



International Journal of Orthopaedics and Traumatology

ISSN Print: 2664-8318
ISSN Online: 2664-8326
Impact Factor: RJIF 5.42
IJOT 2024; 6(1): 90-93
www.orthopedicsjournal.in
Received: 05-08-2024
Accepted: 11-09-2024

Dr. Dikshit Anand
Junior Resident, Department
of Orthopaedics, People's
College of Medical Sciences &
Research Centre, Bhopal,
Madhya Pradesh, India

Dr. Siddhartha Paluvadi
Associate Professor,
Department Orthopaedics,
People's College of Medical
Sciences & Research Centre,
Bhopal, Madhya Pradesh,
India

Dr. Gautam Chatterji
Assistant Professor,
Department Orthopaedics,
People's College of Medical
Sciences & Research Centre,
Bhopal, Madhya Pradesh,
India

Dr. Manmohan Shakya
Associate Professor,
Department Orthopaedics,
People's College of Medical
Sciences & Research Centre,
Bhopal, Madhya Pradesh,
India

Dr. Syed Tariq Mahmood
Associate Professor,
Department Orthopaedics,
People's College of Medical
Sciences & Research Centre,
Bhopal, Madhya Pradesh,
India

Corresponding Author:
Dr. Dikshit Anand
Junior Resident, Department
of Orthopaedics, People's
College of Medical Sciences &
Research Centre, Bhopal,
Madhya Pradesh, India

To study the clinical outcome of arthroscopic release of frozen shoulder joint

**Dr. Dikshit Anand, Dr. Siddhartha Paluvadi, Dr. Gautam Chatterji, Dr.
Manmohan Shakya and Dr. Syed Tariq Mahmood**

DOI: <https://doi.org/10.33545/26648318.2024.v6.i1b.48>

Abstract

Background: Frozen shoulder is a musculoskeletal disorder that causes significant shoulder pain and restricted mobility. Despite the availability of various treatment options, managing this condition can be challenging. Arthroscopic capsular release (ACR) has emerged as an effective intervention for frozen shoulder. Thus, this study aims to evaluate the clinical outcomes of ACR in patients with frozen shoulder.

Materials and method: This hospital-based prospective observational study was conducted at the Department of Orthopaedics, PCMS, Bhopal, from November 2022 to May 2024. Thirty-five patients meeting the inclusion criteria of chronic shoulder pain unresponsive to conservative treatments and significant restrictions in shoulder mobility were included. Data collection involved preoperative and postoperative assessments using a visual analog scale (VAS) for pain, range of motion (ROM) measurements, and shoulder-specific clinical scores. Postoperative physiotherapy included a regimen of exercises, with follow-ups at 2 weeks, 6 weeks, and 12 weeks.

Results: The mean age of participants was 52.2 ± 5.9 years, with 51.4% male and 48.6% female. The right shoulder was predominantly affected with 68.6%. Significant reductions in VAS scores were observed from 8.1 ± 0.8 preoperatively to 0.9 ± 0.3 at 12 weeks ($p < 0.001$). Improvements in shoulder ROM and strength were noted across all measured parameters (internal rotation, external rotation, abduction, forward flexion) and clinical scores (Constant and Oxford shoulder scores) showed substantial enhancement by 12 weeks ($p < 0.001$). Functional outcomes included an average return to work and sports at 2.0 ± 0.9 and 2.6 ± 0.5 months, respectively.

Conclusion: Arthroscopic capsular release for frozen shoulder resulted in significant improvements in pain, range of motion, and functional outcomes. The procedure was well-tolerated, with high patient satisfaction and minimal complications. This study supports ACR as an effective treatment for frozen shoulder, with positive outcomes observed in the Central Indian population.

Keywords: Adhesive capsulitis, frozen shoulder, arthroscopic release

Introduction

Adhesive capsulitis, widely known as frozen shoulder, is a musculoskeletal disorder characterized by substantial limitation in shoulder mobility and significant pain [1]. Initially described as "humeroscapular peri-arthritis" by Duplay in 1879, the condition involves inflammation and fibrosis of the shoulder joint capsule, leading to restricted range of motion and discomfort. Despite advances in understanding and treatment, frozen shoulder remains a challenging condition to manage effectively due to its complex and often persistent nature [2, 3].

This condition limits both active and passive shoulder motions and causes discomfort at night. It has an impact on work, play, everyday activities, and sleep [4]. The pathophysiology of frozen shoulder is caused by active proliferation of fibroblasts within the shoulder joint capsule, together with the conversion of some fibroblasts into myofibroblasts [5].

Frozen shoulder affects approximately 2% of the general population annually, with a higher prevalence in women during their fourth and fifth decades of life. Previously it was believed that it was self-limited, but recent studies have revealed that its course may last as long as 10 years, and up to 40% of the patients will suffer from this disease their entire lives. Bilateral involvement has also been reported in 6% to 50% of the patients [6].

Various treatment options are available, including physical therapy, non-steroidal anti-inflammatory drugs (NSAIDs), steroid injections, and passive range of motion exercises under general anesthesia (GA) [7]. However, some individuals do not respond to these conservative measures. In such cases, arthroscopic release has emerged as an effective management strategy. Although many patients initially undergo physical therapy and corticosteroid injections, surgery may be necessary when conservative treatments fail [8]. Surgical options include open release, arthroscopic release, manipulation under anesthesia (MUA), and combined approaches [9].

Arthroscopic release of the shoulder joint capsule is a well-established procedure for treating frozen shoulder. While there is substantial evidence supporting the efficacy of arthroscopic capsular release (ACR) for improving outcomes in both the short and long term, there is a notable lack of data specific to the Indian subpopulation. Therefore, the present study aims to prospectively evaluate the outcomes of ACR in a cohort from Central India.

Materials and Methods

This hospital based prospective observational study was conducted in the department of Orthopaedics at PCMS, Bhopal from November 2022 to May 2024. A total of 35 patients were included in the study fulfilling inclusion and exclusion criteria. Informed written consent was obtained from all participants before their inclusion in the study, and ethical committee approval was obtained prior to the initiation of the research.

Inclusion criteria

Patients with shoulder pain lasting for at least one month that had not improved with conservative treatment were included in the study. Additionally, patients exhibiting global restriction in both active and passive shoulder movements were enrolled.

Exclusion criteria

Patients who had undergone recent surgery on the shoulder or cervical spine, had tumors around the shoulder, or were deemed unfit for surgery or anesthesia was excluded from the study. Additionally, individuals who refused to consent to the procedure were not included in the study.

Methodology

The informed written consent was obtained from all selected study participants. Demographic profiles of all included patients were noted. Then, patients pain levels and functional limitations were assessed using a 10-cm visual analog scale to capture the severity of symptoms. Clinical diagnoses were made based on medical history and physical examinations, supplemented by radiography for further evaluation. Preoperative assessments focused on measuring pain, functional capacity, and the range of motion of the shoulder joint.

Physiotherapy Regimen

Postoperative physiotherapy began on the first day following surgery. The exercises included forward elevation, abduction, internal and external rotation, pendular motions, and cross body adduction. Patients underwent physiotherapy sessions 3-4 times per day, each lasting 10-15

minutes. After surgery, patients were discharged on day 3 and were followed up on postoperative day 2, and then at 2 weeks, 6 weeks, and 12 weeks to monitor progress and recovery.

Statistical Analysis

Data was analyzed using SPSS Version 23. Continuous data are presented as mean \pm standard deviation, while categorical variables are presented as number (%). The chi-square test was used for nominal data with a significance threshold of $p < 0.05$.

Results

Table 1: Distribution of the studied cases based on gender and their mean age

Variables	No. of Cases (n=35)	Percentage
Mean Age in years	52.2 \pm 5.9	
Gender	Male	18 51.40%
	Female	17 48.60%

The above table 1 showed that, the mean age of 52.2 years (\pm 5.9). The gender distribution was nearly balanced, with 51.4% male (18 cases) and 48.6% female (17 cases).

Table 2: Distribution of patients based on their affected side, Risk Factors, Primary or Secondary causes and Shoulder associated injury

Affected Side	No. of Cases (n=35)	Percentage
Right	24	68.60%
Left	11	31.40%
Risk Factors		
NA	18	51.40%
Diabetes	12	34.30%
Thyroid	2	5.70%
Hypertension	3	8.60%
Primary or Secondary causes		
Primary	18	51.40%
Secondary	17	48.60%
Shoulder associated injury		
Yes	13	37.10%
No	22	62.90%

The above table 2 showed that, the Risk factors included diabetes (34.3%) and hypertension (8.6%), with 51.4% showing no risk factors. Primary causes were found in 51.4%, and 37.1% had shoulder-related injuries.

Table 3: Improvement in pain after arthroscopic release at different periods

VAS Score	Mean \pm SD	p-value
Preop	8.1 \pm 0.8	<0.001
Day2	4.3 \pm 0.7	
2 weeks	2.2 \pm 0.7	
6 weeks	1.3 \pm 0.4	
12 weeks	0.9 \pm 0.3	

The above table 3 showed that, the mean Visual Analog Scale (VAS) score significantly decreased from 8.1 \pm 0.8 preoperatively to 0.9 \pm 0.3 at 12 weeks postoperatively ($p < 0.001$). The scores showed a consistent reduction, with 4.3 \pm 0.7 on day 2, 2.2 \pm 0.7 at 2 weeks, and 1.3 \pm 0.4 at 6 weeks.

Table 4: Range of motion items and strength of abduction at different periods

	Internal rotation	External rotation	Abduction	Forward flexion	Strength of abduction
Preop	20.5±12.4	3.8±1.3	42.5±9.41	78.67±16	13.3±1.7
Day 2	37.5±12.8	33.2±9.6	80.2±15.1	128.1±10.2	20.1±4.6
2 weeks	55.1±8.7	52.1±10.2	125.1±13.4	151.4±11.3	31.1±8.4
6 weeks	66.7±11.4	63.3±14.8	146.7±30.1	162.7±11.1	35.8±7.9
12 weeks	71.0±12.3	70.6±15.1	155.3±28.8	167.9±14.2	39.7±8.5
p-value	<0.001	<0.001	<0.001	<0.001	<0.001

Significant improvements were observed in all parameters by 12 weeks postoperatively ($p < 0.001$). Internal rotation increased from 20.5° to 71°, external rotation from 3.8° to 70.6°, abduction from 42.5° to 155.3°, forward flexion from 78.67° to 167.9°, and abduction strength from 13.3 to 39.7, reflecting notable functional recovery. (Table 4)

Table 5: Clinical score comparison at different periods

Clinical score comparison	Constant shoulder score	Oxford shoulder score
Pre op	33.6± 4.3	10.5± 2.5
Day2	54.3± 4.5	24.1± 5.3
2 weeks	74.1± 8.3	31.4± 6.3
6 weeks	79.7± 6.3	38.8± 6.
12 weeks	83.6± 6.9	41.1± 5.5
p-value	<0.001	<0.001

Table 5 represented that, the Constant and Oxford shoulder scores improved significantly ($p < 0.001$) from preoperative values of 33.6 and 10.5 to 83.6 and 41.1, respectively, at 12 weeks, indicating marked recovery.

Table 6: Functional and psychological outcomes of patients

Variables	Outcome
Return to work (months)	2.0±0.9
Return to sport (months)	2.6±0.5
Average increase in CMS	50.0±8.3
Worst pain over the last 24 h	1.7±0.9

The outcomes showed an average return to work in 2.0±0.9 months and return to sport in 2.6±0.5 months. The Constant shoulder score (CMS) increased by 50.0±8.3, and the worst pain over the last 24 hours was rated at 1.7±0.9, indicating good functional recovery and pain relief. (Table 6)

Discussion

The aim of the current study was to evaluate the clinical outcomes of 35 patients who underwent arthroscopic release for frozen shoulder. The findings indicate that arthroscopic release is an effective treatment for managing frozen shoulder.

In the present study, the mean age of the participants was 52.2±5.9 years, with a slight predominance of males (51.4%). These results align with the findings of Pippal HK *et al.*,^[10] who studied 30 patients with an average age of 52.2 years. Similarly, Hussain A *et al.*,^[11] reported a mean age of 52.76 years, with a range from 35 to 66 years. Ebrahimzadeh MH *et al.*,^[12] also found a participant age range of 36 to 66 years, with an average of 50.8±7.1 years.

In the present study, the majority of cases involved the right shoulder (68.6%), while the left shoulder was affected in 31.4% of cases. Similarly, in a study by Ebrahimzadeh MH *et al.*,^[12] 62.0% of patients had injuries with their right shoulder, and 38.0% had problems with their left. In contrast, Hussain A *et al.*,^[11] reported that most patients had

left shoulder involvement (60.0%), compared to 40.0% on the right side.

The current study also found that primary causes were identified in 51.4% of cases, while 37.1% had shoulder-related injuries. Similar results were observed in the study by Alazabi EEY *et al.*,^[13] where 38.8% of patients experienced shoulder-related injuries.

The study demonstrated a significant reduction in the mean Visual Analog Scale (VAS) score, from 8.1±0.8 preoperatively to 0.9±0.3 at 12 weeks postoperatively ($p < 0.001$). Scores consistently decreased over time: 4.3±0.7 on day 2, 2.2±0.7 at 2 weeks, and 1.3±0.4 at 6 weeks. In comparison, Ebrahimzadeh MH *et al.*,^[12] reported a decrease from 9.3±1.8 to 2.2±0.8 ($p < 0.05$), while El Deriny AM *et al.*,^[14] observed a reduction from 8.10±0.8 to 1.10±0.41 at 12 months ($p < 0.01$). These findings confirm the effectiveness of the intervention in significantly reducing pain.

In current investigation, significant improvements in shoulder function were observed by 12 weeks postoperatively ($p < 0.001$). Internal rotation increased from 20.5° to 71°, external rotation from 3.8° to 70.6°, abduction from 42.5° to 155.3°, forward flexion from 78.67° to 167.9°, and abduction strength from 13.3 to 39.7, indicating substantial functional recovery.

Furthermore, both the Constant and Oxford shoulder scores showed significant improvement ($p < 0.001$), with preoperative scores of 33.6 and 10.5 rising to 83.6 and 41.1, respectively, at 12 weeks. These findings align with El Deriny AM *et al.*,^[14] who reported an increase in the Constant shoulder score from 32.77±4.3 preoperatively to 81.67±6.3 at 12 months ($p < 0.05$), and the Oxford shoulder score from 11.53±2.5 preoperatively to 37.77±6.02 at 12 months ($p < 0.05$). Yoo CJ *et al.*,^[15] observed a significant improvement in the Constant shoulder score from 38.0±19.9 preoperatively to 79.6±17.0 at final follow-up ($p < 0.05$). Similarly, Alazabi EEY *et al.*,^[13] reported an increase in the Constant score from 48.16±6.31 preoperatively to 84.50±11.96 at final follow-up ($p < 0.05$). Ebrahimzadeh MH *et al.*,^[12] found a rise from 30.1±9.3 preoperatively to 82.9±12.5 at final follow-up ($p < 0.001$).

The outcomes of the present study findings indicated an average return to work at 2.0±0.9 months and to sports at 2.6±0.5 months. The Constant shoulder score (CMS) improved by 50.0±8.3 points, and the worst pain over the last 24 hours was rated at 1.7±0.9, reflecting substantial functional recovery and pain relief. These results are consistent with Galasso *et al.*,^[16] who found that all patients resumed their previous work and sports activities within two to three months.

Limitations

- The study was limited by a small sample size of participants.
- The 12-week follow-up period restricts the ability to evaluate long-term prognosis.

- The research was conducted at a single center and did not include a control group.

Conclusion

Arthroscopic release for frozen shoulder results in notable improvements in shoulder mobility, pain relief, and overall function. Patients typically showed significant gains in range of motion including internal and external rotation, abduction, and forward flexion within a few weeks post-surgery. Pain levels decrease considerably, which enhances the quality of life and daily activities. The present study concluded that the procedure is generally well-tolerated, with a high rate of patient satisfaction and minimal complications. These outcomes highlight arthroscopic release as a highly effective and safe option for treating frozen shoulder.

Conflict of Interest

Not available.

Financial Support

Not available.

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How to Cite This Article

Anand D, Paluvadi S, Chatterji G, Shakya M, Mahmood ST. To study the clinical outcome of arthroscopic release of frozen shoulder joint. *International Journal of Orthopaedics and Traumatology*. 2024;6(1):90-93.

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