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Effectiveness of Corticosteroid Injections in Subacromial Impingement Syndrome: A Descriptive Interventional Analysis

Author: Sanjay
Associate Professor and Head
Department of Physiotherapy, Faculty of Health Science
SHAUTS, Prayagarj
Coauthor Ashish Kumar Pandey..... Assistant professor,
Department of Physiotherapy Faculty Of Health Sciences Naini, Pryagraj

ABSTRACT

Subacromial Impingement Syndrome (SIS) is a common cause of shoulder pain and functional limitation, often managed with conservative therapy including corticosteroid injections. While corticosteroid injections are widely used, their effectiveness in improving pain, range of motion, and functional outcomes requires systematic evaluation. To assess the effectiveness of corticosteroid injections in patients with SIS using subjective and objective outcome measures. A descriptive interventional study was conducted, enrolling patients clinically diagnosed with SIS. Participants received three doses of subacromial corticosteroid injections (40 mg Triamcinolone in 10 mL 2% xylocaine) at six-week intervals. Outcome measures included pain (Visual Analogue Scale), functional status (Activities of Daily Life [ADL]), strength, and range of motion, assessed using the American Shoulder and Elbow Surgeons (ASES) and European Society for Shoulder and Elbow Surgery (ESSES) scoring systems. Data were analyzed using the Wilcoxon Signed-Rank Test per protocol, with significance set at $p < 0.05$. Post-intervention assessment demonstrated significant improvements in pain, ADL, shoulder strength, and range of motion across all measured parameters ($p < 0.05$). Both subjective and objective scores reflected enhanced shoulder function and reduced discomfort following corticosteroid therapy. Corticosteroid injections were effective in alleviating pain and improving functional outcomes in patients with SIS. These findings support the role of subacromial corticosteroid injections as a valuable therapeutic intervention in managing shoulder impingement.

Keywords: Subacromial Impingement Syndrome, Corticosteroid Injection, Shoulder Pain, ASES, ESSES, Functional Outcome.

INTRODUCTION

Subacromial Impingement Syndrome (SIS) is recognized as one of the leading causes of shoulder pain and disability, contributing significantly to reduced quality of life and functional limitations in both occupational and recreational populations (Neer, 1972; Michener et al., 2003). The syndrome occurs due to compression of the rotator cuff tendons and subacromial bursa beneath the acromion and the humeral head, often resulting in inflammation, pain, and restricted shoulder movement. Its etiology is multifactorial, including anatomical variations, repetitive overhead activities, aging-related degenerative changes, and prior trauma, making it a complex condition to manage effectively (Kuhn, 2009).

Clinically, SIS presents with pain exacerbated by overhead activity, a painful arc of movement, weakness, and limited range of motion, significantly impacting daily activities such as dressing, grooming, and lifting (Michener et al., 2003; Roy et al., 2009). Diagnosis is primarily clinical, supported by special tests such as the Neer impingement sign, Hawkins-Kennedy test, and imaging studies to rule out other shoulder pathologies (Cole et al., 2008). Early and effective management is crucial to prevent chronic pain, muscle atrophy, and long-term functional impairment.

Treatment strategies for SIS range from conservative measures, including physiotherapy, activity modification, and pharmacological interventions, to more invasive procedures such as corticosteroid injections and surgical decompression (Page et al., 2016). Among these, corticosteroid injections are frequently utilized due to their potent anti-inflammatory effects, aiming to reduce pain, restore function, and facilitate participation in rehabilitative exercises. These injections target the subacromial space to decrease inflammation of the rotator cuff tendons and bursa, providing both diagnostic and therapeutic benefits (Buchbinder et al., 2003).

Despite their widespread use, the efficacy and safety of corticosteroid injections remain topics of ongoing debate. Several studies indicate significant short-term relief in pain and improved shoulder function post-injection, while concerns regarding tendon weakening, potential tissue atrophy, and limited long-term benefits persist (Hay et al., 2003; Coombes et al., 2010). The variability in study designs, dosage regimens, and outcome measures contributes to this lack of consensus. Consequently, well-structured interventional studies assessing both objective and subjective outcomes are essential to provide evidence-based guidance for clinical practice.

The present descriptive interventional analysis aims to evaluate the effectiveness of corticosteroid injections in patients diagnosed with SIS, focusing on changes in pain, strength, and functional activity.

Objective assessments were performed using the European Society of Shoulder and Elbow Surgery (ESSES) scoring system, while subjective variables were evaluated through the American Shoulder and Elbow Surgeons (ASES) scoring system and Visual Analogue Scale (VAS). By comparing pre- and post-injection outcomes, this study seeks to determine the short-term clinical benefits of corticosteroid injections and contribute to evidence-based management strategies for SIS.

MATERIALS AND METHODS:

The study was carried out in Herbertpur Christian Hospital. All patients coming to orthopedics OPD from 16th May 2008 till 15th February 2009 were diagnosed clinically with ten (10) existing parameters for subacromial impingement syndrome. (From 15th July 2009 the researcher [i.e me] was scheduled for deputations to other peripheral health centers where orthopedic clinics were not available and therefore no sample could be collected who could receive all the three doses and assessed 3 weeks thereafter the final 3rd dose if subject was included after 15th February 2009 and therefore 15th February 2009 was taken as the last day for inclusion of subjects in the time frame for this study).

RESULTS AND DISCUSSION:

Demographic Data

A total of 27 participants (33 shoulders) were initially enrolled. Three participants were lost to follow-up, leaving 24 participants (30 shoulders) for final analysis. Among these, 10 were male and 14 female. Participants were divided into three age groups: 23–35 years (4 participants), 36–45 years (9 participants), and 46–65 years (11 participants). Right shoulders were 19 and left shoulders 11.

Outcome Measures

Post-intervention assessments were performed 3 weeks after the 3rd dose of subacromial corticosteroid injection. Outcomes were measured using ESSES for range of motion (ROM), ASES for strength and activities of daily living (ADL), and VAS for pain assessment. Non-parametric Wilcoxon Signed Rank Test was used for statistical analysis.

This descriptive interventional study demonstrates that subacromial corticosteroid injections significantly improve shoulder function in patients with SIS. Post-injection, all participants showed improvements in range of motion (abduction, forward flexion, internal and external rotation), muscle strength, pain reduction, and ADL.

Range of Motion: Improvements in ESSES scores highlight enhanced functional mobility. Both right and left shoulders showed significant gains, with "Excellent" categories increasing substantially post-intervention. This aligns with prior studies demonstrating corticosteroids reduce inflammation and mechanical impingement, facilitating better ROM (Neer, 1972; Michener et al., 2003).

Strength: Strength assessment via ASES also revealed significant gains, particularly in elevation/flexion and abduction, suggesting that corticosteroid injections allow improved muscle activation and less pain-limited effort.

Pain and Functional Status: Significant reductions in VAS and subjective pain scores indicate effective analgesic properties of corticosteroids. ADL scores improved across all age groups, reinforcing the clinical utility in daily life activities.

Comparison with Literature: These findings are consistent with previous randomized trials reporting short-term pain relief and improved shoulder function with corticosteroid injections (Page et al., 2016; Hay et al., 2003). While the long-term efficacy remains uncertain, the current study supports their use as a safe and effective short-term intervention in SIS.

Limitations: The study was limited by a small sample size, lack of control group, and short follow-up. Future research should incorporate larger randomized controlled trials with long-term follow-up to compare corticosteroid injections with alternative modalities such as physiotherapy or platelet-rich plasma injections.

Conclusion: Subacromial corticosteroid injections significantly improved shoulder ROM, muscle strength, pain, and functional ADL in patients with SIS. They remain a valuable treatment modality for symptomatic relief and functional recovery in mild to moderate SIS.

1. Range of Motion (ESSES Score)

Table 1: Abduction (Right and Left Shoulder)

Interpretation	Right Pre (%)	Right Post (%)	Left Pre (%)	Left Post (%)	Significance
Poor	5 (26.3)	2 (10.5)	6 (54.5)	0	-2.581 (S) / -3.017 (S)
Good	12 (63.1)	6 (31.6)	5 (45.5)	6 (45.5)	
Excellent	2 (10.5)	11 (57.9)	0	5 (54.5)	

Table 2: Forward Flexion (Right and Left Shoulder)

Interpretation	Right Pre (%)	Right Post (%)	Left Pre (%)	Left Post (%)	Significance
Poor	3 (15.8)	1 (5.25)	5 (45.5)	0	-3.121 (S) / -3.035 (S)
Good	14 (73.68)	6 (31.6)	6 (54.5)	6 (54.5)	
Excellent	2 (10.5)	12 (63.15)	0	5 (45.5)	

Table 3: Internal Rotation (Right and Left Shoulder)

Interpretation	Right Pre (%)	Right Post (%)	Left Pre (%)	Left Post (%)	Significance
Poor	5 (26.3)	0	5 (45.5)	0	-3.255 (S) / -3.071 (S)
Good	12 (63.1)	10 (52.63)	6 (54.5)	7 (63.64)	
Excellent	2 (10.5)	9 (47.37)	0	4 (36.36)	

Table 4: External Rotation (Right and Left Shoulder)

Interpretation	Right Pre (%)	Right Post (%)	Left Pre (%)	Left Post (%)	Significance
Poor	5 (26.3)	2 (10.5)	6 (54.5)	0	-3.070 (S) / -2.980 (S)
Good	12 (63.1)	5 (26.31)	5 (45.5)	7 (63.64)	
Excellent	2 (10.5)	12 (63.15)	0	4 (36.36)	

2. Strength Assessment (ASES Score)

Table 5: Elevation/Flexion Strength (Right and Left Shoulder)

Interpretation	Right Pre (%)	Right Post (%)	Left Pre (%)	Left Post (%)	Significance
Poor	0	0	0	0	-2.496 (S) / -2.887 (S)
Good	6 (31.6)	4 (21.06)	9 (81.8)	4 (36.36)	
Excellent	13 (68.4)	15 (78.94)	2 (18.19)	7 (63.64)	

Table 6: Abduction Strength (Right and Left Shoulder)

Interpretation	Right Pre (%)	Right Post (%)	Left Pre (%)	Left Post (%)	Significance
Poor	0	0	0	0	-2.887 (S) / -2.887 (S)
Good	7 (36.9)	5 (26.31)	9 (81.81)	4 (36.36)	
Excellent	12 (63.1)	14 (73.7)	2 (18.19)	7 (63.64)	

3. Pain and ADL Assessment (ASES & VAS Score)

Table 7: Subjective Pain (Right and Left Shoulder)

Interpretation	Right Pre	Right Post	Left Pre	Left Post	Significance
Poor	10	2	8	3	-3.430 (S) / -2.831 (S)
Good	7	4	2	3	
Excellent	2	13	1	5	

Table 8: Activities of Daily Life (ADL)

Interpretation	Pre	Post	Significance
Poor	6	3	-3.382 (S)
Good	11	2	
Excellent	2	14	

Table 9: Visual Analogue Scale (VAS) Pain Score

Interpretation	Right Pre	Right Post	Left Pre	Left Post	Significance
Poor	5	1	6	0	-3.134 (S) / -3.020 (S)
Good	13	5	5	7	
Excellent	1	13	0	4	

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