic clinical examination, laboratory investigations and outcome measures coded, entered and analyzed using Microsoft Excel software. Data were then imported into Statistical Package for the Social Sciences (SPSS version 20.0) (Statistical Package for the Social Sciences) software for analysis. According to the type of data qualitative represent as number and percentage, quantitative continues group represent by mean ± SD, the following tests were used to test differences for significance; Differences between quantitative paired by paired t. P value was set at <0.05 for significant results & <0.001 for high significant result. Data were collected and submitted to statistical analysis.
III. RESULTS:

With a median age of 51.1±5.91 and a maximum age of 65, males accounted for 38.9 percent and females 61.1 percent (Figure 8).

Duration of disease was distributed as 11.93±4.10 with minimum 8 and maximum 24 months, regard site 44.4% were right and 55.6% were left, and 55.6% were affected in their dominant hand (Table 1).

Activity level significantly increased from 11.77±2.64 to 18.66±1.08 (Table 2).

Pain constant score significantly increased from 5.94±1.43 to 13.44±2.66 (Figure 9).

Only 4 cases had complication 22.2% (1 case with infection and Three cases stiffness) (Table 3).

11 cases with excellent (61.1%) followed by good (22.2%) then Fair 11.1% and only one poor with 5.6%. (Table 4).

![Figure (8): Age and sex distribution among studied group](image)

**Table (1): characters distribution for affected shoulders.**

<table>
<thead>
<tr>
<th>Duration /M</th>
<th>Mean± SD</th>
<th>11.93±4.10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median (Range)</td>
<td>14.0 (8-24)</td>
<td></td>
</tr>
</tbody>
</table>

| Site | LT | 9 | 55.6 |
| RT | 9 | 44.4 |

| Affected dominant hand | -VE | 8 | 44.4 |
| +VE | 10 | 55.6 |
| Total | 18 | 100.0 |

**Table (2): Activity level distribution pre and at last follow up**

<table>
<thead>
<tr>
<th>Activity level</th>
<th>Pre</th>
<th>Last follow up</th>
<th>Paired t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.77±2.64</td>
<td>18.66±1.08</td>
<td>11.501</td>
<td>0.00**</td>
<td></td>
</tr>
</tbody>
</table>

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Figure (9): Pain score distribution pre and at last follow up

Table (3): Complication distribution

<table>
<thead>
<tr>
<th>Complication</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>14</td>
<td>77.8</td>
</tr>
<tr>
<td>Infection</td>
<td>1</td>
<td>5.6</td>
</tr>
<tr>
<td>Stiffness</td>
<td>3</td>
<td>16.7</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table (4): Overall outcome distribution

<table>
<thead>
<tr>
<th>Outcome</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>11</td>
<td>61.1</td>
</tr>
<tr>
<td>Good</td>
<td>4</td>
<td>22.2</td>
</tr>
<tr>
<td>Fair</td>
<td>2</td>
<td>11.1</td>
</tr>
<tr>
<td>Poor</td>
<td>1</td>
<td>5.6</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>100.0</td>
</tr>
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</table>

IV. DISCUSSION:

Frozen shoulder is a medical problem seen in the general population by orthopedic surgeon. It is a problem that causes patient's pain and disability. Symptoms can last up to 2 years and longer (10).

Over the years, frozen shoulder has had many different names, including shoulder periarthritis, adherent subacromial bursitis, and adhesive capsulitis. Currently, frozen shoulder and adhesive capsulitis are the preferred terms and may be used interchangeably (11).

Primary frozen shoulder is used to describe the limitation of active and passive motion in all direction without known reason. Although it is regarded as a self-limited disease in long term follow up, it has been reported that some of the patients did not regain normal motion. Secondary frozen shoulder is the stiffness of the shoulder, which is described by a known cause such as trauma, diabetes mellitus, cervical disease, hyperthyroidism, or ischaemic heart disease (12).

One of the initial objectives in the treatment of frozen shoulder is to restore motion and thereby improve shoulder function. A number of therapeutic interventions have been reported with mixed results (13).

There are non-operative (conservative) treatments such as physical therapy, intra articular steroid injection, non-steroidal anti-inflammatory drugs, and there are surgical options such as open or arthroscopic soft tissue release.
procedures and manipulation under anesthesia. Humeral fractures, nerve injuries, and dislocations are reported as serious complications due to manipulation under anesthesia. The main problems of open procedures are wide dissection and rehabilitation difficulties following surgery. Successful results are reported with arthroscopic procedures recently. With the arthroscopic technique, diagnosis and treatment of the diseases is obtained with minimum morbidity and it gives the possibility to interfere with the other accompanying intra articular pathologies (14).

Arthroscopic release for frozen shoulder resulted in a persistent reduction in pain severity and frequency as well as in improvements in shoulder range of motion as many as 7 years after arthroscopic release (range, 5–13 years). Several other studies have shown good outcomes more than 1 year after capsular release for adhesive capsulitis. Capsular release can, however, result in iatrogenic instability (15,16).

The current study was a prospective study conducted on 18 patients with Frozen shoulder who admitted to Orthopedic Department Zagazig University hospital during the period from 2-2021 to 8-2021 treated by Arthroscopic capsular release to evaluate the rate and extent of restoration of shoulder function after this surgery, and to know how immediate the improvement is and how quickly patients return to normal function after an arthroscopic release.

In our study age was distributed as 51.11±5.91 with minimum 45 and maximum 65 years old. Our findings are comparable to other studies that showing that Adhesive Capsulitis of Shoulder being common in third and fourth decade of life (17). In other conducted studies showed average age of 52 years (18,19).

But Paxton et al., (20) found the average age of patients was 59.1 with range 45–69 years. Disagreement with Knese, (21) who announced that average age was 45.7 ± 8.3 year. Also, Dalley II et al., (22) from the result of National Joint Registry of England and Wales defined the patients mean age was 41 years (range: 29–56 years) who were treated from Adhesive Capsulitis of Shoulder.

As regard sex distribution in our study male were 38.9 % and female were 61.1%. This covenant with findings of Frances chi (23) who defined that 35.5% of patients was female. also Di Giacomo et al., (24) who found that male to female ratio was 3:1 ratio. In contrast Dalley II et al., (22) defined that male/female ratio was (0.5:1.) among patients operated by Arthroscopic Capsular Release for Adhesive Capsulitis of Shoulder.

As regard site affection in the current study 44.4% were right and 55.6% were left. Consistence with Dalley II et al., (22) who defined that adhesive capsulitis was right side 47.8% and left side 52.2%. Disagreement with Di Giacomo et al., (24) who noticed that affected Side – right: left ratio 7:14 among studied patients operated by Arthroscopic Capsular Release for Adhesive Capsulitis of Shoulder.

In this study Duration of disease before surgery was distributed as 11.93±4.10 with minimum 8 and maximum 24 months. this was coincidence with Jae Chul Yoo, et al. (25) who reported 12 months between onset of symptoms and surgery.

While in other study the time between onset of symptoms and surgery ranged from six to 20 months, with an average of nine months (26).

In the current study Activity level significantly increased from 11.77±2.64 to 18.66±1.0 and Pain significantly increased from 5.94±1.43 to 13.44±2.66 and total shoulder constant score significantly increased from 48.16±6.31 to 84.50±11.96 after Arthroscopic Capsular Release for Adhesive Capsulitis of Shoulder.

Many authors have reported rapid pain and motion improvements after arthroscopic capsular release. Watson et al. (27) reported that pain settled at a mean of 2.24 weeks (range, 4 days–8 weeks), and 33 patients (45%) experienced total symptom resolution at the initial 4-day assessment. Furthermore, the mean time required to regain ROM equal to or within 10% of the normal contralateral side was 5.5 weeks (range, 1.4–12 weeks).

Nicholson (24) reported that the average time to a final pain-free ROM was 2.8 months (range, 1.6–5.8 months). Ozbaydar et al. (28) reported complaints of pain and limitation disappeared at a mean 3.5 months (range, 15 days–12 months) in 14 patients (87.5%) who were fully satisfied with the procedure. Harryman et al. (29) reported that 73% of their patients recovered excellent function within 3 months. Ide and Takagi (30) found that pain and function...
were significantly improved at 4 weeks, and 91% maintained a good condition for a mean of 7.5 years. Furthermore, several studies have concluded that arthroscopic capsular release enables rapid recovery, and the natural advancement of adhesive capsulitis was possibly shortened by the procedure. (31,30,32)

Moreover, in contrast to other study that reported temporary deterioration of the motions was observed during early postoperative period, whereas pain persisted in 59.3% of the patients at 6 months postoperatively. Patients reported that despite surgical treatment, it took a mean 7.9 months to recover a pain-free level of daily activities. This differences in this study were notable finding of this study was due to high incidence of combined pathologies observed in 28 of the 30 shoulders (93.3%) evaluated (32).

As regard outcome in this study, 11 cases with excellent (61.1%) followed by good (22.2%) then Fair 11.1% and only one poor with 5.6%.

According to Post - operative complications, our current study defined that Only 4 cases had complication 22.2% (1 case with infection and Three cases stiffness) the infected case was diabetic follow up had occurred post-operative and treated with antibiotic dressing and good control of diabetes, more ever Three cases was stiffness due to lack of proper physiotherapy. Other studies reported no complications (32,26,22).

In addition, Yamaguchi et al. (33) also recommend adequate pain control after surgery to retain motion and help postoperative physiotherapy. In the present study, stretching exercise using a CPM machine was performed for all patients. However, continuous supervised exercise was not uniformly performed, and the home exercise program recommended was not monitored in our patients, especially in elderly patients living in rural areas. We are of the opinion that an inadequate postoperative exercise program might be responsible for three cases stiffness that occurred.

V. CONCLUSION:

Arthroscopic treatment is effective in adhesive capsulitis of the shoulder, resistant to conservative treatment with low rate of post-operative complication.

Conflicts of Interest: No conflict of interest.

REFERENCES