International Journal of Life Sciences, Biotechnology and Pharma Research Vol. 14, No. 4, April 2025 Online ISSN: 2250-3137
Print ISSN: 2977-0122

DOI: 10.69605/ijlbpr_14.4.2025.76

ORIGINAL RESEARCH

Outcome analysis of arthroscopic subacromial decompression in various stages of shoulder impingement syndrome

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Received Date: 15/12/2024 Accepted: 18/01/2025 Publication: 20/02/2025

ABSTRACT

Background: Subacromial impingement syndrome is the most common disorder for shoulder pain causing functional loss and disability due to repetitive overhead activities of daily living or sports. Treatment options can be conservative as first line, if it fails surgery is recommended. This can vary based on individual patient factors such as age, duration of symptoms. Arthroscopic Subacromial Decompression is the gold standard to treat this pathology. **Materials and Methods:** A prospective study was done to study the functional outcome of Arthroscopic Subacromial Decompression using Constant and Murley score. 40 patients were included in this study, out of which 20 were operated and followed up for 1 year. All these patients were categorised by the age, type of acromion morphology, stages of impingement. Radiological outcomes were measured by comparing pre operative and post operative Acromio-Humeral Distance (AHD) in AP radiographs. **Conclusion:** Arthroscopic Subacromial Decompression in a properly selected patients and with good surgical technique is a beneficial procedure for shoulder impingement in terms of functional and radiological outcomes resulting in improvement of symptoms and early return to work.

Keywords: Subacromial impingement syndrome, Acromio Humeral Distance, Arthroscopic Subacromial decompression, Constant & Murley Score

INTRODUCTION

Half of the general population experience shoulder pain atleast once every year. Subacromial impingement syndrome is the most common disorder of shoulder in all age groups, which accounts for about 44-65% of all complaints of shoulder pain. Subacromial impingement syndrome is characterized by functional loss and disability of shoulder, which is caused by repetitive trauma mostly involving overhead activities of daily living/sports causing degeneration and inflammation affecting the structures of subacromial space leading to anterolateral shoulder pain, decreased range of movements.

Subacromial impingement syndrome (SAIS) presents in many forms, ranging from inflammation to degeneration of subacromial bursa and rotator cuff tendons. Thus includes various terms like • subacromial bursitis • rotator cuff tendinosis • Partial/ full thickness rotator cuff tears. Neer coined the term "impingement syndrome" in 1972 and described the mechanism involved in SAIS, as a chronic mechanical process in which the conjoint tendon of the rotator cuff undergoes repetitive compression and micro trauma occurs, as it passes under the coracoacromial arch. As the arm is abducted or internally rotated, the subacromial space decreases and the cuff become increasingly compressed.

The supraspinatus tendon appears to be in close contact with anterio-inferior border of the acromion when arm is in 90° abduction with 45° of internal rotation. This makes the supraspinatus tendon is the most involved tendon of the rotator cuff in shoulder impingement. The supraspinatus muscle derives its blood supply from the anterior circumflex humeral and suprascapular arteries. The supraspinatus tendon has an avascular area near its insertion site at the greater tuberosity called "critical" zone. The impingement usually occurs here and this zone increases in size with advancing age.

Neer classified these changes of rotator cuff into three stages;

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Stage 1 Edema and hemorrhage
Stage 2 Thickening and fibrosis of bursa, tendinitis of rotator cuff
Stage 3 Bony spurs, partial and full thickness rotator cuff tears
The main aim of treatment In subacromial impingement syndrome (SAIS) is to relieve the pain and return to normal day-to-day activities as soon as possible. Improved function can be obtained by reducing the inflammatory edema, strengthening the muscles.
Arthroscopic Subacromial Decompression (ASD) is more evolved over past decade and adopted because of less morbidity and the possibility of performing through arthroscopic portals reduces infection rate and the risks of neurovascular damages. So in a properly selected patients and with good surgical technique, will have good outcome resulting in improvement of symptoms and early return to work.

Aim and objective

To study the outcome analysis of arthroscopic subacromial decompression in various stages of shoulder impingement syndrome using Constant and Murley score.

MATERIALS AND METHODS

Patients presenting with impingement symptoms in the orthopaedic outpatient department of Thanjavur Medical College. Patients were evaluated clinically and radiologically confirmed, then planned for Arthroscopic subacromial decompression. This is a prospective study conducted with sample size of 40 patients from November 2022 to November 2023. Follow up period is 1 year.

Inclusion criteria

1. Subacromial bursitis with impingement syndrome
2. Calcific rotator cuff tendinitis with impingement syndrome.
3. Type 3 Neer impingement syndrome
4. Type 2 or Type 3 (Curved or flat) acromion morphology.

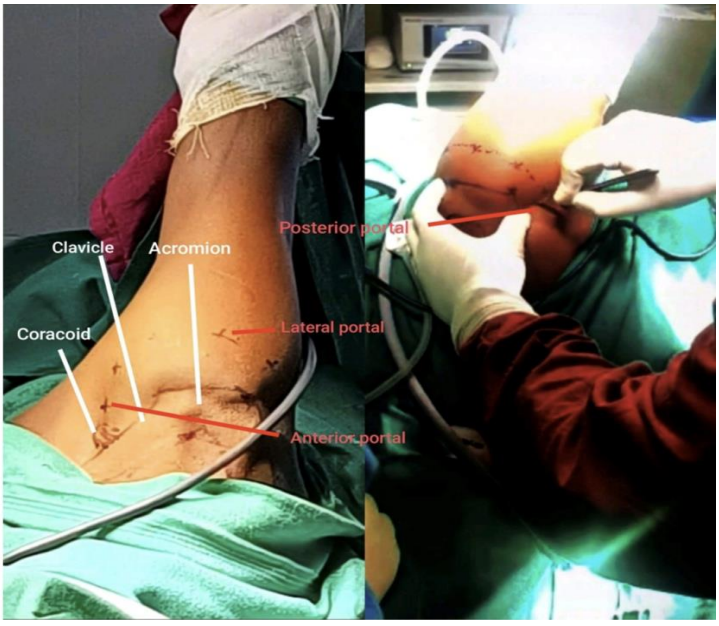
Exclusion criteria

1. Complete rotator cuff tear
2. Patients not willing for surgery
3. Associated neuromuscular disorder
4. Surgically unfit.

Preoperative planning was done and categorized according to age, impingement stages, acromion types. Post operatively, patients were followed up and outcome measured using Constant and Murley score.
Radiological outcomes were also measured by comparing preoperative and post-operative Acromio-Humeral Distance (AHD) in radiographs.

Procedure

Under general anesthesia, patient in lateral decubitus position, bony landmarks identified. Posterior portal located and superficial skin incision made with no.11 blade over the soft spot. A cannula and blunt trocar are inserted anteromedial and parallel to glenoid articular surface toward the coracoid process. The trocar is to slide lateral to glenoid ridge to enter the joint. A Standard arthroscope of 30° inserted through posterior portal and probe through anterior portal. Once the rotator interval is visible examined the superior labrum and biceps tendon. Then SGHL examined which runs often with LHBT (long head of biceps tendon). Arthroscope rotated to visualize MGHL and subscapularis tendon which lies anterior to MGHL by rotating the arm. Then arthroscope rotated downwards to assess antero-inferior labrum.



CLINICAL IMAGE

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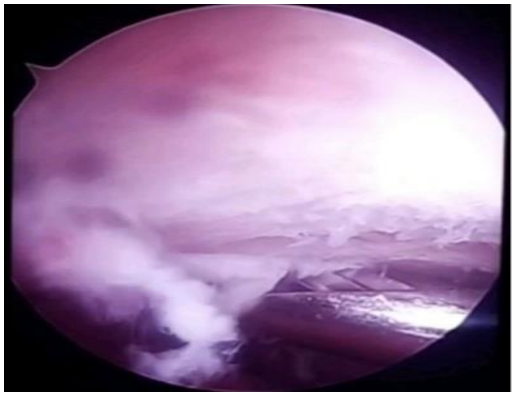
After inspecting the labrum, arthroscope advanced superiorly to look for supraspinatus and infraspinatus tendon attachment to greater tuberosity and checked for complete tears. The arthroscope removed from glenohumeral joint. Using the same posterior portal, the blunt trocar and arthroscope are directed anteriorly and superiorly towards the anterolateral corner of acromion to enter the subacromial space. Adhesions removed. The arthroscope is advanced just lateral to coracoacromial ligament and replaced by trocar. Then the trocar and arthroscope are then advanced to exit the anterior skin incision. A second cannula is placed over tip of trocar and both cannulas brought into bursa. Once bursa is distended, tissues within the posterior portion of bursa are resected for better visualization. A spinal needle used to identify the location for lateral portal which is parallel to under surface of acromion. The undersurface of acromion and coracoacromial ligament are examined.



SCOPY IMAGE

With arthroscope in posterior portal and a motorized shaver is introduced in lateral portal, soft tissues and bursal tissues (bursectomy performed) are removed from acromion. Using burr inserted through lateral portal, around 4-7 mm of bone resected from anterior and inferior prominence of acromion. Beginning from anterior and lateral edge, a gentle anterior to posterior sweeping motion of the burr is used to resect posteriorly. After the space is decompressed thoroughly, the arthroscope moved from posterior portal to lateral portal and burr reintroduced from posterior portal. The posterior lip of acromion is kept as fulcrum and the burr is placed at the deepest point of concavity in acromion.

Resection is done again in sweeping motion from lateral to medial and progressing anteriorly. The acromion gets tapered anteriorly while providing a smooth transition to bony cortex posteriorly. By following the angle of posterior acromion the appropriate amount of bone is resected, acromioplasty done using posterior cutting block technique which results in flat acromion. The arthroscope returned to posterior portal to view the undersurface contour of acromion and inspected for any irregularity. If bony spurs are noted near the acromio-clavicular joint, are resected.

Post-operatively the arm kept in cuff and collar immobilization. Regular follow-up done at 6 weeks, 6 months, and 1 year whom evaluated with Constant and Murley score in each follow-up.

RESULTS

The majority of the study population (45%) fell within the 40-49 age range, with males comprising 65% and females 35% of the population. Most patients had symptoms for months before undergoing surgery, indicating a prolonged course of shoulder impingement prior to intervention.

Pre-operative ROM

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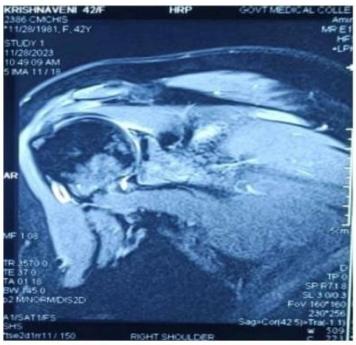
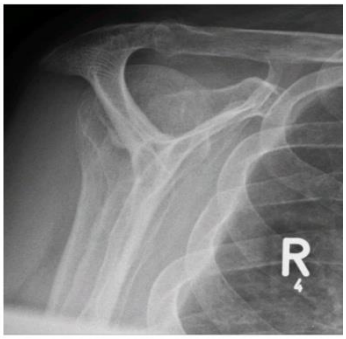
- 42/F
- Right Partial supraspinatus tear (Stage 3)
- Type 2 acromion

MRI



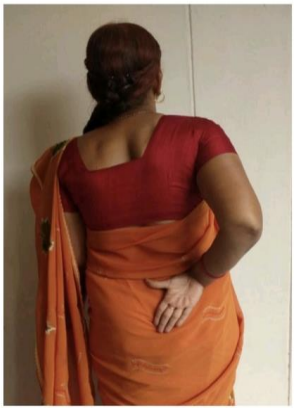
Scapular Y view



Pre-operatively, 25% of patients had an AHD between 7-7.9 mm, 25% had 8-8.9 mm, with notable improvements post-operatively. Majority of patients shown post-operative improvement even though some patients had normal subacromial space pre-operatively.

This demonstrates the procedure's effectiveness in increasing subacromial space. Significant improvements in Constant-Murley scores were observed from 6 weeks to 1 year, with a statistically significant increase ($p < 0.05$) by 1 year. This highlights the long-term effectiveness of ASD in improving shoulder function.

1 year follow up ROM



The complication rate was low, with only 5% of patients experiencing bleeding and 15% experiencing fluid extravasation. The majority of surgeries (80%) were complication-free.

The strong correlation between early (6-week) and long-term (1-year) Constant scores suggests that early recovery is predictive of long-term success, reinforcing the importance of early post-operative care and monitoring.

Although AHD improved significantly postoperatively, the correlation between AHD and long-term function was weak, indicating that while AHD is important, it is not the sole determinant of shoulder function. Other factors must be considered for a comprehensive understanding of patient outcomes.

CONCLUSION

This study demonstrates that Arthroscopic Subacromial Decompression (ASD) effectively improves shoulder function and symptom relief in patients with subacromial impingement syndrome. The majority of patients, particularly in the 40-49 age group, achieved significant functional gain, as shown by improvements in Constant-Murley scores and acromio-humeral distance (AHD).

Although AHD increased post-operatively, the weak correlation between AHD and long-term functional outcomes suggests that while anatomical improvements are beneficial, they do not solely determine recovery. The early post-operative functional outcomes strongly predict long-term success, emphasizing the importance of early recovery and rehabilitation in achieving sustained results. The low complication rate further makes Arthroscopic

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Subacromial Decompression as a safe intervention for appropriately selected patients. These findings signifies Arthroscopic Subacromial Decompression's role as a valuable surgical option for patients with subacromial impingement syndrome, providing substantial and lasting functional improvements.

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