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A Comparative Study Between the Effect of Intraarticular Triamcinolone and Methylprednisolone Injection in Adhesive Capsulitis

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ABSTRACT
Retraction of the anterior glenohumeral joint capsule, causing pain and range of motion restriction, is the hallmark of adhesive capsulitis, often known as frozen shoulder, which typically occurs in the absence of intrinsic shoulder illness. To compare efficacy between a single dose of intra-articular Triamcinolone and Methylprednisolone injection in management of adhesive capsulitis in a tertiary care hospital in eastern India (Kolkata). it is a prospective observational study, This study was conducted from July 2019 to June 2020, Place of study were Department of Physical Medicine and Rehabilitation And Department Of Pharmacology, R G Kar Medical College and Hospital, Kolkata and total sample size 84. In Group A, the mean SDQ-1 (Mean±S.D.) of patients was 65.50±6.92. In Group B, the mean SDQ-1 (Mean±S.D.) of patients was 76.43±4.99. Distribution of mean SDQ-1 with Group was statistically significant ($p<0.0001$). We concluded that both methylprednisolone and triamcinolone intra-articular injections work well to treat adhesive capsulitis. Triamcinolone may provide a slightly faster improvement in functional outcome and pain reduction during the first month of treatment.

INTRODUCTION

Retraction of the anterior glenohumeral joint capsule, causing pain and range of motion restriction, is the hallmark of adhesive capsulitis, often known as frozen shoulder, which typically occurs in the absence of intrinsic shoulder illness. Shoulder movement is severely limited and both active and passive range of motion gradually disappear. Patients who use the outpatient services at the Physical Medicine and Rehabilitation department frequently complain about it. It is thought to impact up to 20% of those with diabetes mellitus and 2-5% of the general population. (1) There are two types of causes: primary (idiopathic) and secondary (which includes diabetes mellitus, hemiparesis, rotator cuff tears and cardiovascular disorders). Codman originally used the term "frozen shoulder" in 1934, while Naviesar first used the term adhesive capsulitis in 1945[1]. The reason the condition is referred to as "frozen" shoulder is that the likelihood of using the shoulder decreases with increasing pain. When the shoulder is not used, the capsule around it thickens and tightens, making the shoulder much harder to move-it becomes "frozen" in place. Because of their limited movement and postures, people with adhesive capsulitis typically have excruciating pain that worsens when they lie still, which makes it difficult for them to sleep for extended periods of time.

Adhesive capsulitis is described as "a condition of uncertain aetiology characterised by significant restriction of both active and passive shoulder motion that occurs in the absence of a known intrinsic shoulder disorder" by the American Shoulder and Elbow Surgeons (ASES)[2]. Disagreement exists, meanwhile, over the precise range of motion (ROM) restriction associated with this illness, which obscures the clinical diagnosis. (4) Three stages are typically associated with adhesive capsulitis: Stage 1 (freezing stage) is characterized by increasing pain and stiffness for two to nine months; Stage 2 (frozen stage) is characterized by persistent stiffness for four to twelve months; and Stage 3 (thawing stage) is characterized by spontaneous recovery for twelve to forty-two months (5). Despite being frequently characterized as a self-limiting illness that resolves on its own in two to three years, up to 40% of individuals may continue to have symptoms and 7-15% may lose some degree of functionality permanently[3].

MATERIALS AND METHODS

Study design: prospective observational study.

Place of study: Department of Physical Medicine and Rehabilitation and Department of Pharmacology, R.G Kar Medical College and Hospital, Kolkata.

Sample size: 84

Study period: From July 2019 to June 2020.

Inclusion criteria:

- Diagnosed and staged of adhesive capsulitis of shoulder by attending expertise of PMR OPD
- After completing 6 months ofconservative therapy and indicated for intra-articular steroid injection by the physician
- Age >18 years, any gender, any race, any socio-economical status

Exclusion criteria:

- Unwilling, non-cooperative patients
- Any obvious contraindication for steroid injection.
- Any previous history of bony fracture, joint dislocation, rotator cuff injury
- Any history of bony cancer, severe osteoporosis.
- Any hematological disorder
- Any immunodeficiency disorder

Study tools:

- Pre designed proforma
- Spirit
- Providone iodine
- Gauge piece
- Gloves
- Stethoscope and sphygmomanometer
- Pulse oxymeter
- Syringe and needle
- Inj Lignocaine
- Normal Saline
- Injection steroid (triamcinolone and Methylprednisolone)
- Apron

Statistical analysis: For statistical analysis, data were initially entered into a Microsoft Excel spreadsheet and then analyzed using SPSS (version 27.0; SPSS Inc., Chicago, IL, USA) and GraphPad Prism (version 5). Numerical variables were summarized using means and standard deviations, while categorical variables were described with counts and percentages. Two-sample t-tests, which compare the means of independent or unpaired samples, were used to assess differences between groups. Paired t-tests, which account for the correlation between paired observations, offer greater power than unpaired tests. Chi-square tests (χ^2 tests) were employed to evaluate hypotheses where the sampling distribution of the test statistic follows a chi-squared distribution under the null hypothesis, Pearson's chi-squared test is often referred to simply as the chi-squared test. For comparisons of unpaired proportions, either the chi-square test or Fisher's exact test was used, depending on the context. To perform t-tests, the relevant formulae for test statistics, which either

exactly follow or closely approximate a t-distribution under the null hypothesis, were applied, with specific degrees of freedom indicated for each test. p-values were determined from Student's t-distribution tables. A $p \leq 0.05$ was considered statistically significant, leading to the rejection of the null hypothesis in favour of the alternative hypothesis.

RESULT AND ANALYSIS

In Group A, the mean SDQ-0 (Mean±S.D.) of patients was 86.33±5.73. In Group B, the mean SDQ -0 (Mean±S.D.) of patients was 86.57±4.05. Distribution of mean SDQ-0 with Group was not statistically significant (p = 0.803). In Group A, the mean SDQ-1 (Mean±S.D.) of patients was 65.50±6.92. In Group B, the mean SDQ-1 (Mean±S.D.) of patients was 76.43±4.99. Distribution of mean SDQ-1 with Group was statistically significant (p<0.0001). In Group A, the mean SDQ-2 (mean± s.d.) of patients was 30.16±4.90. In Group B, the mean SDQ-2 (Mean±S.D.) of patients was 57.57±6.07. Distribution of mean SDQ-2 with Group was statistically significant (p<0.0001). In Group A, the mean SDQ-3 (Mean±S.D.) of patients was 16.09±5.01. In Group B, the mean SDQ-3 (Mean±S.D.) of patients was 31.87±8.03. Distribution of mean SDQ-3 with Group was statistically significant (p<0.0001). In Group A, the mean VAS -0 (Mean±S.D.) of patients was 8.23±0.82. In Group B, the mean VAS -0 (Mean±S.D.) of patients was 7.95±0.79. Distribution of mean VAS-0 with Group was not statistically significant (p = 0.115). In Group A, the mean VAS-1 (Mean±S.D.) of patients was 5.93±0.78. In Group B, the mean VAS-1 (Mean±S.D.) of patients was 6.95±0.73. Distribution of mean VAS-1 with Group was statistically significant (p<0.0001). In Group A, the mean VAS-2 (Mean±S.D.) of patients was 4.55±0.67. In Group B, the mean VAS-2 (Mean±S.D.) of patients was 5.81±0.67. Distribution of mean VAS-2 with Group was statistically significant (p<0.0001). In Group A, the mean VAS-3 (Mean±S.D.) of patients was 1.95±0.73. In Group B, the mean VAS-3 (Mean±S.D.) of patients was 3.83±0.76. Distribution of mean VAS-3 with Group was statistically significant (p<0.0001). In Group A, the mean BMI (Mean±S.D.) of patients was 23.59±2.79. In Group B, the mean BMI (Mean±S.D.) of patients was 24.10±2.03. Distribution of mean BMI with Group was not statistically significant (p = 0.352) (Table 1, 2 and Fig. 1).

DISCUSSION

The present investigation revealed no noteworthy dissimilarities in the average ages of the two cohorts, which were 52.33±6.16 years and 50.55±7.92 years, respectively. According to earlier research, the majority age group in both categories (50 and 45.2%) was 41-50 years old.

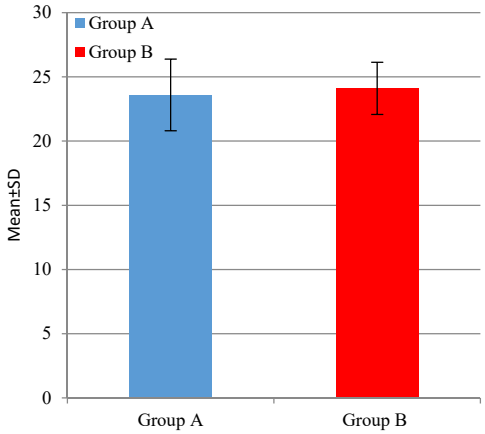

Fig. 1: Comparison of study group A and B

Table 1: Comparison of study groups according to SDQ-Adjusted score (n = 84)

SDQ	Group A (N = 42)	Group B (N = 42)	p-value
SDQ-0			
Mean±SD	86.33±5.73	86.57±4.05	0.8030
Median	87.5	87.5	
Range	75-93.8	82.3-93.8	
SDQ-1			
Mean±SD	65.50±6.92	76.43±4.99	<0.0001
Median	62.5	75	
Range	56.3-75	68.8-82.3	
SDQ-2			
Mean±SD	30.16±4.90	57.57±6.07	<0.0001
Median	32.3	56.3	
Range	25-37.5	50-68.8	
SDQ-3			
Mean±SD	16.09±5.01	31.87±8.03	<0.0001
Median	12.5	31.3	
Range	6.3-25.0	18.8-43.8	

Table 2: Comparison of study groups according to VAS score (n = 84)

VAS	Group A (N = 42)	Group B (N = 42)	p-value
VAS -0			
Mean±SD	8.23±0.82	7.95±0.79	0.1150
Median	8	8	
Range	7-10	7-9	
VAS-1			
Mean±SD	5.93±0.78	6.95±0.73	<0.0001
Median	6	7	
Range	5-7	6-8	
VAS-2			
Mean±SD	4.55±0.67	5.81±0.67	<0.0001
Median	4	6	
Range	4-6	5-7	
VAS-3			
Mean±SD	1.95±0.73	3.83±0.76	<0.0001
Median	2	4	
Range	1-3	3-5	

The male to female ratio in this study was 1.63. The gender ratio was the same for both groups. Prior research by Sakeni *et al*.[4] showed same kind of female preponderance among adhesive capsulitis patients.

Regarding BMI, weight and height, there were no notable variations seen between the two groups. The mean BMI for Group A was 23.59±2.79 kg/m^2 and for Group B it was 24.10±2.03 kg/m^2. The average height and weight of the two groups were 156.0±7.01 cm and 158.29±8.14 cm, respectively and 60.68±9.04 kg and 57.75±10.16 kg, respectively..

According to this survey, the majority of the studied populations were literate up to middle school (33.4%) and high school (37.0%). The majority of the

population (64.3%) had a per capita family income of more than 2000 Indian rupees, while the majority of the population (39.3%) were semiskilled workers.

There were no discernible variations in the length of pain experienced by either group when compared. The two groups' respective means were 6.12±2.04 months and 6.09±2.00 months.

We discovered that the patient's dominant shoulder pain interferes with their ability to perform their daily tasks. Out of the 84 patients, 60.7% reported having pain in their dominant shoulder, whereas 39.3% reported having discomfort in their non-dominant shoulder.

Despite this, there was no variation in the baseline disability score (mean SDQ score 86.57±4.05 in the methylprednisolone group and 86.33±5.73 in the triamcinolone group). Compared to methylprednisolone, the patient treated with triamcinolone responded better on the second visit. Following three appointments at two, four and twelve weeks, the triamcinolone group's SDQ score was noticeably higher than that of the methylprednisolone group. p<0.0001.

Nevertheless, the baseline pain score (mean VAS score 8.23±0.82 for the triamcinolone group and 7.95±0.79 for the methylprednisolone group) did not differ either. Compared to methylprednisolone, the patient treated with triamcinolone responded better on the second visit. The triamcinolone group showed a significantly better VAS score than the methylprednisolone group at the following three visits, which were in two, four and twelve weeks. p-value was less than 0.0001. This study and the study of are related[5].

Rizk *et al*.[6] found that While intraarticular methylprednisolone injections did not improve shoulder range of motion, two thirds of patients experienced temporary, partial pain alleviation. Based on our findings, it appears that the triamcinolone injection's efficacy may extend beyond the uncomfortable freezing phase to the sticky phase.

In every instance of ROM flexion, ROM abduction, ROM internal rotation and ROM external rotation, intraarticular triamcinolone performs noticeably better on consecutive visits than methylprednisolone.

First of all, since a set dosage was employed in this investigation, it is improbable that these results may be attributed to dosage variations. Secondly, from the pharmacological point of view there were pharmacokinetic or pharmacodynamic variations between triamcinolone acetonide and methylprednisolone acetate. And thirdly some studies of Eustace *et al*.[7] thought that correct intra-articular injections were associated with superior clinical outcomes. They also recommended doing it under a fluoroscope.

Since more than half of the intraarticular injections performed in this trial using the anterior technique failed to reach the desired position in the glenohumeral joint, the posterior approach was used instead of the anterior approach by Eustace *et al*.[7] Furthermore, the rheumatologist benefits from the needle mobility technique in terms of precisely administered injections. As a result, the likelihood of prejudice is reduced.

CONCLUSION

We concluded that both methylprednisolone and triamcinolone intra-articular injections work well to treat adhesive capsulitis. Triamcinolone may provide a slightly faster improvement in functional outcome and pain reduction during the first month of treatment. In the end, though, both corticosteroids offer significant advantages in terms of symptom management and enhanced shoulder function. Larger sample sizes and longer follow-up times are required for more research in order to validate these results and create definite treatment guidelines.

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