

COMPARATIVE STUDY BETWEEN SODIUM HYALURONIC ACID AND DEXTROSE PROLOTHERAPY IN THE MANAGEMENT OF TEMPORO-MANDIBULAR JOINT INTERNAL DERANGEMENT

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DOI: 10.21608/dsu.2021.24268.1029

Manuscript ID: DSU-2002-1029

KEYWORDS

Arthrocentesis,
dextrose prolotherapy,
hyaluronic acid,
internal derangement,
TMJ, PRP.

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ABSTRACT

Aim: The study was done to compare between hyaluronic acid and dextrose prolotherapy in management of temporomandibular joint internal derangement. **Patients and methods:** The present study included 30 adult patients suffering from internal derangement of Temporomandibular joint were selected from outpatient clinic, oral and maxillofacial surgery department in faculty of dentistry, Suez Canal University as well as October 6 university. **Group I:** Composed of 15 patients (10 females, 5 males) where hyaluronic acid was injected intra-articular. **Group II:** Composed of 15 patients (9 females, 6 males) where dextrose prolotherapy was injected (4 times) at 2 weeks, 4 weeks and 6 weeks intervals over a total of 12 weeks. **Results:** No difference between Group I and II; both showed the highest mean MIO values. Group I and Group II; both showed lower mean of VAS scores after 12 months compared to pre-operative measurement. After 6 months, Group II showed the highest prevalence of deviation followed by Group I. **Conclusion:** Sodium hyaluronic acid and Prolotherapy is a successful technique to improve maximum inter-incisal opening as well as assisted interincisal opening and improved higher significant changes in pain intensity.

INTRODUCTION

Internal derangements of TMJ were nonsurgical treated in initial stages with medications, physiotherapy and occlusal splints⁽¹⁾.

Intra articular injection of corticosteroids alone or after arthrocentesis provides long-term palliative effects on clinical signs and subjective symptoms of TMJ pain^(2,3).

Various studies have demonstrated the use of drugs, others recommended Corticosteroids, dextrose prolotherapy and SH for treatment of TMD's^(4,5).

Aim of study: was done to compare between hyaluronic acid and dextrose prolotherapy in management of temporomandibular joint internal derangement.

PATIENTS AND METHODS

Patient's examination

A-History

All patients were subjected to prepared medical questionnaire. Medical history was taken from all patients and documented in the patient's own chart. Chief complaint & history of chief complaint was taken from patient's own words.

Dental history and history of any surgical procedure previously done in the area of interest.

B- Clinical Examination

A comprehensive intraoral examination of oral structures was carried out in conjugation with the dental history.

For the assessment of patients with TMJ ID, all patients were undergone;

- *Clinical examination:*
 1. Occlusion
 2. Muscles of mastication
- *TMJ examination*
 1. Joints noises
 2. GAIT
 3. Inter-incisal opening / PROM/AROM (passive/active range of motion) .

C- Radiographic Examination:

Radiographic examination, including: - preoperative magnetic resonance imaging (MRI) was done for all patients. Figure (1)

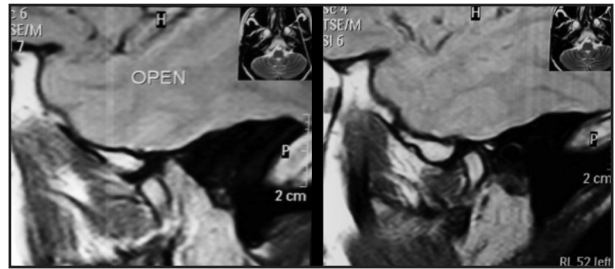


Fig. (1) Preoperative T1 magnetic resonance imaging, sagittal view showing anterior disc displacement

Study design: The patients were divided into two equal groups randomly:

- **Group I: (study group)** Composed of 15 patients where arthrocentesis hyaluronic acid was injected intra-articular.
- **Group II: (control group)** Composed of 15 patients where dextrose prolotherapy was injected (4 times) at 2 weeks, 4 weeks and 6 weeks intervals over a total of 12 weeks.

Patient preparation:

Before administering injection, the skin over the target area is cleansed with appropriate antiseptic, draping around areas of injection with sterilized towels, condylar head and lateral TMJ fossa rim were identified by palpation, then target areas marked with a washable felt-tip pen.

Group I: (study group) arthrocentesis followed by hyaluronic acid:

Composed of 15 patients where hyaluronic acid was injected intra-articular. Figure (2-3)



Fig. (2) Clinical photograph showing sodium hyaluronic acid syringe for injection intra-articular



Fig. (3) Clinical photograph showing sodium hyaluronic acid (CuraVisc) injection intra-articular

Group III: (control group) Prolotherapy technique:

Composed of 15 patients where dextrose prolotherapy was injected (4 times) at 2 weeks, 4 weeks and 6 weeks intervals over a total of 12 weeks. This consists of 25% dextrose and 2% lidocaine into a 3-mL syringe. The result was dextrose of approximately 12.5% for each TMJ.

A. Patient Posture and Head Position: The patient was preferably positioned supine turning head to the opposite side away from the injection site.

B. Pre-injection Procedure: 12.5% Dextrose which is the most commonly used prolotherapy solution, Before administering injection, the skin over the target area is cleansed with appropriate antiseptic, draping around areas of injection with sterilized towels. Then, the target areas were palpated and subsequently marked with a washable felt-tip pen.

C. Articular injection approach: The facial structures and TMJ are highly sensitive areas hence.

Patients were asked to open their mouth as wide as possible and a needle was inserted 2 mm below lateral cantho-tragal line and 10 mm in front of tragus.

Since, anterior disc displacement of TMJ is the commonest, the first target area was Posterior joint space. A bite block was placed intra-orally between anterior teeth so that patient becomes unable to close his mouth during the procedure.

The needle was directed medially and slightly anteriorly. Following aspiration, 1 mL of prolotherapy solution is deposited at this site. Figure (4)



Fig. (4) Clinical photograph showing for Prolotherapy injection intra-articular

Anterior disc attachment was considered the second target, where superior portion of lateral pterygoid muscle was connected to the articular disc.

When closing mouth, the target area was palpated just anterior to condyle when mouth is closed as the slight depression.

The next target was the attachment of masseter muscle, which was palpated along zygomatic arch inferior border and marked when posterior and anterior aspects of the condyle are being evaluated.

Patients were asked to clench on their teeth makes the masseter prominent, the most rigid area to palpation was the tenderest as well. The final ml was injected directly when patient relaxed their jaws.

The same procedure was repeated on opposite joint if it was affected too.

D. Injection Frequency Protocol: injections were repeated two times, at one month interval. At each appointment, the joints were palpated for noise and pain and the affected muscles for pain. The range of jaw motion also was measured inter-incisally.

- Data was tabulated and statistically analyzed.

RESULTS

Follow up

Follow up for 1 year at the following intervals (1, 3, 6 and 12 months) from the last injection.

Postoperative clinical assessment included:

- *Subjective evaluation:*
 1. Visual Analogue Scale (pain – tenderness – chewing).
- *Objective evaluation:*
 - 1- Interincisal opening / PROM/AROM (passive/ active range of motion).
 - 2- Mandibular deviation.

Statistical Analysis

Kolmogorov-Smirnov and Shapiro-Wilk tests used for normality. Normal means (parametric) through ANOVA test and non-normal means (non-parametric) through Kruskal-Wallis test.

Maximum Inter-incisal Opening (MIO), Assisted Inter-incisal Opening (AIO) showed parametric

distribution while pain (VAS) scores showed non-parametric distribution.

Qualitative data were presented as % and frequencies. Fisher's Exact test was used to compare between the three groups. Friedman's test followed by Dunn's test was used to study time changes in qualitative data.

A. Maximum Inter-incisal Opening (MIO)

1. Comparison between the two groups

After 1 month, no difference statistically between MIO in the two groups.

After 3, 6 as well as 12 months, no difference between Group I and Group II; both showed highest mean MIO values.

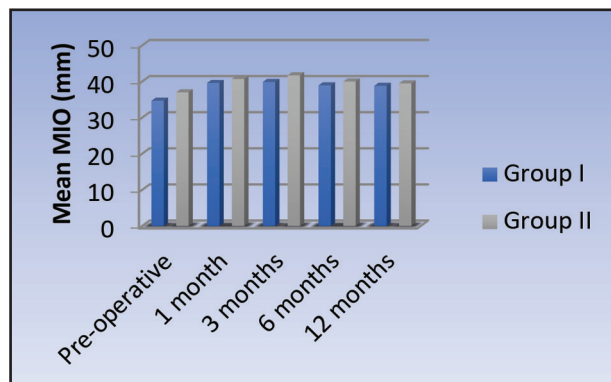


Fig. (5) Bar chart representing comparison between mean MIO in the two groups

2. Changes after treatment within each group

In Group I as well as Group II; there was increase in MIO after 1 month. There was no change in mean MIO from 1 to 3, 3 to 6 as well as from 6 months to 12 months. The mean MIO after 12 months showed statistically significantly higher mean value compared to pre-operative measurement.

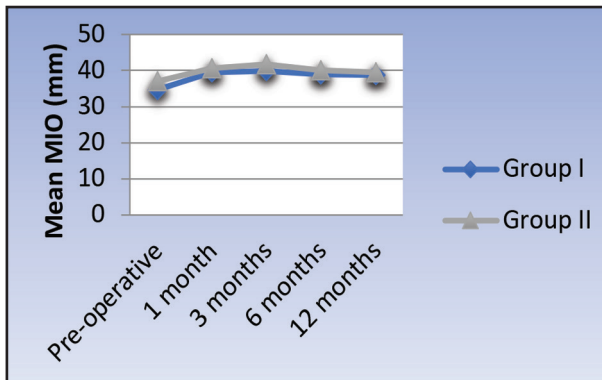


Fig. (6) Line chart representing comparison between mean MIO at different time periods in each group

B. Assisted Inter-incisal Opening (AIO)

1. Comparison between the three groups

Pre-operatively, Group II showed lower mean value. Group I showed the lowest mean AIO.

After 1 month, there was no difference between AIO in the two groups.

After 3, 6 as well as 12 months, no difference between Group I and II; both showed the highest mean AIO values.

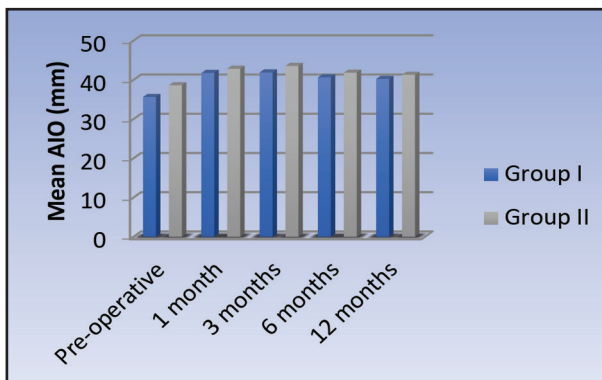


Fig. (7) Bar chart representing comparison between mean AIO in the two groups

2. Changes after treatment within each group

In Group I as well as Group II; there was increase in AIO after 1 month. No change in mean

AIO from 1 to 3, 3 to 6 as well as from 6 months to 12 months. The mean AIO after 12 months showed statistically significantly higher mean value compared to pre-operative measurement.

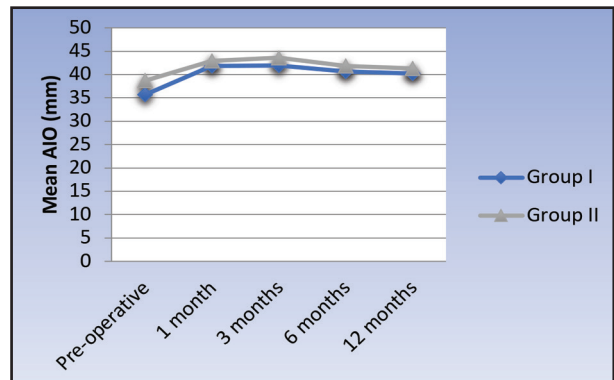


Fig. (8) Line chart representing comparison between mean AIO at different time periods in each group.

C. Pain (VAS scores)

Comparison between the two groups

Pre-operatively, after 1 month as well as after 3 months; no difference between VAS scores in the two groups.

After 6 as well as 12 months, no difference between both Groups; both showed the highest mean VAS scores.

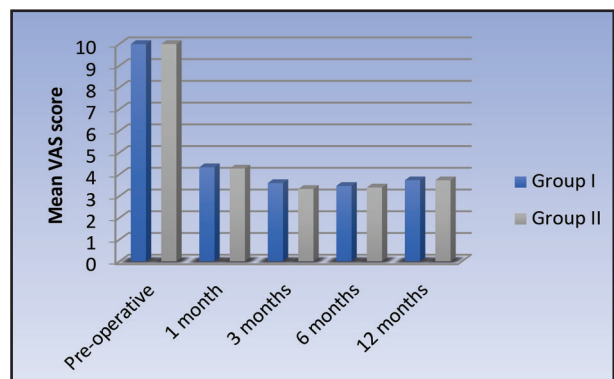


Fig. (9) Bar chart representing comparison between mean VAS scores in the two groups

1. Changes after treatment within each group

In Group I as well as Group II; statistically significant decrease in VAS scores after 1 month as well as from 1 month to 3 months. No change in mean VAS scores from 3 to 6 as well as from 6 months to 12 months. The mean VAS scores after 12 months showed statistically significantly lower mean score compared to pre-operative measurement.

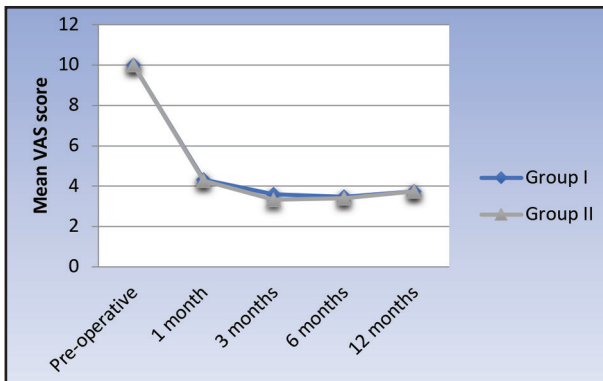


Fig. (10) Line chart representing comparison between mean VAS scores at different time periods in each group

A. Deviation

Comparison between the three groups

Pre-operatively, all cases showed deviation.

After 1 month, difference between both groups. Group II showed the highest deviation followed by Group I.

After 3 months, no difference between prevalence of deviation in the two groups.

After 6 months, difference between the two groups. Group II showed the highest prevalence of deviation followed by Group I.

After 12 months, difference between the two groups. Group I showed the highest prevalence of deviation followed by Group II.

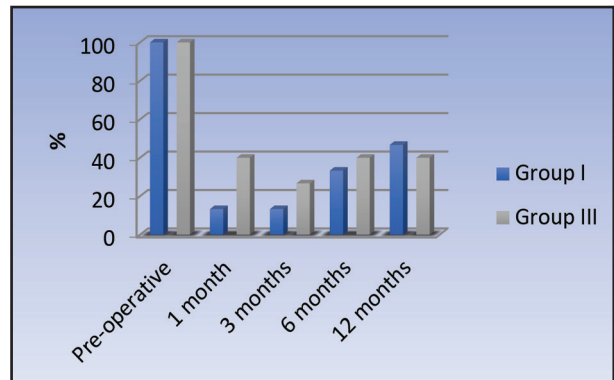


Fig. (11) Bar chart representing prevalence of deviation in the two groups

2. Changes after treatment within each group

In Group I; there was a significant change in prevalence of deviation by time. There was a decrease in prevalence of deviation after 1 month and no change from 1 month to 3 months. There was an increase in prevalence of deviation from 3 to 6 as well as from 6 months to 12 months.

In Group II; change in deviation by time. There was a decrease in prevalence of deviation at all follow up intervals except for after 6 as well as 12 months no deviation.

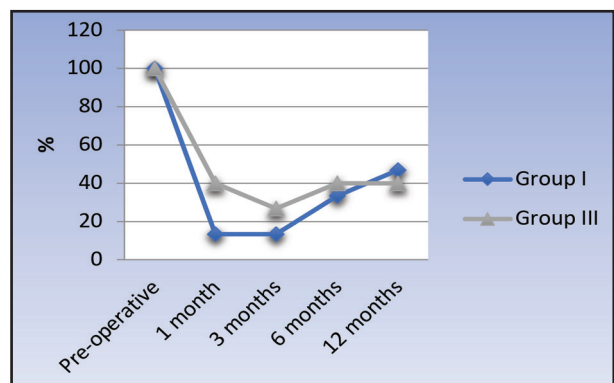


Fig. (12) Line chart representing prevalence of deviation at different follow up times

DISCUSSION

TMD 's causes remains idiopathic, certain hypothesis have been proposed such as a muscular cause, occlusal disharmony and intracapsular reasons^(6,7).

Posterior disc attachment mainly affected by inflammation^(8,9). interleukin-1beta (IL-1beta) , tumor necrosis factor alpha (TNFalpha), prostaglandin E2 (PGE2), matrix metalloproteinases (MMPs), leukotriene B4 (LkB4) serotonin- 5-hydroxytryptamine (5-HT) plays an important role in TMD's^(10,11).

MMPs are early detector and marker to determine TMJ arthritis⁽¹²⁾. Serotonin is produced in synovial membrane and in synovial fluid and was considered the mediator of inflammation and pain. Producing in gastrointestinal mucosal enterochromaffin cells and absorbed by platelets^(7,10).

The purpose of current study was done to compare between hyaluronic acid and dextrose prolotherapy in management of temporomandibular joint internal derangement.

In our study, in Group I as well as Group II; there was an increase in statistically significant in MIO after 1 month. There was no change in mean MIO from 1 to 3, 3 to 6 as well as from 6 months to 12 months. The mean MIO after 12 months showed statistically significantly higher mean value compared to pre-operative measurement.

This was in agreement to retrospective analysis on dextrose prolotherapy to TMJ. Each patient received 4-6 injections of a 15% dextrose⁽⁴⁾.

Another study reported that pain relief was at least 50% while 57% reported greater than 75% pain relief. The average starting range of motion was 4.3 and ending range of motion was 5.1. Before prolotherapy, 29% had very limited motion (49% or less of normal motion). This decreased to only 7% after treatments were concluded⁽⁴⁾.

In our study pain intensity showed significant difference among each group, Pre-operatively, after 1 month as well as after 3 months; there was no difference between VAS scores in the three groups.

After 6 as well as 12 months, no statistically significant difference between Group I and Group II; both showed highest mean VAS scores. However, Group II was the lowest mean VAS scores

In Group I as well as II; a decrease in VAS scores after 1 month as well as from 1 to 3 months. no change in mean VAS scores from 3 to 6 as well as from 6 months to 12 months. The mean VAS scores after 12 months showed statistically significantly lower mean score compared to pre-operative measurement.

This was in agreement with a study done by **Alpaslan et al**⁽³⁾ who conclude the high MIO and pain relieving in the SH group in the first 3 months due to its highly lubricant effects.

SH or Corticosteroid intra-articular injection has an effect OA. SH was the best alternative because of lower side effects risk. SH long term lubricating effect play role in preventing inflammatory mediator's onset responsible for pain. HA injection plus arthrocentesis was more effective in improving symptoms management⁽¹²⁾.

After 1 month, there was a difference statistically between both groups. Group II showed the highest prevalence of deviation followed by Group I that showed the lowest prevalence of deviation.

In Group I; by time a significant change in prevalence of deviation. There was a decrease in prevalence of deviation after 1 month and no change from 1 month to 3 months. There was an increase in prevalence of deviation from 3 to 6 as well as from 6 months to 12 months.

In Group II; there was a change significantly in prevalence of deviation by time. There was a decrease in prevalence of deviation after 1 month as well as from 1 month to 3 months. There was an increase in prevalence of deviation from 3 to 6 months then no change in prevalence of deviation from 6 to 12 months.

CONCLUSION

Arthrocentesis followed by sodium hyaluronate and Prolotherapy is a successful technique to improve maximum inter-incisal opening as well as assisted interincisal opening and improved higher significant changes in pain intensity.

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