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Manipulation Under Anesthesia with Intra-Articular Steroid Injection versus Manipulation under Anesthesia in Idiopathic Adhesive Capsulitis of the Shoulder in terms of Functional Outcome

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ABSTRACT

Objective: To compare the outcome between manipulation under anaesthesia with intra-articular steroid injection in patients with shoulder adhesive capsulitis.

Study Design: Retrospective longitudinal study

Place and Duration of Study: Dr. Ziauddin Hospital, Karachi Pakistan, from Sep 2019 to Feb 2020.

Methodology: A total of 70 patients diagnosed with primary ACS were distributed into two groups, i.e., Group-M (35 in manipulation under anaesthesia only) and Group-MI (35 in manipulation under anaesthesia with an intra-articular steroid injection). All patients were assessed for shoulder pain and disability index along with the pain severity on the visual analogue scale at each subsequent visit on the first week, 1st, third and sixth months after the intervention.

Results: The results indicated a significant time effect (p=0.001) in both groups. The mean shoulder pain, disability index and pain on the visual analogue scale were lesser in the MI-Group than in the M-Group. Further, we found a statistically significant difference in mean shoulder pain (p=0.001) and disability index (p=0.016) between groups at six months.

Conclusion: In the initial post-procedure period and over six months of follow-up, MI showed improved outcomes than M. These patients require additional counselling and motivation for long-term physical therapy programs even after intervention for optimal results.

Keywords: Adhesive capsulitis of the shoulder, Intra-articular steroid injection, Manipulation under anaesthesia.

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INTRODUCTION

Adhesive capsulitis of the shoulder (ACS) or frozen shoulder is characterized by disabling pain and constrained movements, often accompanied by disability to work and perform daily activities along with disrupted sleep, with a prevalence of up to 5% in the general population.[1] Incidence of ACS is 3-5% in general population, reaching up to 20% in diabetic patients.[2] It is more frequent in women of 40-60 years, and the disease is bilateral in one-fourth of the patients.[3,4]

Pain and decreased range of motion (ROM) are the standard symptoms throughout the ACS course.[5] These symptoms may persist for 12-24 months. About 10% of the affected population never recover full ROM.[6] v Manipulation under anaesthesia (MUA) is the most commonly used non-conservative treatment for ACS.[7] During MUA, the tight shoulder joint capsule is stretched and torn. It is a time-effective procedure, simple to perform, which results in rapid restoration of the shoulder joint ROM along with the reduction in symptoms of ACS.[8]

Although ACS is known to be a mild and self-limiting disease, there is a definite disability in daily activities alongside pain, leading to limited functionality.[9] Hence, controlling symptoms and decreasing the extent of disability should be key goals of ACS management. Combining ICSI and MUA may be a favoured choice for some surgeons in managing refractory idiopathic ACS.[10] However, the advantage of adding ICSI to MUA needs to be clarified. Thus, we conducted a retrospective cohort study to assess the effect of MUA with ICSI on pain severity and functional outcomes in patients with ACS. This study would also help create data for Pakistan & fill the gap in the literature.

METHODOLOGY

This retrospective longitudinal study was carried out at Ziauddin Hospital, Karachi, from September 2019 to February 2020. Ethical approval was obtained from ERC (Ref# ERC-8-2021). The sample size was estimated by considering abduction at one week as 112.1 ± 15.8 in M-Group and 121.6±12.6 in MI-Group.[9]

Inclusion Criteria: Patients aged 40 to 55 years, of either gender having shoulder pain along with stiffness

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for at least one month, with normal imaging and reduction in passive movement of shoulder >30 in at least two planes (flexion, abduction, and external rotation) when compared with the opposite side, were included in the study

Exclusion Criteria: Patients with secondary ACS, infection at the injection site, and patients who cannot receive anaesthesia (like patients with severe cardiac or pulmonary dysfunction), were excluded from the study.

Non-probability consecutive sampling technique was applied. Of the enrolled patients, seven patients were excluded due to bilateral involvement, five patients due to incomplete preoperative or follow-up data, and eight patients had secondary ACS, such as osteoarthritis, calcific tendinopathy, rotator cuff rupture, or rheumatic diseases, and thus were excluded. The remaining 70 patients diagnosed with primary ACS were distributed into two groups, MUA only (Group-M) and MUA plus ICSI (Group-MI), of 35 patients each.

Demographic and clinical data of all the included patients were extracted from the previous records at each subsequent visit on one week, 1, 3 and 6 months after the intervention; pain intensity and shoulder function were assessed by the SPADI (shoulder pain and disability index).[10] The patient was asked to point out the worst pain they felt when the affected shoulder was at rest, and the pain was measured using the VAS (visual analogue scale).[10,11]

Manipulation was done under general anaesthesia after receiving anaesthesia fitness; only manual abduction of the affected shoulder was done on the anatomic plane to the extent of the contralateral shoulder. The patient was placed in a supine position with the affected side close to the edge of the operating table; the surgeon gripped and pushed the distal humerus superiorly using one hand and meanwhile pressing on the lateral aspect of the proximal humerus using the other hand to avoid shoulder dislocation. During manipulation, a cracking sound or characteristic feeling of adhesive tissue breakdown in the shoulder was commonly felt and was seen as a sign to confirm the diagnosis of ACS. Group-MI also received an ICSI immediately following MUA. ICSI has performed under aseptic conditions with a 21G needle with Depomedrol 80 mg and 10 ml of 2% Lidocaine through a lateral approach by marking anatomic landmarks. Passive stretching exercises immediately commenced following Manipulation, and active self-exercises continued daily for the next week. All patients were prescribed analgesics as per need during the first week of intervention. Analgesics were similar in both groups to control the bias.

Statistical Package for Social Sciences (SPSS) version 26.0 was used for the data analysis. Quantitative variables were expressed as Mean±SD and qualitative variables were expressed as frequency and percentages. Repeated measure one-way ANOVA was applied to assess the difference in SPADI and VAS scores at different time intervals between both groups. Post-hoc Bonferroni test was applied to assess the pairwise difference. The unpaired Student t-test was used for comparison of the groups for mean SPADI and VAS scores in the sixth month. The p-value ≤0.05 was considered statistically significant.

RESULT

Of 70 patients, 55(78.5%) were males, and 15 (21.4%) were females. The range of age was between 40-55 years, with the mean age in the M-Group being 47.11±5.22 years and for the MI- Group, 47.74±4.49 years. The left shoulder was predominantly involved compared to the right in both groups. The mean duration of symptoms was 12.09 weeks in Group- M and 14.[11] weeks in Group- MI. Shoulder dislocation during MUA occurred in only one patient in the M-Group, manually repositioned immediately with no complications (Table-I).

Table-I: Baseline characteristics of Study Subjects (n=70)

Characteristics	Overall	Groups	
		Group-M (n=35)	Group-MI (n=35)
Age (years)	47.43±4.84	47.11±5.22	47.74±4.49
Gender			
Male	55(78.6)	28(80)	27(77.1)
Female	15(21.4)	7(20)	8(22.9)
Site			
Left	45(64.3)	26(74.3)	19(54.3)
Right	25(35.7)	9(25.7)	16(45.7)
Duration of symptoms (weeks)	13.10±2.66	12.09±2.03	14.11±2.84
Shoulder dislocation during MUA			
No	69(98.6)	34(97.1)	35(100)
Yes	1(1.4)	1(2.9)	0

Data presented as Mean±SD or n(%)

In Group- M (only MUA) and MI (MUA+ICSI), the mean SPADI scores were calculated. In Group-M, the mean shoulder pain decreased from 33.17 before intervention to 9.57 on a 6-month post-procedure follow-up visit. In both groups, MI, when mean baseline shoulder pain (p=0.001) and disability index

(p=0.001) were compared with post-intervention mean baseline shoulder pain and disability index, it showed a statistically significant difference. In Group-M (only MUA), the mean VAS decreased from 6.97 before intervention to 3.09 in 1 month. It gradually rose to 4.11 on the 6-month post-procedure follow-up visit, whereas in Group-MI (MUA+ICSI), the mean VAS dropped from 6.89 before intervention to 2.46 in one month and gradually increased to 3.29 on 6-month post-procedure follow up visit. The results indicated a significant time effect (p=0.001) in both groups. Follow-up pair-wise comparison for SPADI in both groups indicated that each pairwise difference was statistically significant (p=0.001). There was a significant decrease in SPADI scores over time in both groups. Follow-up pair-wise comparison for VAS score in both groups indicated that each pairwise difference was statistically significant (p=0.001), (Table-II).

Table-II: Comparison of SPADI and VAS score in both Groups at Different Time Intervals(n=70)

Groups	Pain (SPADI)					p-value
	Before intervention	1st week	1st month	3rd month	6th month	
Group-M (n=35)	33.17±3.25	26.86±3.15	19.71±2.79	14.03±2.85	9.57±2.33	0.001*
Group-MI (n=35)	32.49±4.05	21.14±3.82	16.11±3.33	12.06±2.97	8.20±2.01	0.001*
Disability (SPADI)						
Group-M (n=35)	57.46±6.65	48.37±7.56	40.03±7.13	34.63±6.54	23.83±4.82	0.001*
Group-MI (n=35)	56.63±8.82	44.34±8.45	31.77±8.01	25.11±6.47	18.00±4.96	0.001*
Pain (VAS)						
Group-M (n=35)	6.97±1.29	4.54±1.17	3.09±1.09	3.40±1.57	4.11±1.92	0.001*
Group-MI (n=35)	6.89±1.27	3.97±0.95	2.46±1.01	2.89±1.43	3.29±2.40	0.001*

*Data presented as Mean±SD, *Significant at level of significance as 0.05*

The mean shoulder pain, disability index and pain on VAS were compared between both groups in the sixth month. The mean shoulder pain, disability index and pain on VAS were lesser in the MI-Group than in the M-Group. Further, we found a statistically significant difference in mean shoulder pain (p=0.001) and disability index (p=0.016) between both groups at six months (Table-III).

Table-III: Comparison of mean SPADI and VAS score in both Groups at 6-months (n=70)

	Groups	Mean	SD	p-value
Pain (SPADI)	Group-M (n=35)	23.83	4.823	0.001*
	Group-MI (n=35)	18.00	4.965	
Disability (SPADI)	Group-M (n=35)	9.57	2.330	0.016*
	Group-MI (n=35)	8.20	2.012	
Pain (VAS)	Group-M (n=35)	4.11	1.922	0.116
	Group-MI (n=35)	3.29	2.408	

**Significant at level of significance as 0.05*

DISCUSSION

Frozen shoulder is a common, sometimes painful, but ultimately self-limiting condition usually managed in the primary care setting with a combination of analgesics, injections, and physiotherapy.[11] In the current study, and we found a significant decrease in SPADI and VAS in both groups at 6-month post-procedure follow-up visits.A study conducted by Song *et al*. found ICSI immediately after M delivered added benefits in rapid pain relief and reduction in disability for patients with ACS. However, combining ICSI and MUA did not improve clinical outcomes at 3- and 6-month follow-ups.[12]

Although the frozen shoulder is considered to be self-limited, which is likely to resolute over a year or two, authors recommended that in patients with established stiffness, manipulation is a superior option to other conventional treatments as they necessitate months to years of treatment to regain ROM.[13] MUA can be considered after six months of refractory symptoms in ACS. It includes controlled, forced re-establishment of shoulder movements. Elevation and abduction release the inferior capsule due to the capsule rupture from the humeral neck. Forced external rotation tears the coracohumeral ligament allowing for improvement of rotational movements.[14] Opponents argue that it cannot be seen or felt what other structures than the joint capsule are damaged during manipulation. In addition, severe complications of M have been reported, such as a humeral shaft fracture, glenoid rim fracture, shoulder dislocation, brachial plexus traction injury or intra-articular damage to the cartilage or rotator cuff.[13,15,16] Farrell *et al*.reported excellent results in 70% of patients treated with Manipulation at 15 years follow-up.[17] Wang *et al*.concluded that MUA accelerates ACS recovery and improves shoulder function and symptoms within a short period. They have also reported neither recurrence of symptoms in 8-year follow-up nor residual complications.[18]

Intra-articular corticosteroid injections have commonly been used to manage ACS for many years, quel-

ling inflammation and reducing the patient's symptoms. The number of injections, as well as the injection techniques used, varies.[19] Often corticosteroid injections are performed as a mixture with a local anaesthetic; in our study, we used Depomedrol 80 mg and 10 ml of 2% lidocaine**.** The improvement of ROM is attributed to the effect of the local anaesthetic medication that reduces the pain and the muscle spasm.[20]

LIMITATIONS OF STUDY

This study had a short follow-up period of 6 months. Therefore, prolonged effects of this intervention cannot be observed. Another limitation is that the manipulation can be performed under general anaesthesia, brachial plexus block, or cervical root nerve block, as described in a previous study. However, we have only used one method during MUA, general anaesthesia. Each method has different advantages; for example, the Nerve block provides analgesia during manipulation and prolonged analgesia for immediately commenced active and passive exercises following the intervention.

CONCLUSION

This study concluded that combining MI is a safe and effective approach for treating idiopathic ACS. Therefore, in the initial post-procedure period and over six months of follow-up, MI showed improved outcomes than M. These patients require additional counselling and motivation for long-term physical therapy programs even after intervention for optimal results.

Conflict of Interest: None.

Authors Contribution

Following authors have made substantial contributions to the manuscript as under:

NM: & MKA: Data acquisition, data analysis, drafting the manuscript, approval of the final version to be published.

SA: Data interpretation, critical review, approval of the final version to be published.

KA: Critical review, concept, study design, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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