ORIGINAL ARTICLE

Comparison of Subacromial Ketorolac Injection Vs Subacromial Steroid Injection in the treatment of Shoulder Impingement Syndrome

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ABSTRACT

Aim: To compare the outcome of subacromial ketorolac injection versus subacromial steroid injection in Shoulder Impingement Syndrome.

Methodology: This randomized controlled trial was done at the Department of Orthopedics Unit II, Mayo Hospital, Lahore from 26th April 2018 to 25th October 2018. The sample size was 218 patients 15 to 60 years of age with shoulder impingement syndrome, were included and patients with a fracture or rotator cuff tear who presented with weakness and muscle wasting, taking regular systemic NSAIDs or steroids, history of gastrointestinal (GI) ulcers and bleeding disorders were excluded. Randomization was done by lottery method. Group A (ketorolac group) was given a single injection of 60 mg ketorolac mixed with 1 ml 2% lidocaine and Group B (steroid group) was given 40 mg methylprednisolone mixed with 1 ml 2% lidocaine. All patients were followed up on 4th weeks.

Results: Out of 218 patients, 117 (53.67%) were males and 101 (46.33%) were females with a male to female ratio of 1.2:1. The mean age of patients in group A was 39.09±9.90 years and in group, B was 38.08±8.61 years. The mean post-injection VAS score in group A was 2.80±0.94 and in a group, B was 4.20 ± 0.98 with a p-value of <0.001. The mean post-injection constant score in group A was 31.59±6.86 and in group, B was 41.31±4.56 with a p-value of <0.001.

Conclusion: Sub-acromial ketorolac injection showed a better mean pain score and constant score than subacromial steroid injection in patients with shoulder impingement syndrome.

Keywords: Shoulder Impingement Syndrome, subacromial ketorolac injection, subacromial steroid injection,

INTRODUCTION

Periarticular shoulder disorder refers to a set of diverse diseases including subacromial and subdeltoid bursitis, rotator cuff tendinitis, calcific tendinitis, and rotator cuff tear with or without adhesive capsulitis leading to shoulder pain and restricted range of motion (ROM)¹. Patient present with pain on elevating the arm or when lying on the affected side. Shoulder pain is the third most common musculoskeletal complaint in orthopaedic practice,² and impingement syndrome is one of the more common underlying diagnoses. On a pathophysiological basis, it can have various functional, degenerative, and mechanical causes. The impingement hypothesis assumes a pathophysiological mechanism in which different structures of the shoulder joint come into mechanical conflict².

A representative cross-sectional study has shown that approximately 30% of the Finnish population over age 30 suffers from occasional or persistent shoulder pain in the course of a single month³. Another study has shown that 16% of the population has shoulder pain in one month. Peak incidence is during the sixth decade of life.⁴ The most common clinical diagnoses are rotator cuff defects (85%) and/or impingement syndromes (74%). The prevalence of rotator cuff defects rises with age. Up to 30% of persons over age 70 have a total defect, but 75% of such cases are asymptomatic⁴. The goal of treatment is to eliminate pain and restore joint function. Good and very good results can be achieved with conservative and surgical methods in

approximately 80% of cases⁵. There are still no valid measuring instruments or prospective studies showing which patients stand to benefit from conservative treatment or surgery^{6,7,8}. There is as yet no German guideline on this topic; a Dutch guideline on subacromial pain was issued in 2014⁹. Shoulder impingement syndrome is usually treated conservatively including resting, non-steroidal anti-inflammatory drugs (NSAIDs), sub-acromial injections (corticosteroids, local anaesthetics, hyaluronate and recently tenoxicam), suprascapular nerve blockage, and physical and manual therapy^{10,11}.

Steroid injections are widely utilized and are a well accepted method of treatment for patients with subacromial impingement syndrome who have not responded to more conservative therapies^{12,13}. Since steroids are effective mainly because of their anti inflammatory properties, there is an argument to use local injections of NSAIDs to decrease inflammation in the subacromial space. There is evidence that subacromial injections of NSAIDs may provide pain relief and restoration of function in shoulder impingement syndrome. Ketorolac is an NSAID that acts by inhibiting the synthesis of prostaglandins which is used for the treatment of moderate to severe pain^{14,16}.

The study objective was to compare the treatment outcome of two groups in terms of pain and function.

MATERIALS AND METHODS

This randomized controlled trial was done using a probability simple random sampling technique in the Department of Orthopedics Unit II, Mayo Hospital, Lahore from 26th April 2018 to 25th October 2018. The sample size

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was 218 patients, aged between 15 to 60 years with shoulder impingement syndrome for a duration of more than one month were included and patients with prior operations of the shoulder joint, fracture or a major tear of the rotator cuff presenting with weakness and muscle wasting, injection in the same shoulder within the previous 2 months, taking regular systemic NSAIDs or steroids and gastrointestinal ulcers or bleeding disorders were excluded.

After approval from the local ethical committee, informed written consent was obtained from all the patients. Shoulder Impingement Syndrome was defined as patients with a history of pain (VAS =3-10) with passive and active abduction and positive Neer sign and Hawkins-Kennedy test (elevate the patient's arm to test for reproducible pain) was taken as positive. All patients were offered to pick up a slip from total mixed up slips (half-slips contained the letter 'A' and the other half slips contained the letter 'B') and he/she was placed in that respective group. Group A (ketorolac group) was given a single injection of 60 mg ketorolac mixed with 1 ml 2% lidocaine and Group B (steroid group) was given 40 mg methylprednisolone mixed with 1 ml 2% lidocaine. The outcome was measured after 4 weeks of subacromial injection in terms of following i.e. Mean Pain score, it was assessed by a visual analogue scale with 0 no pain and 10 worst pain. Mean Constant's score was assessed for function evaluation (pain, activity level, and range of motion with standard goniometry).

Statistical analysis was performed using SPSS version 20.0. Mean and standard deviation was calculated for age, BMI, duration of disease, pre-injection and post-injection VAS score and constant's score. Frequencies and

percentages were calculated for gender and diabetes mellitus (yes/no). An independent sample t-test was used to compare post-injection VAS score and constant's score in both groups and a p-value of ≤ 0.05 was taken as significant. P-value ≤ 0.05 was considered significant.

RESULTS

Out of 218 patients, 117(53.67%) were males and 101(46.33%) were females with a male to female ratio of 1.2:1. In group-A, there were 54(49.54%) male and 55(50.46%) female cases while in group B there were 63(57.80%) male and 46(42.20%) female cases. The mean age in group-A and group-B was 39.09 ± 9.90 years and 38.08 ± 8.61 years. The mean BMI in group-A was 29.07 ± 2.60 and in group, B was 29.32 ± 2.31 . The age, gender and BMI distribution were statistically the same in both study groups, p-value > 0.05 .

The mean pain at baseline in group-A was 6.34 ± 1.34 and in group-B was 6.61 ± 1.10 on the visual analogue score with no significant difference, p-value > 0.05 . After treatment the mean pain was statistically less in group-A (2.8 ± 0.94) when compared with group-B (4.2 ± 0.98), p-value < 0.001 . The mean constant score in group-A and group-B was statistically same at baseline i.e. 66.49 ± 10.85 and 65.99 ± 9.91 respectively, p-value > 0.05 while after treatment the mean constant score was statistically less in group-A (31.59 ± 6.86) as compared to group-B (41.31 ± 4.56), p-value < 0.001 .

Table-I: comparison of demographic and clinical parameters in both groups

	Group A (n=109)	Group B (n=109)	p-value
Age (years)	39.09 ± 9.90	38.08 ± 8.61	> 0.05
BMI	29.07 ± 2.60	29.32 ± 2.31	> 0.05
Pain baseline	6.34 ± 1.34	6.61 ± 1.10	> 0.05
Mean pain post injection	2.8 ± 0.94	4.2 ± 0.98	< 0.001
Constant score baseline	66.49 ± 10.85	65.99 ± 9.91	> 0.05
Constant score Post injection	31.59 ± 6.86	41.31 ± 4.56	< 0.001

DISCUSSION

Periarticular shoulder disorder refers to a set of diverse diseases including subacromial and subdeltoid bursitis, rotator cuff tendinitis, calcific tendinitis, and rotator cuff tear with or without adhesive capsulitis leading to shoulder pain and restricted range of motion (ROM)^{17,18}. Shoulder impingement syndrome is usually treated conservatively including resting, NSAIDs, subacromial injections (corticosteroids, local anaesthetics, hyaluronate and recently tenoxicam), suprascapular nerve blockage, and physical and manual therapy¹⁹⁻²².

This study was conducted to compare the outcome of subacromial ketorolac injection versus subacromial steroid injection in Shoulder Impingement Syndrome. The age range in this study was from 15 to 60 years with a mean age of 28.53 ± 9.42 years. The mean age of patients in group A was 39.09 ± 9.90 years and in group, B was 38.08 ± 8.61 years. The majority of the patients 118 (54.13%) were between 31 to 40 years of age. Out of 218 patients, 117(53.67%) were males and 101 (46.33%) were females with a male to female ratio of 1.2:1. The mean post-injection

VAS score in group A was 2.80 ± 0.94 and in a group, B was 4.20 ± 0.98 with a p-value of < 0.001 . The mean post-injection constant score in group A was 31.59 ± 6.86 and in group, B was 41.31 ± 4.56 with a p-value of < 0.001 . In a study, the mean post-injection VAS score at 4 weeks was 3.75 ± 1.71 in the steroid group while 4.45 ± 1.96 in the ketorolac group. Similarly, the constant's score for function assessment was 29.1 ± 17.70 and 36.9 ± 19.42 respectively¹⁶. Min et al compared the efficacy of a single subacromial injection of ketorolac with a single injection of methylprednisolone in 32 patients with impingement syndrome. They found that ketorolac was equally effective in the treatment of shoulder impingement with better improvement in the University of California at Los Angeles (UCLA) shoulder scores during a 4-week follow-up²³.

Min et al performed the same study on 48 patients and showed that, at 4 weeks, a ketorolac injection had better efficacy than triamcinolone injections, as proved by the improvements of the UCLA Shoulder Assessment Score, forward flexion strength, and patient satisfaction²⁴. Karthikeyan et al²⁵ compared the efficacy of a single

subacromial injection of tenoxicam, with a single injection of methylprednisolone in patients with impingement syndrome. Although tenoxicam injection exerted positive effects, they found significantly greater improvements in the methylprednisolone group. Their results were different from our study and this could be due to the low potency of analgesic effect of tenoxicam compared to methylprednisolone or ketorolac.

In a study²⁶ twenty patients with shoulder impingement syndrome received an injection of 60mg ketorolac and were evaluated in terms of visual analogue scale (VAS), range of motion (ROM) and Constant-Murley score. The outcomes are compared with the data of patients treated by 40mg triamcinolone injection, retrospectively. There was no significant difference in the demographics, VAS, ROM, and Constant-Murley score between the two groups before the injection. At the 4 weeks follow-up, pain improvement was significantly greater in the corticosteroid group (2.7 ± 1.53) than in the ketorolac group (4.9 ± 2.08 ; $p < 0.001$). However 12 weeks after the injection, there was no significant difference in pain improvement between the two groups (ketorolac: 2.9 ± 2.32 , corticosteroid: 2.6 ± 1.82 ; $p = 0.707$). The Constant-Murley score at the final follow-up improved from 33.5 to 52.1 in the corticosteroid group, and from 39.0 to 56.6 in the ketorolac group ($p = 0.677$). ROM was increased in both groups, and external rotation was significantly greater in the ketorolac group than in the corticosteroid group at the final follow-up (ketorolac: $29.3^\circ \pm 9.90^\circ$, corticosteroid: $20.8^\circ \pm 7.99^\circ$; $p = 0.005$)²⁶. In another study, where subacromial corticosteroid injection was given in shoulder impingement syndrome showed overall improvement in 31(91.2%) patient with three out of 31 required the second dose of injection till last follow-up (p -value < 0.001)²⁷.

In another study¹, forty patients having shoulder impingement syndrome with findings of rotator cuff tendinitis or subacromial bursitis on magnetic resonance imaging were included in the study. Patients were randomized into two subacromial injection groups: patients in the first group (10 males, 10 females; mean age 45.3 years; range 32 to 67 years) were administered 20 mg tenoxicam three times by weekly intervals, and patients in the second group (8 males, 12 females; mean age 46.5 years; range 29 to 73 years) were administered 40 mg methylprednisolone acetate just for once. Visual analogue scale (VAS), active range of motion (ROM) of the shoulder joint, and Disabilities of Arm, Shoulder and Hand (DASH) questionnaire scores were evaluated at baseline, six weeks after treatment, and the first year. Visual analogue scale, DASH, and active ROM scores in both groups were statistically significantly improved. No statistically significant difference was detected between subacromial tenoxicam and steroid injections in terms of post-treatment VAS, DASH, and active ROM scores. Mean pre-and post-treatment VAS scores in the tenoxicam group were 7.8 (range, 3-9) and 2.6 (range, 2-4), respectively. Mean pre-and post-treatment VAS scores in the steroid group were 6.2 (range, 3-10) and 3.6 (range, 0-7), respectively. Mean pre-and post-treatment DASH scores in the tenoxicam group were 59.4 (range, 45-80) and 14.7 (range, 8.3-25.8), respectively. Mean pre-and post-treatment DASH scores in the steroid group were 56.7 (range, 33.3-85.8) and 18.1

(range, 0-69.2), respectively. Although the improvement in active ROM was higher in the steroid group, the difference between the two groups was not statistically significant.¹

CONCLUSION

This study concluded that subacromial ketorolac injection shows a better mean pain score and constant score than subacromial steroid injection in patients with Shoulder Impingement Syndrome. So, we recommend that subacromial ketorolac injection should be used routinely in patients with Shoulder Impingement Syndrome to reduce their morbidity.

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