

Comparison of Intraarticular Cortico Steroid Injection Combined With Sodium Hyaluronate versus Corticosteroid Alone for the Treatment of Unilateral De-Rangement of Temporomandibular Joint after Arthrocentesis

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ABSTRACT

Background: Internal derangements are the commonest disorders of temporomandibular joint (TMJ). Internal derangements are related to either acute or chronic insult of TMJ complex. Disk derangement with reduction often causes a painless clicking or popping sound when the mouth is opened. In general, management of TMJ-related conditions becomes necessary when pain or dysfunction are present.

Objective: To compare the outcome of intra-articular corticosteroid injection combined with sodium hyaluronate versus corticosteroid alone for treatment of internal derangement of temporomandibular joint after arthrocentesis.

Material & Methods: This was a randomized control trial conducted at Department of Oral & Maxillofacial Surgery, Rashid Latif Dental College, Lahore. Study was conducted during November 2023 to April 2024. After meeting the inclusion criteria 60 patients were enrolled. Informed consent and demographic information was taken from all the patients. Then patients were divided into two groups. Group A is treated with corticosteroid+sodium hyaluronate and group B was treated with corticosteroid alone. After 2 weeks, patients were evaluated for pain by using VAS and score was noted.

Results: The mean age of patients in group A was 35.13±11.89 years and in group B was 32.23±12.75 years. Male to female ratio was 0.8:1. The mean VAS in group A was 1.43±1.104 and in group B was 2.27±1.285 (p-value=0.009). The mean maximal mouth opening (MMO) in group A was 42.13±3.026 mm and in group B was 37.70±4.120 mm (p-value=<0.001).

Conclusion: Intra-articular corticosteroid injection combined with sodium hyaluronate showed significantly effective results for treatment of internal derangement of TMJ after arthrocentesis.

Keywords: TMJ, Arthrocentesis, Mouth opening, VAS, Corticosteroid Injection

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INTRODUCTION

Internal derangements are the commonest disorders of temporomandibular joint (TMJ).⁽¹⁾ TMJ dysfunction is a common problem and affects up to one-third of all adults

at some stage in their life. The most frequent cause of TMJ dysfunction is internal derangement which refers to an alteration in the normal pathways of motion of the TMJ that largely involves the function of the articular disc,

therefore, these alterations have been also referred to as disc derangement.⁽²⁾ TMJ disorders are an ever increasingly encountered clinical condition. Internal derangement, a type of disc interference disorder is cited as one of the most common.⁽³⁾ Different treatment modalities including conservative and surgical methods have been proposed to treat the same.⁽¹⁾

Arthrocentesis is gaining popularity in the treatment of internal derangement of TMJ. Being minimally invasive it does not have the demerits of surgical approaches and at the same time is producing better results than conservative approaches.⁽¹⁾ Arthrocentesis is a simple and safe procedure for patients with internal derangement of the TMJ with closed lock.⁽⁴⁾ In literature, it was found that intra-articular injection with corticosteroids and sodium hyaluronate seems to be an effective method for treating internal derangements of the TMJ.⁽⁵⁾ Intra-articular corticosteroid injections are occasionally administered to alleviate inflammation. Intra-articular corticosteroid injection has an unpredictable prognosis and can also lead to local side-effects on the joint.⁽⁴⁾

One study showed that mean pain score was 1.14 ± 0.690 with combination of intra-articular corticosteroid injection and sodium hyaluronate ($n=7$) while 2.57 ± 0.535 with corticosteroid alone ($n=7$). The difference was significant ($p\text{-value} < 0.05$). But mouth opening was 43 ± 2.380 mm with combination of intra-articular corticosteroid injection and sodium hyaluronate while 40.14 ± 2.734 mm with corticosteroid alone. The difference was insignificant ($p\text{-value} > 0.05$).⁽⁶⁾ The rationale of this study is to compare the outcome of intra-articular corticosteroid injection combined with sodium hyaluronate versus corticosteroid alone for treatment of internal derangement of TMJ after arthrocentesis. In literature, it has been reported that addition of corticosteroid can be helpful in reducing pain and can achieved normal maximal mouth opening after arthrocentesis. Moreover, addition of sodium hyaluronate solution can also help in further reduction of pain and improvement in mouth opening. But in routine, corticosteroid and sodium hyaluronate are not given after arthrocentesis due to cost of procedure, especially in poor resource setting. Moreover, the results of previous study (quoted above) are also not much reliable due to very small sample size ($n=7$ in each group). So through this study we want to get local magnitudes and implement the use of corticosteroid plus sodium hyaluronate after arthrocentesis for internal derangement of TMJ, by using a large sample size. This will help to improve our practice and more successful management protocol to be implemented in future.

Objective

To compare the outcome of intra-articular corticosteroid injection combined with sodium hyaluronate versus corticosteroid alone for treatment of internal derangement of temporomandibular joint after arthrocentesis

MATERIALS AND METHODS

This was a randomized Controlled Trial conducted at

Department of Oral and Maxillofacial Surgery, Rashid Latif Dental College, Lahore. Study was conducted during November 2023 to April 2024. Patients of age 16-60 years of either gender with internal derangement of TMJ (as per operational definition) undergoing arthrocentesis under general anesthesia. Following patients were excluded from the study. i.e. Patients with TMJ on both sides (on clinical examination). Patients with previous TMJ surgery, TMJ arthritis and bony changes over glenoid fossa, articular eminence and condyle (medical record). Patients with osteoarthritis, osteomalacia, bone tuberculosis (medical record) and Diabetic patients ($\text{BSR} > 186\text{mg/dl}$)

Sample Size: Sample size of 60 cases; 30 cases were calculated with 95% confidence level, 90% power of study and taking magnitude of mean mouth opening i.e. $43 \pm 2.38\text{mm}$ with combination of corticosteroid and sodium hyaluronate and $40.14 \pm 2.734\text{mm}$ with corticosteroid alone for treatment of internal derangement of TMJ after arthrocentesis. ⁽⁶⁾ Sample selection was done with the help of non-probability, consecutive sampling.

Data Collection Procedure

Total 60 patients matching the inclusion criteria was selected from the OPD of Department of Oral and Maxillofacial Surgery, Rashid Latif Dental College, Lahore. Informed consent was obtained. Demographic detail (name, age, sex, anatomical side, duration of TMJ) was also obtained. Arthrocentesis was performed by a single surgical team under general anesthesia with assistance of researcher. After surgery, trial drugs were administered. Before trial drugs, patients were randomly divided in two groups by using lottery method. In group A, 0.5ml of betamethasone and 0.5ml of sodium hyaluronate (combination) intra-articularly and the group B, patients were injected 1 ml of betamethasone only intra-articularly. After 2 weeks, patients were evaluated for pain by using VAS and score was noted (VAS 0-10 was used where 0=no pain, 1-3=mild, 4-7=moderate pain and 8-10=severe pain) by researcher himself. Meanwhile, mouth opening was assessed by using ruler and maximum mouth opening after 2 weeks were measured.

Data Analysis

All collected data was entered and analyzed by using SPSS version 21. Quantitative variables like age, duration of TMJ internal derangement, pain and maximal mouth opening was Presented as mean $\pm$ SD. Qualitative variables like gender and anatomical side was described as frequency and percentage. Both groups were compared for mean pain score and mean mouth opening by using independent sample t-test was applied with $P \leq 0.05$ as significant. Data was stratified for age, gender, anatomical side and duration of TMJ internal derangement. Post-stratification, independent sample t-test was applied with $p\text{-value} \leq 0.05$ as significant.

RESULTS

The mean age of the group A patients was 35.13 ± 11.89 years whereas the mean age of the group B patients was 32.23 ± 12.75 years. Male patients in group A were

10(37%) whereas in group B the male patients were 17(63%). Female patients in group A were 20(60.6%) whereas the female patients in group B were 13(39.4%). Out of 60 patients the mean value of duration of TMJ of the group A patients was 6.30 ± 3.45 whereas the mean value of duration of TMJ of the group B patients was 5.10 ± 3.57 . Statistically insignificant difference found between the study groups with duration of TMJ of the patients. i.e. $p\text{-value}=0.190$. In group A left anatomical side patients were 18(75%) whereas left anatomical side patients in group B were 6(25%). While in group A right anatomical side patients were 12(33.3%) whereas right anatomical side patients in group B were 24(66.7%). Statistically significant difference found between the study groups with anatomical side of the patients. i. e. $p\text{-value}=0.002$. Mean value of VAS in group A patients was 1.43 ± 1.104 whereas the mean value of VAS in group B was 2.27 ± 1.285 . Statistically significant difference found between the study groups with pain. i.e. $p\text{-value}=0.009$. Mean value of maximal mouth opening (MMO) in group A patients was 42.13 ± 3.026 mm whereas the mean value of MMO in group B was 37.70 ± 4.120 mm. Statistically significant difference found between the study groups with MMO of the patients. i. e. $p\text{-value}<0.001$. The study results showed that in patients with age ≤ 40 years the mean value of pain in group A was 1.63 ± 1.025 whereas the mean value of pain in group B was 2.33 ± 1.317 ($p\text{-value}=0.084$). Similarly in patients with age >40 years the mean value of pain in group A was 1.21 ± 1.188 whereas the mean value of pain in group B was 2.11 ± 1.269 ($p\text{-value}=0.109$). Patients ≤ 40 years of age among them the mean value of MMO in group A was 42.19 ± 2.97 mm whereas the mean value of MMO in group B was 37.14 ± 4.16 mm ($p\text{-value}<0.001$). Similarly, in patients with age >40 years the mean value of MMO in group A was 42.07 ± 3.19 mm whereas the mean value of MMO in group B was 39.00 ± 3.94 mm ($p\text{-value}=0.053$). The study results showed that in male patients the mean value of pain in group A was 1.40 ± 1.17 whereas the mean value of pain in group B was 2.12 ± 1.36 ($p\text{-value}=0.178$). Similarly, in female patients the mean value of pain in group A was 41.40 ± 3.24 whereas the mean value of pain in group B was 37.53 ± 4.15 ($p\text{-value}=0.018$). In this study in male patients the mean value of MMO in group A was 1.45 ± 1.09 mm whereas the mean value of MMO in group B was

2.46 ± 1.19 mm ($p\text{-value}=0.018$). Similarly, in female patients the mean value of MMO in group A was 42.50 ± 2.93 mm whereas the mean value of MMO in group B was 37.92 ± 4.23 mm ($p\text{-value}=0.001$). In this study patients with duration of TMJ ≤ 9 the mean value of pain in group A was 1.43 ± 1.12 whereas the mean value of pain in group B was 2.27 ± 1.28 ($p\text{-value}=0.019$). Similarly, in patients with duration of TMJ >9 the mean value of pain in group A was 1.43 ± 1.34 whereas the mean value of pain in group B was 2.25 ± 1.50 ($p\text{-value}=0.33$). In our study in patients with duration of TMJ ≤ 9 the mean value of MMO in group A was 41.96 ± 3.06 mm whereas the mean value of MMO in group B was 37.85 ± 4.14 mm ($p\text{-value}<0.001$). Similarly, in patients with duration of TMJ >9 the mean value of MMO in group A was 42.71 ± 3.04 whereas the mean value of MMO in group B was 36.75 ± 4.42 mm ($p\text{-value}=0.02$). According to this study in patients with left anatomical side the mean value of pain in group A was 1.50 ± 1.09 whereas the mean value of pain in group B was 1.50 ± 1.05 ($p\text{-value}=1.000$). Similarly, in patients with right anatomical side the mean value of pain in group A was 1.33 ± 1.15 whereas the mean value of pain in group B was 2.46 ± 1.28 ($p\text{-value}=0.014$). In this study in patients with left anatomical side the mean value of MMO in group A was 41.33 ± 2.87 mm whereas the mean value of MMO in group B was 40.00 ± 4.09 mm ($p\text{-value}=0.385$). Similarly, in patients with right anatomical side the mean value of MMO in group A was 43.33 ± 2.96 mm whereas the mean value of MMO in group B was 37.13 ± 4.003 mm ($p\text{-value}<0.001$).

Table 1
Patients characteristics in Treatment Groups

n	Study Groups		p-value
	Group A	Group B	
	30	30	
Age	35.13 $\pm$ 11.89	32.23 $\pm$ 12.75	-
Gender			
Male	10(37%)	17(63%)	-
Female	20(60.6%)	13(39.4%)	-
Duration of TMJ	6.30 $\pm$ 3.45	5.10 $\pm$ 3.57	0.190
Anatomical Side			
Right	18(75%)	6(25%)	0.002
Left	12(33.3%)	24(66.7%)	
Pain	1.43 $\pm$ 1.10	2.27 $\pm$ 1.28	0.009
MMO	42.13 $\pm$ 3.02	37.70 $\pm$ 4.12	<0.001

Table 2
Comparison of Pain & MMO in both groups stratified for Patients factors

	Pain		p-value	Maximal Mouth Opening		p-value
	Group-A	Group-B		Group A	Group B	
Age						
≤ 40 Years	1.63 $\pm$ 1.025	2.33 $\pm$ 1.317	0.084	42.19 $\pm$ 2.97	37.14 $\pm$ 4.16	<0.001
>40 Years	1.21 $\pm$ 1.188	2.11 $\pm$ 1.269	0.109	42.07 $\pm$ 3.19	39.00 $\pm$ 3.94	0.053
Gender						
Male	1.40 $\pm$ 1.17	2.12 $\pm$ 1.36	0.178	1.45 $\pm$ 1.09	2.46 $\pm$ 1.19	0.018
Female	41.40 $\pm$ 3.24	37.53 $\pm$ 4.15	0.018	42.50 $\pm$ 2.93	37.92 $\pm$ 4.23	0.001
Duration of TMJ						
≤ 9	1.43 $\pm$ 1.12	2.27 $\pm$ 1.28	0.019	41.96 $\pm$ 3.06	37.85 $\pm$ 4.14	<0.001
>9	1.43 $\pm$ 1.34	2.25 $\pm$ 1.50	0.33	42.71 $\pm$ 3.04	36.75 $\pm$ 4.42	0.02
Anatomical Side						

Left	1.50±1.09	1.50±1.05	1.000	41.33±2.87	40.00±4.09	0.385
Right	1.33±1.15	2.46±1.28	0.014	43.33±2.96	37.13±4.003	<0.001

DISCUSSION

TMJ with internal derangement is one of the common intra-articular disorder. The etiology and prevalence of TMJ disorders are multifactorial and can vary among people. When problems occur with the TMJ, ligaments and surrounding muscles, it can lead to a range of symptoms collectively referred to as TMJ disorders. Some common signs and symptoms include: Facial pain, Jaw tiredness, Jaw clicking or popping, Restricted jaw movement, Ear-related symptoms Ear pain, ear aches, tinnitus (ringing in the ears), or a sense of fullness in the ears), Headaches.^(14,15) The prevalence of clinically significant TMJ related jaw pain is 5% of the general population. Approximately 2% of the general population seeks treatment for TMJ-related symptoms.^(7,8)

In this study the mean value of VAS in Corticosteroid & sodium hyaluronate group patients was 1.43±1.104 whereas the mean value of VAS in Corticosteroid alone group was 2.27±1.285 (p-value=0.009). According to this study the mean value of maximal mouth opening (MMO) in corticosteroid & sodium hyaluronate group patients was 42.13±3.026 mm whereas the mean value of MMO in corticosteroid alone group was 37.70±4.120 mm (p-value=0.009). Statistically corticosteroid & sodium hyaluronate group showed significant effective results than to Corticosteroid alone group. Some of the studies are discussed below showing their results as.

E Machado et al⁽⁵⁾ resulted that after analyzing the literature, it was found that intra-articular injection with corticosteroids and sodium hyaluronate seems to be an effective method for treating internal derangements of the TMJ.

One study showed that mean pain score was 1.14±0.690 with combination of intra-articular corticosteroid injection and sodium hyaluronate (n=7) while 2.57±0.535 with corticosteroid alone (n=7). The difference was significant (P<0.05). But mouth opening was 43±2.380mm with combination of intra-articular corticosteroid injection and sodium hyaluronate while 40.14±2.734mm with corticosteroid alone. The difference was insignificant (P>0.05).⁽⁶⁾

A study by Girish B. Giraddi et al⁽¹⁾ documented that intra articular injection of corticosteroid or sodium hyaluronate after arthrocentesis had considerable effect on the TMJ. Both betamethasone and sodium hyaluronate can be used after arthrocentesis with similar results. Both groups of patients were benefited from the treatment at the 6 month follow up and there was slightly less intensity of pain in sodium hyaluronate group compared with corticosteroid group.

Several randomized comparisons of intra-articular hyaluronic acid (sodium hyaluronate) and corticosteroid (betamethasone) TMJ injections have shown no significant difference between the two treatments. Both

treatments resulted in sustained, significantly reduced TMJ symptoms and improved joint mobility for 1–2 years.^(9,10)

Two well-designed clinical trials show better results for intra-articular TMJ infiltration with SH as compared to corticosteroids for joint TMD signs and symptoms. Both are effective at the short and long term, however HA has not the undesirable effects which may be induced by corticosteroids that is structural bone changes.^(11,12)

On the other hand computed tomography examinations, which proposed to assess changes in osteoarthritic TMJ due to intra-articular injections, show that progression, regression and absence of changes in cases with osteoarthritis are observed in TMJ that have been treated and in contralateral TMJ that have not been treated, showing no statistically significant differences between sodium hyaluronate and corticosteroid.⁽¹³⁾

Not much literature is available to evaluate these techniques. So, further randomized controlled clinical trials, with representative samples and longer follow-up time must be carried out in order to assess the real effectiveness of this technique.

According to this study in patients with duration of TMJ ≤9 the mean value of pain in group A was 1.43±1.12 whereas the mean value of pain in group B was 2.27±1.28 (p-value=0.019). Similarly, in patients with duration of TMJ >9 the mean value of pain in group A was 1.43±1.34 whereas the mean value of pain in group B was 2.25±1.50 (p-value=0.33). In our study in patients with duration of TMJ ≤9 the mean value of MMO in group A was 41.96±3.06 mm whereas the mean value of MMO in group B was 37.85±4.14 mm (p-value=<0.001). Similarly, in patients with duration of TMJ >9 the mean value of MMO in group A was 42.71±3.04 whereas the mean value of MMO in group B was 36.75±4.42 mm (p-value=0.02).

In male patients the mean value of pain in group A was 1.40±1.17 whereas the mean value of pain in group B was 2.12±1.36 (p-value=0.178). Similarly, in female patients the mean value of pain in group A was 41.40±3.24 whereas the mean value of pain in group B was 37.53±4.15 (p-value=0.018). In this study in male patients the mean value of MMO in group A was 1.45±1.09 mm whereas the mean value of MMO in group B was 2.46±1.19 mm (p-value=0.018). Similarly, in female patients the mean value of MMO in group A was 42.50±2.93 mm whereas the mean value of MMO in group B was 37.92±4.23 mm (p-value=0.001).

CONCLUSION

This study concluded that intra-articular corticosteroid injection combined with sodium hyaluronate showed significantly effective results in terms of pain control and MMO than to corticosteroid alone for treatment of internal derangement of TMJ after arthrocentesis

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