Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v29i04.7030

TO STUDY THE EFFICACY OF LOW-MOLECULAR WEIGHT SODIUM HYALURONIDASE AND BETAMETHASONE IN TEMPOROMANDIBULAR JOINT ARTHROCENTESIS.: A COMPARATIVE STUDY

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Abstract:
Introduction: Dysfunction of the temporomandibular joint (TMJ) is a therapeutic challenge for oral and maxillofacial surgeons. Temporomandibular joint disorders (TMD) refer to a group of heterogeneous dysfunction conditions involving the masticatory system, reducing life quality of the sufferers. One of the most common forms of Temporomandibular disorder (TMD) is Internal derangement (ID). Arthrocentesis was considered as an intervening treatment modality between nonsurgical treatment and arthroscopic surgery.

Aim of study: This comparative study was designed to investigate the efficacy of low-molecular weight sodium hyaluronidase and betamethasone in the treatment of temporomandibular joint disorders through Arthrocentesis procedure.

Material and Methods: A total of 100 patients visiting to the outpatient department of Oral and Maxillofacial Surgery Pacific Institute of Dental College, age group 18 -60 years included in the study based on inclusion criteria. The patients' complaints were limited mouth opening, TMJ pain, and joint noises during function. Patients were randomly divided into two groups.

Group A patients will receive 1 ml of 10mg Sodium hyaluronate and Group B patients will receive 1 ml of 0.05mg of Betamethasone in joint space ,in single puncture. Parameters such as temporomandibular joint pain intensity, clicking sounds (opening and closing click sounds) maximum incisal mouth opening, protrusive and Right & Left lateral excursions will be recorded. Patients were followed at regular interval of one week, 1, 3, and 6 (follow up) after last injection.

Results: According to the visual analogue scale for pain intra articular injection low molecular weight Hyaluronic acid proved to be better compared to injection betamethasone. Preoperative maximum mouth opening in group A patients with a mean of 23.2, while postoperative maximum mouth opening with a mean of 35.5 at 6months follow up The preoperative maximum mouth opening in

Group B patients opening with a mean of 24.7, while postoperative maximum mouth opening with a mean of 34.2 at 6months follow up

Conclusion: Both techniques increased maximal mouth opening, lateral movements, and function, while reducing TMJ pain and noise. Although patients benefitted from both techniques. It is observed that arthrocentesis followed by intra articular injection of low molecular weight hyaluronic acid was better than betamethasone.

Keywords: Arthrocentesis, corticosteroid(betamethasone),Sodium hyaluronate, temporomandibular joint disorders

INTRODUCTION:

Temporomandibular disorders (TMDs) are a group of more than 30 conditions that cause pain and dysfunction in the jaw joint and muscles that control jaw movement. "TMDs" refers to the disorders, and "TMJ" refers only to the temporomandibular joint itself. The disorders are characterized by a classically described triad of clinical signs: muscle and/or TMJ pain, TMJ sounds and restriction, deviation or deflection of mouth opening path. One of the most common forms of Temporomandibular disorder (TMD) is Internal derangement (ID). It has been reported that 80 % of patients with signs and symptoms of TMD.[1]

Various treatment modalities for temporomandibular disorders (TMD) have been proposed, mainly occlusal splint therapy, physiotherapy, complimentary medicine, pharmacotherapy, and occlusal treatments.[2] Recent reports have pointed out the importance of joint lubrication for a correct joint function, also hypothesizing that abnormalities of the joint lubrication system may play a role in the onset of TMJ dysfunctions.

Dysfunction of the temporomandibular joint (TMJ) is a therapeutic challenge for oral and maxillofacial surgeons.[3] The objective of management for any disease process is the full restoration of function with improvement of the quality and quantity of life. Arthrocentesis is now increasingly recognized as first line surgical intervention in TMDs patients. Temporomandibular joint (TMJ) arthrocentesis was introduced approximately 21 years ago; since the description of arthrocentesis by Nitzan in 1991. The procedure has gained wide acceptance among maxillofacial surgeons in treating internal derangement of temporomandibular joint (TMJ) [4].

Arthrocentesis is a method of flushing out the TMJ by placing needles into the upper joint compartment using local anaesthesia or sedation. Arthrocentesis was considered as an intervening treatment modality between nonsurgical treatment and arthroscopic surgery. The major indications for arthrocentesis are acute and chronic limitation of motion due to disk displacement, adhesions and hypomobility due to restriction of condylar translation in the upper joint space; this procedure increases the hydraulic pressure of upper chamber of the TMJ, which removes adhesions and increases the range of motion.[5] single puncture arthrocentesis using the dual-needle is fast and easy to perform.[6] Intra-articular corticosteroid injection alone or after arthrocentesis provides long-term palliative effects on subjective symptoms and clinical signs of TMJ pain. Unfortunately, intra-articular corticosteroid injection has an unpredictable prognosis and also can cause local side effects on joint tissues. Recently, sodium hyaluronate (SH) has been proposed as an alternative therapeutic agent with similar therapeutic effects. This highly viscous, high molecular substance plays an important role in joint lubrication and protection of the cartilage, which diminishes granulation tissue formation and diminished formation of adhesions. Intra-articular sodium hyaluronate might be the best alternative due to reduced risk for side effects.

Various pharmacological agents (Intra-articular injections) have been used for alleviating temporomandibular joint pain and dysfunction. They are Non-steroidal anti-inflammatory drugs (NSAIDs) (Piroxicam, Tenoxicam), Corticosteroids such as methylprednisolone, triamcinolone acetonide, betamethasone, dexamethasone, Opioids (Morphine), Local anaesthetic agents (Bupivacaine, Mepivacaine), hyaluronidase and hyaluronic acid injections.

Several randomized comparisons of intra-articular hyaluronic acid (Sodium Hyaluronate) and corticosteroid (Betamethasone) TMJ injections. which is highly viscous, high-molecular substance playing an important role in joint lubrication and protection of the cartilage but there are very few studies done with the Low-Molecular Sodium Hyaluronidase. Hence this study has been conducted with to compare the efficacy of low-molecular weight sodium hyaluronidase and betamethasone in temporomandibular joint arthrocentesis.

MATERIALS AND METHODS:

A total of 100 patients visiting to the outpatient department of Oral and Maxillofacial Surgery Pacific Institute of Dental College, age group 18 -60 years included in the study based on inclusion criteria. Inclusion criteria were- patients' complaints were limited mouth opening, TMJ pain, and joint noises during function. Clinical diagnosis of anterior disc displacement (temporal and occipital tenderness, headache, Persistence of symptoms at least more than 2 months. Exclusion criteria- Systemic disease, Arthritis or history of condylar trauma, Degenerative change of condylar head, Facial asymmetry, retrognathism, prognathism. pregnancy or breast feeding and patients who are unwilling to participate in the study.

Patients were randomly divided into two groups. Group A patients will receive 1 ml of 10mg Sodium hyaluronate and Group B patients will receive 1 ml of 0.05mg of Betamethasone in joint space ,in single puncture. Parameters such as temporomandibular joint pain intensity, clicking sounds (opening and closing click sounds) maximum incisal mouth opening, protrusive and Right & Left lateral excursions will be recorded. Patients were followed at regular interval of one week, 1, 3, and 6 (follow up) after last injection.

Marking for Auriculotemporal, Deep Temporal and Masseteric nerve block; A line is drawn from middle of tragus to lateral canthus (Holmund - Hellsing line). A point is marked 10mm anterior to Mid Tragus and 2mm below the H - H Line correlates with the posterior recess. An 18-gauge modified double lumen single barrel needle is penetrated in the marked area.

Statistical analysis was done by tabulating the data & analyzed using Microsoft Excel & SPSS version 22. Chi square test was applied wherever necessary.

RESULTS:

The mean age of patients was 26.8 years in Group-A treat by 1 ml of 10mg Sodium hyaluronate and 27.3years in Group-B treat by 1 ml of 0.05mg of Betamethasone. A detailed age distribution is shown in (Table- 1) and Gender distribution (Table 2)

Table 1: Sex distribution and Table 2: Sex distribution

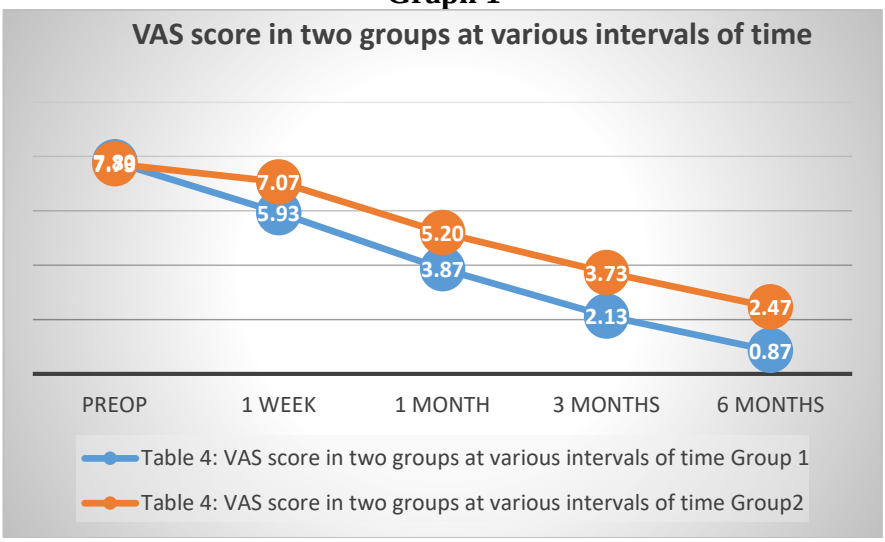
Table 1: Age distribution of study patients in two groups	
Age (Years)	**Mean**
Group A (Sodium hyaluronate)	26.8
Group B (Betamethasone	27.3

Table 2: Gender distirbution of study patients in two groups		
Gender	**Group A**	**Group B**
Male	30	40
Female	70	60
Total	100	100

Pain was decreased in both the groups postoperatively on VAS Scale recorded in post-treat at 6 month follow-up visit of Group A (Sodium hyaluronate))than pre-treat visit ,followed by Group B (Betamethasone) is shown in (Table-3). (Graph 1)

Table 3: VAS score in two groups at various intervals of time		
Time Interval	**Group 1**	**Group2**
Preop	7.80	7.73
1 Week	5.93	7.07
1 Month	3.87	5.20
3 Months	2.13	3.73
6 Months	0.87	2.47

Graph 1



Preoperative maximum mouth opening in group A patients with a mean of 23.2, while postoperative maximum mouth opening with a mean of 35.5 at 6months follow up. The preoperative maximum mouth opening in Group B patients opening with a mean of 24.7, while postoperative maximum mouth opening with a mean of 34.2 at 6months follow up. (Table 4)

Table 4: Mouth opening (mm) in two groups at various intervals of time		
Time Interval	**Group A**	**Group B**
Preop	23.2	24.7
1 Week	29.3	28.8
1 Month	31.5	30.1
3 Months	34.1	32.7
6 Months	35.5	34.2

The left lateral excursions, right lateral excursions were increased in both the groups post operatively

Table 5A: Lateral movements (Right) in two groups at various intervals of time		
Time Interval	**Group 1**	**Group 2**
Preop	6.83	6.87
1 Week	7.13	7.13
1 Month	7.43	7.47
3 Months	7.73	7.87
6 Months	7.90	7.87

Table 5B: Lateral movements (Left) in two groups at various intervals of time		
Time Interval	**Group 1**	**Group 2**
Preop	7.93	7.33
1 Week	8.20	8.07
1 Month	8.23	8.07
3 Months	8.47	8.27
6 Months	8.43	8.27

The clicking sounds were decreased in both the groups post operatively.

Table 10: TMJ sounds in two groups at various intervals of time		
Time Interval	**Group 1**	**Group 2**
Preop	93.3	93.3
1 Week	66.7	76.6
1 Month	53.3	66.7
3 Months	26.7	36.7
6 Months	13.3	23.3

Group 1 shown better results and improvements in all parameters over group 2. Intragroup comparison shown no statistically difference between group 1 and group 2 based on VAS score and mouth opening (mm) in two groups at various intervals of time.

DISCUSSION:

The TMJ disorders are characterized by a classically described triad of clinical signs: muscle and/or TMJ pain, TMJ sounds and restriction, deviation or deflection of mouth opening path. Primary goals of the treatment for TMD are to increase the range of motion and relieve the functional pain of the TMJ.

In the present study, clinical parameters such as pain, clicking sounds, lateral and protrusive movement of jaws, and improved significantly in both the treatment arthrocentesis with Sodium hyaluronate injection and arthrocentesis with Betamethasone. The results are in similar with systematic review of Eduardo etal.2013[7]. In their study they found that injections with sodium hyaluronate showed better results.

Our results were also similar with study of Kapusuz G.et al. 2014[8],that studied effectiveness intra-articular injections of hyaluronic acid, tenoxicam and betamethasone on the relief of temporomandibular joint disorder complaints , they found that hyaluronic acid produced better pain

relief scores when compared to the other anti-inflammatory agents studied. Hyaluronic acid probably plays an important indirect role in joint lubrication by adhering to surface-active phospholipids. It was found that the mechanical lysis of adhesions and lavage of the TMJ was often successful in treating various internal derangements.[9] Hyaluronic acid is found in the extracellular matrix of several connective tissues of high molecular weight, including joint cartilage and synovial fluid .In such sites, HA molecules are predominantly synthesized, It is synthesized by synoviocytes, fibroblasts and chondrocytes present in the connective tissue, HA metabolic activity in cell renewal helps the nutrition of avascular zones of the disk and joint cartilage through its combination with glycosaminoglycans coming from proteoglycans produced by chondrocytes[10,11] Corticosteroids have a potent anti-inflammatory effect on synovial tissue and are known to reduce effusion, decrease pain and bring about an increase in range of motion of synovial joints.[12] Intra-articular corticosteroid injection alone or after arthrocentesis provides, long-term palliative effects on subjective symptoms and clinical signs of TMJ pain.[13,14]

In 1939, Mayer at al first identified it in synovial fluid. Hyaluronic acid may act as a shock absorber that protects cartilage cells from shock waves, and it may also act as a barrier.[15] Hyaluronic acid also has anti- inflammatory actions such as scavenging for free radicals and reducing vascular permeability, as well as inhibition and phagocytosis of polymorphonuclear leucocytes and macrophages. It also has analgesic properties. Several reports have indicated that intra- articular injection of hyaluronic acid may be effective treatment for rheumatoid arthritis, osteoarthritis, and also disorders of the TMJ.

Conclusion: TMJ arthrocentesis is a simple, less invasive and less expensive technique and an effective and efficient alternative to more invasive surgical procedures. Both techniques increased maximal mouth opening, lateral movements, and function, while reducing TMJ pain and noise In our study found that It is observed that arthrocentesis followed by intra articular injection of low molecular weight hyaluronic acid was better than betamethasone however additional research may require for long term evaluation of the results.

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