RESEARCH PAPER

A Prospective Observational Study evaluating the effectiveness of corticosteroid injection in managing impingement syndrome at a Tertiary Care Hospital

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ABSTRACT

Background: Impingement syndrome involves compression of the rotator cuff tendons or subacromial bursa, leading to pain and restricted shoulder movement. Corticosteroid injections are used when conservative measures fail, providing short-term anti-inflammatory relief.

Objective: To evaluate the effectiveness of corticosteroid injections in reducing pain (VAS) and improving functional outcomes (FAS), with attention to adverse effects and associated risk factors.

Methodology: A prospective, single-centre observational study was conducted on 39 patients with impingement syndrome from November 2024 to April 2025. Patients received a combined injection of triamcinolone acetonide and lidocaine (1:1). Pain and function were assessed using VAS and FAS at baseline and one month post-treatment.

Results: The cohort showed female predominance (64.1%), with most patients aged 40–70 years. Significant pain reduction was observed, with 52.6% of patients with severe pain (VAS 8–10) and 71.4% with moderate pain (VAS 6–8) improving to VAS 0–2 ($p = 0.0321$). Functional outcomes also improved significantly ($p = 0.028$), with many patients reporting no post-treatment difficulty.

Conclusion: Corticosteroid injections with lignocaine are effective in providing significant short-term pain relief and functional improvement in impingement syndrome..

Keywords: Impingement syndrome, Corticosteroid injections, Shoulder pain, Visual Analog Scale (VAS),Functional outcome, Subacromial impingement, Hyperglycaemia, Tertiary care hospital

How to cite this article: Nithesha C K, Cherian JM, Rameeza Nazarin A, Sana, Rajarajan S, Aparna K S. A Prospective Observational Study Evaluating the Effectiveness of Corticosteroid Injection in Managing Impingement Syndrome at a Tertiary Care Hospital. Int J Drug Deliv Technol. 2026;16(19s): 320-324. DOI: 10.25258/ijddt.16.19s.37

INTRODUCTION

Impingement syndrome is one of the most common causes of shoulder pain, characterized by compression or irritation of the rotator cuff tendons and/or the subacromial bursa within the subacromial space. This condition typically presents with pain, restricted range of motion, and functional limitation, particularly during overhead activities. It predominantly affects middle-aged and elderly individuals and is frequently associated with repetitive movements, occupational strain, and degenerative changes in the shoulder joint.[1]

First described by Charles S. Neer in 1972, impingement syndrome was initially considered a purely mechanical problem caused by compression of the rotator cuff beneath the coracoacromial arch. However, current understanding recognizes it as a multifactorial condition involving both

extrinsic factors, such as anatomical variations and acromial morphology, and intrinsic factors, including tendon degeneration, inflammation, and altered biomechanics of the shoulder. These factors collectively contribute to progressive pain, reduced mobility, and impaired quality of life.[2]

Management of impingement syndrome typically begins with conservative approaches such as rest, activity modification, physiotherapy, and the use of nonsteroidal anti-inflammatory drugs (NSAIDs). When these measures fail to provide adequate relief, corticosteroid injections are commonly employed as a second-line treatment. Corticosteroids exert potent anti-inflammatory effects, reducing local inflammation and pain, thereby facilitating improved mobility and participation in rehabilitation programs.[3]

Several studies have demonstrated the short-term efficacy of corticosteroid injections in reducing pain and improving shoulder function. However, concerns remain regarding their long-term benefits and potential adverse effects, including tendon weakening and transient hyperglycaemia, particularly in patients with comorbid conditions such as diabetes mellitus. Additionally, there is limited data from real-world clinical settings, especially in tertiary care hospitals, evaluating both effectiveness and safety outcomes in routine practice.[4]

Given these considerations, the present study was undertaken to evaluate the effectiveness of corticosteroid injections in reducing pain and improving functional outcomes in patients with impingement syndrome. The study also aims to assess the safety profile of this intervention, with particular emphasis on adverse effects such as hyperglycaemia, and to identify associated risk factors related to daily activities.

MATERIALS AND METHODS

This prospective observational study was conducted at Valluvanad Hospital, a tertiary care centre, over a period of six months following approval from the Institutional Ethics Committee (approved on 30-09-2024). The study population comprised patients diagnosed with impingement syndrome who were receiving corticosteroid injection therapy and were willing to participate.

The aim of the study was to assess the effectiveness of corticosteroid injections in managing impingement syndrome. The primary objective was to evaluate pain reduction using the Visual Analog Scale (VAS) and improvement in functional outcomes following therapy. Secondary objectives included assessment of the safety profile of corticosteroid injections, particularly the risk of post-injection hyperglycaemia, and identification of risk factors associated with the development of impingement syndrome in relation to daily activities.

A total of 39 patients were included based on predefined inclusion and exclusion criteria. Data were collected using a specially designed data collection form along with a structured interviewer-administered questionnaire. Information collected included demographic details, clinical characteristics, pain scores, functional status, treatment history, and adverse effects.

Inclusion criteria comprised inpatients and outpatients aged 18–80 years diagnosed with impingement syndrome and willing to receive corticosteroid injection therapy, including those undergoing conservative or alternative treatments (excluding surgical management). Exclusion criteria included patients below 18 or above 80 years of age, those unwilling to participate or receive corticosteroid injections, patients scheduled for surgery, individuals with difficulty in recalling information (e.g., psychiatric illness), and those with a history of severe allergic reactions to corticosteroids.

Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) version 25.0. Categorical variables were expressed as frequencies and percentages, while continuous variables were presented as mean ± standard deviation (SD). Pre- and post-treatment outcomes were compared using the paired t-test, and a p-value of <0.05 was considered statistically significant.

RESULTS

Among the study participants, a substantial reduction in pain was observed following corticosteroid injection therapy. Patients who initially reported severe pain (VAS 8–10) demonstrated marked improvement, with 52.6% transitioning to the lowest pain category (VAS 0–2), and none remaining in the severe category post-treatment. Similarly, among patients with moderate baseline pain (VAS 6–8), 71.4% improved to VAS 0–2. Statistical analysis demonstrated a significant difference between pre- and post-treatment pain scores ($p = 0.0321$), indicating a meaningful reduction in perceived pain following the intervention.

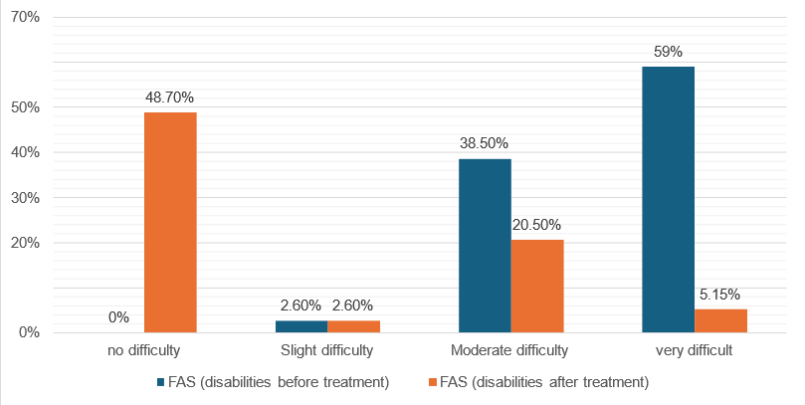

Figure 1: Percentage distribution on FAS (before and after treatment)

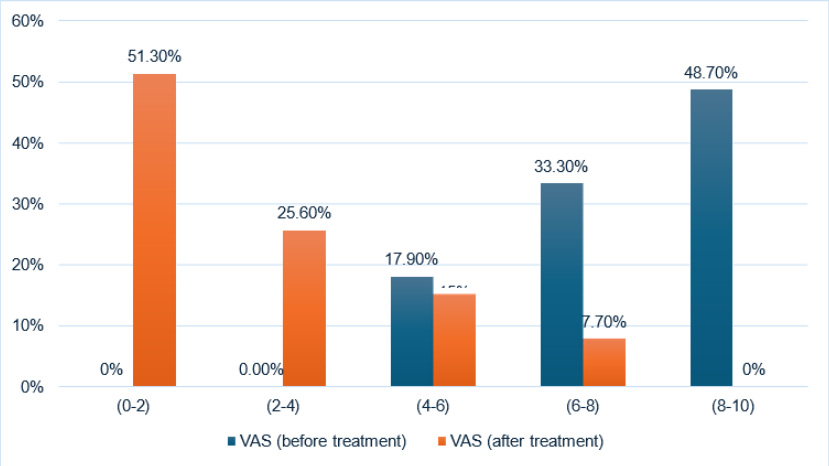

Figure 2: Percentage distribution of VAS (before and after treatment).

Among participants with moderate functional difficulty at baseline, notable improvement was observed post-treatment, with 40% reporting no difficulty and 46.7% reporting only slight difficulty. All patients with slight difficulty prior to treatment reported no difficulty following intervention. Among those with severe functional limitation at baseline, some improvement to lower disability categories was observed; however, 52.2% remained in the same category.

The differences in functional outcomes before and after treatment were statistically significant ($p = 0.028$), indicating a positive effect of the intervention. These findings highlight the clinical effectiveness of corticosteroid injection combined with lignocaine in improving functional status and reducing disability associated with impingement syndrome.

Table 1: On comparing the VAS based on treatment

VAS (before treatment)	(8-10)	10	3	4	100.0%	19	
		52.6%	15.8%	21.1%	19	100.0%	
		VAS (AFTER TREATMENT)				**TOTAL**	**P VALUE**
		(0-2)	(2-4)	(4-6)	(6-8)		
	(4-6)	5	1	1	0	7	
		71.4%	14.3%	14.3%	7	100.0%	
	(6-8)	5	6	1	100.0%	13	
		41.7%	41.7%	8.3%	13	100.0%	0.0321*

Table 2: On comparing FAS based on treatment

		FAS (AFTER TREATMENT)				TOTAL	P VALUE
		Moderate difficulty	No difficulty	Slight difficulty	Very difficult		
FAS (disabilities Before treatment)	Moderate difficulty	15	6	7	0	15	0.028*
		100.0%	40.0%	46.7%	0.0%	100.0%	
	Slight difficulty	1	1	0	0	1	
		100.0%	100.0%	0.0%	0.0%	100.0%	
	Very difficult	23	12	3	2	23	
		100.0%	52.2%	13.0%	8.7%	100.0%	

DISCUSSION

The present prospective observational study demonstrates that corticosteroid injections are effective in reducing pain and improving functional outcomes in patients with impingement syndrome. These findings are consistent with several previously published studies evaluating the role of corticosteroids in subacromial impingement.

In the current study, a significant reduction in pain was observed, with a large proportion of patients improving from moderate-to-severe pain (VAS 6–10) to minimal pain (VAS 0–2) ($p = 0.0321$). This is in agreement with the findings of Neer (1972), who first described the mechanical basis of impingement and advocated subacromial decompression, and later studies that established corticosteroid injections as an effective non-surgical alternative for symptom relief. Similarly, a randomized controlled trial by Carette et al. demonstrated that subacromial corticosteroid injections provide significant short-term pain relief compared to placebo, particularly within the first 4–6 weeks.[1,2]

The functional improvement observed in this study ($p = 0.028$), with a substantial proportion of patients reporting no or minimal difficulty post-treatment, is also supported by previous literature. Studies by Koester et al. and Buchbinder et al. have reported that corticosteroid injections significantly improve shoulder function and range of motion in the short term, although the long-term benefits remain variable.[3,4] Our findings align with these observations, highlighting the short-term efficacy of corticosteroids in improving daily functional capacity.

The demographic profile in this study, with a predominance of females (64.1%) and individuals aged 40–70 years, is comparable to earlier epidemiological studies that report higher prevalence of impingement syndrome among middle-aged individuals, particularly women. This may be attributed to hormonal influences, occupational factors, and differences in musculoskeletal structure. Additionally, the high prevalence of diabetes mellitus (38.5%) observed in this study is noteworthy and has been previously reported as a risk factor for tendon degeneration and delayed healing, thereby increasing susceptibility to shoulder pathologies.[5,6]

Repetitive activity was identified as a major contributing factor (84.6%) in this study, which is consistent with earlier research indicating that repetitive overhead movements and occupational strain play a crucial role in the development of impingement syndrome. This supports the multifactorial etiology of the condition, involving both extrinsic mechanical compression and intrinsic tendon degeneration.[7]

Regarding safety, the present study found minimal and non-serious adverse effects, including transient hyperglycaemia and skin changes. This is in line with existing literature, which suggests that local corticosteroid injections have a favorable safety profile when used judiciously. However, the observed occurrence of hyperglycaemia, particularly in diabetic patients, is consistent with prior studies emphasizing the need for careful monitoring of blood glucose levels following corticosteroid administration.[8,9]

While the results confirm the effectiveness of corticosteroid injections, it is important to note that current evidence suggests their benefits are primarily short-term. Studies comparing corticosteroid injections with physiotherapy have shown that although injections provide faster pain relief, long-term outcomes may be similar. Therefore, corticosteroid injections should ideally be used as an adjunct to rehabilitation programs rather than as a standalone treatment.[10]

The limitations of this study include a small sample size, short follow-up duration, and lack of a control group, which may restrict the generalizability of the findings. Future studies with larger sample sizes, longer follow-up periods, and comparative designs are recommended to further validate these results and assess long-term outcomes.

CONCLUSION

Corticosteroid injections are effective in reducing pain and improving functional outcomes in patients with impingement syndrome. A significant proportion of patients with severe baseline pain showed marked improvement, with none remaining in the severe category post-treatment. The use of standardized tools confirmed meaningful clinical benefit.

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