



# Comparative Outcomes of Subacromial Decompression and Closed Manipulation in Patients with Impingement Syndrome and Stiff Shoulder: A Prospective Study

**Dr. S. Sairamakrishnan\***

Assistant Professor, Department of Orthopaedics,  
Sri Lakshmi Narayana Institute of Medical Sciences & Hospital,  
Osudu, Puducherry - 605502

**\*Corresponding Author**

**Dr. S. Sairamakrishnan,**

Assistant Professor, Department of Orthopaedics,  
Sri Lakshmi Narayana Institute of Medical Sciences & Hospital,  
Osudu, Agaram Village,  
Koodapakkam Post, Puducherry - 605502

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**Abstract:** A prospective study evaluated the treatment outcomes for impingement syndrome and stiff shoulder. A total of 200 patients were enrolled in the study, 152 with impingement syndrome alone (Group A) and 48 with impingement syndrome and stiff shoulder (Group B). Under anesthesia, Group A underwent subacromial decompression, while Group B underwent closed manipulation. Among group A and group B patients, 81% and 68% achieved satisfactory outcomes, respectively. Diabetic patients in Group A achieved satisfactory results in 82% of cases, while those in Group B achieved satisfactory results in 44% of cases. Study results indicate that postoperative external rotation range of motion is lower in Group B, indicating an additional procedure targeting the anterior capsule or rotator interval could improve patient function. As a result of performing acromioplasty on patients with stiff shoulders and impingement syndrome, stiffness was not exacerbated. A preoperative counseling session is essential for setting appropriate treatment expectations, especially for patients who have diabetes and stiff shoulders.

## Introduction

As a result of associated pain, stiff shoulders usually restrict passive range of motion of the glenohumeral joints. It can be difficult to distinguish between this and reduced range of motion caused by impingement syndrome. In many cases, impingement syndrome impairs a person's daily activities due to restricted shoulder motion. As a first step, study [1] suggested that shoulder impingement syndrome be treated non-surgically. In the case of stiff shoulders, non-surgical treatment may not work for long periods of time. [2] It is also possible to use surgical intervention in these cases, although there are some concerns. Acromioplasty, for example, can leave raw

acromial surfaces, which can cause adhesions. Currently, there are no studies describing the effects of subacromial decompression without operative capsular release on impingement syndrome [3]. Retrospective studies were conducted to compare how the two treatments treat impingement syndrome with stiff shoulders, compared to subacromial decompression alone.

## Methodology

There were 210 patients with impingement syndrome who failed conservative treatment over the course of one year. Following up with 10 patients wasn't possible, so they were excluded, leaving 200 to be tracked for at least two years. In



the study, 152 patients with impingement syndrome alone (Group A) and 48 patients with impingement syndrome associated with stiff shoulder (Group B) participated. Study identified the tender points, including supraspinatus insertions, acromioclavicular joints, bicipital grooves, coracoid processes, and anteroinferior glenoid margins. Spurling and Lhermitte tests were also performed during the physical examination. Finally, an impingement injection test was conducted. In preoperative evaluations, exclude patients with glenohumeral arthritis, calcific tendinitis, rotator cuff tears of full or partial thickness, ruptured biceps tendons, cervical arthritis, herniated discs, and brain lesions causing shoulder pain. Despite non-steroidal anti-inflammatory medications, local steroid injections, and intensive physical therapy programs, programs failed to relieve shoulder pain.

A diagnosis of impingement syndrome was then made. After the diagnosis had been made, the patient underwent a clinical examination to determine how mobile she was, a functional assessment score from the American Shoulder and Elbow Surgeons (ASES), and a visual analog scale (VAS) pain assessment in order to determine the objective degree of shoulder disability.

A test for subacromial impingement was performed to diagnose impingement syndrome by injecting 2% lidocaine into the bursa subacromia. Study measured the degree of pain in the subacromial space before and after injection using a Visual Analog Scale (VAS). Pain and function were measured using the ASES scale. [4] Positive results were defined as a decrease in pain of 50% on the VAS [Table 1]. [5] Impingement syndrome with stiff shoulder is defined as a forward elevation less than 100° and a side rotation less than 30°. As a result of the impingement injection test, patients

with increased mobility were placed in Group A. Patients with pain during shoulder movements may exhibit pseudo-limitation of shoulder motion. Some patients experience improved shoulder range of motion following impingement injections since the anesthetic drug provides pain relief.

**Intervention:** Prior to arthroscopic examination, stiff patients underwent a closed manipulation. Stabilizing the axillary border of the scapula was performed under the patient's back by an assistant. To avoid excessive leverage, the operator gripped the humerus high in the axilla. Initially, humerus was elevated to 90°, and then gently rotated after achieving sufficient forward elevation. During the manipulation, the object was rotated externally from the side. Finally, it was rotated internally with minimal force. As soon as this procedure was repeated, we reached a satisfactory range of motion. [6,7] Twenty cases experienced a sharp increase in shoulder movement and capsular constriction during closed manipulation, while four others experienced a gradual increase because of slow plastic deformation.

Anteroposterior and suprascapular views were used to determine the amount of acromioplasty. Acromioplasty and distal clavicle resections were performed on eight patients with stiff shoulders and six patients without stiff shoulders with acromioclavicular joint pain or tenderness on the AC joint.

With a pulley and string, the shoulder was passively elevated within 24 hours of surgery. The first postoperative day was marked by physical therapy, including range-of-motion exercises. Until the final follow-up, patients were evaluated preoperatively, six months after surgery, and three months thereafter. The mean follow-up period was 32 months in Group A and 33 months in Group B.

**Table 1:** Patient demographics in impingement syndrome groups with and without stiffness

ISWOS*		ISWS†
No. of patients	152 cases	48 cases
Average age	52 years	55 years
Male: Female	58 : 94	16 : 32
Symptom duration	27 months	30 months
After Improvement	68% (50-100%)	66% (50-100%)



Impingement Test		
Rate of diabetes mellitus	14%	30%
Fasting blood glucose	224 mg/dl	207 mg/dl
of diabetic patients	(117-376 mg/dl)	(1210-410 mg/dl)

**Statistical Analysis:** Ages and range of movement were analyzed using student t-tests, while pain and ASES evaluation scores were analysed using Mann-Whitney U tests. Statistically significant improvements were determined by comparing the results of the pre- and post-surgery evaluations.

### Results

The impedement syndrome without stiffness group consisted of 152 patients, while the stiffness group consisted of 48 patients. Thus, in our series, there was a 25% incidence of stiff shoulder as a result of impingement syndrome in our patients. The average fasting blood glucose of the group A patients was 224 mg/dL, and the average fasting blood glucose of the group B patients was 207 mg/dL [Table 1]. It is significant that impingement syndrome alone had a lower incidence of diabetes than stiff shoulder alone ( $P < 0.06$ ). There was an average duration of 28 months (range, 5 to 240 months). Following an impingement injection test, VAS showed a mean pain reduction of 66% without stiff shoulders and 68% with stiff shoulders before treatment. As compared to baseline values, both groups improved significantly in ASES functional score and postoperative pain. The ASES functional score in Group B was worse preoperatively than in Group A. Both groups did not differ significantly ( $P > 0.06$ ) postoperatively. To determine satisfactory outcomes, we used the ASES scores of the patients [Table 2]. Those who achieved excellent (91 to 100 points) or good results (91 to 100 points) were satisfied with their treatment results. According to ASES evaluation scores, 32 (68%) of stiff patients and 122 (81%) of

non-stiff patients had satisfactory outcomes. There was a satisfactory outcome for 6 diabetic patients (44%) who had stiffness and 18 (83%) who didn't (Table 4). Group B patients were satisfied with 83% while Group A patients were satisfied with 94% [Table 3]. In both groups, external rotations to the side, forward elevations, and internal rotations improved after surgery. ( $P > 0.06$ ) Range of external rotation was lower in Group B (with stiffness) than in Group A postoperatively. There were no significant differences in range of motion after surgery [Table 2].

### Discussion

Occasionally, shoulder surgeons find it challenging to distinguish between impingement syndrome and stiff shoulder due to the fact that pain and limited motion are common clinical presentations. In addition, diabetics, hyperthyroids, and people who suffer from intrathoracic disease are more frequently diagnosed with frozen shoulder. It was reported [8] that adhesive capsulitis affects the capsule and synovium of the humeral head, mimicking shoulder impingement syndrome in Stage 1. The impingement syndrome can cause stiffness of the shoulder joint. [1,9-15] If both occur at the same time, it is difficult to distinguish between the two conditions. According to Neer1, frozen shoulder pain that cannot be relieved with subacromial injections is caused by stiffness in the glenohumeral joint. An impingement syndrome-related stiffness is characterized by a restricted range of motion across the body, limited internal rotation, and limited adduction forward. [11]

**Table 2: Range of motion and ASES functional scores in impingement syndrome groups with and without stiffness.**

	Preoperative	Postoperative
ISWOS*		
Pain	14	2
ASES score	66	182



Forward flexion	128°	155°
External rotation at the side	54°	72°
External rotation at 90° abduction	69°	80°
Internal rotation	T (T -buttock) ‡	T (T -L) ‡ 8 5 4
ISWS†		
Pain	16	2
ASES Score	48	176
Forward flexion	90°	152°
External rotation	13°	64°
External rotation At 90° abduction	35°	79°
Internal rotation	L (L -buttock) ‡	T (T -L

Stiff shoulder has been treated with local steroid injections and physiotherapy [16-19], manipulation under anesthesia [10, 12, 14, 15, 17, 20] with joint distention [21] or with arthroscopic capsular release [22-25]. A hydrostatic distension 12 can be performed under local anesthesia to rupture the joint capsule; however, it is often poorly tolerated. However, arthroscopic dilation [12] of the anterior structures has limitations, due to the limited glenohumoral joint volume, making it difficult to

enter without damaging the joint. There are fewer complications associated with open division, but it makes early physiotherapy more difficult due to wound healing restrictions. Joint manipulation was performed under anesthesia, allowing the capsular contractures to be ruptured while preventing the early active mobilization from being disrupted. The procedure is well tolerated when continuous local analgesics are delivered into the joint postoperatively.

**Table 3: Outcomes and satisfaction in impingement syndrome patients with and without stiffness**

ASES score	Number of patients with ISWOS*	Number of patients with ISWS†
Excellent (91 to 10 points)	106 cases	28 cases
Good (81 to 90 points)	16 cases	4 cases
Fair (71 to 80 points)	20 cases	12 cases
Poor	10 cases	4 cases

Anesthesia-induced manipulation, however, can cause fractures, tendon ruptures, and brachial plexus injuries [26-28], requiring skillful execution. There were no such complications encountered. In our study, patients with shoulder stiffness and

diabetes mellitus also had an unsatisfactory outcome. [6,16,18, 24,29] Operative treatment should be considered for these patients with an unsatisfactory outcome and unsatisfactory results.

**Table 4: Diabetes mellitus and impingement syndrome with and without stiffness results**

	ISWOS*		ISWS†	
	Preoperative	Postoperative	preoperative	Postoperative
ASES score	56	176	58	160
Excellent		16 cases		6 cases



Good		2 case		0 case
Fair		4 cases		4 cases
Poor		0 case		4 cases
Patient satisfaction		82%		58%

In patients with impingement pain and stiff shoulders, Goldberg reported that more aggressive treatment was rarely needed, such as global capsular releases.<sup>23</sup> The patients with stiffness did not undergo arthroscopic capsular release, but both groups improved to similar ranges of internal rotation and forward elevation. External rotation was worse in Group B (with impingement syndrome and stiff shoulder) than in Group A (without stiffness). Therefore, we agree with Bennett<sup>22</sup>'s report that impingement syndrome and stiff shoulders can be treated with procedures to improve external rotation, such as releasing the rotator interval, together with subacromial decompression. As soon as possible after surgery, a pulley was used to encourage shoulder elevation passively. The first postoperative day was spent in range-of-motion exercises as part of physical therapy. This prevents postoperative subacromial adhesions, which cause recurrent stiffness after acromioplasty. Our series of five patients could not be completed due to the death of one patient from a heart attack and another from lung cancer, as well as the non-presence of three patients due to their migration to other cities. Diabetes was significantly associated with stiffness over impingement syndrome alone ( $P < 0.05$ ). Diabetes patients are predisposed to stiffness, so this may explain their poor results. In staged management, due to the long interval between procedures, staged management prolongs the patient's suffering due to simultaneous treatment of impingement syndrome and stiff shoulder. The study found that manipulation under anesthesia failed to relieve stiff shoulder and impingement pain [30].

### Conclusion

The study highlights that conservative treatments may not be sufficient for managing shoulder stiffness associated with impingement syndrome. Subacromial decompression combined with manipulation has shown to provide satisfactory

pain relief for these patients. However, patients with stiff shoulders face greater challenges in regaining their range of motion compared to those with impingement syndrome alone. Further research is necessary to identify the most effective procedures for achieving optimal clinical outcomes. The study suggests that, in addition to other surgical interventions, procedures targeting external rotation, such as anterior capsular and rotator interval releases, may be beneficial for patients experiencing both stiffness and impingement syndrome.

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