

Efficacy of Arthrocentesis with Injection of Hyaluronic Acid in The Treatment of Internal Derangement of Temporomandibular Joint

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Abstract:

This cross-sectional study was designed to find out the effect of arthrocentesis with injection hyaluronic acid in the treatment of internal derangement of temporomandibular joint (TMJ ID) for the restoration of TMJ function. The study included 25 patients, aged 13 to 50 years with symptoms of TMJ pain and clicking during function and limited mouth opening. TMJ ID was assessed with clinical examination and conformed with MRI. Arthrocentesis was done with insertion of two 21 gauge needles in the upper joint compartment and joint lavaged with 200 ml of ringer's lactate solution and at the end 1ml of hyaluronic acid was injected. Intensity of TMJ pain and clicking was assessed using visual analog scale, maximum mouth opening, lateral jaw movement and protrusion were assessed with millimeter scale. All the parameters were measured before the procedure, immediately after the procedure then after 2 weeks, 1 month, 3 months and 6 months procedure. During 6 months follow-up, clinical examination and comparison of the results showed 84% reduction in TMJ pain, 92% improvement in mouth opening and clicking disappear in 80% of patients.

Key words: TMJ pain, clicking, internal derangement, arthrocentesis and hyaluronic acid.

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Introduction:

Temporomandibular joint disorders (TMDs) are one of the most misdiagnosed and mistreated maladies in the medical practice. TMDs are not life threatening but they may strongly affect the quality of life. Painful temporomandibular joint function disturbs day to day life and body image. These problems sometimes become so significant that they may impair person emotional stability.¹

Epidemiological study has shown that at-least 33 percent of American population suffer from this problem.² The males to females ratio seeking care of TMD is 4:1. Accordingly, analgesics directed at the TMD are among the top selling over the counter medicine in America.³

Internal derangement of the temporomandibular joint (TMJ ID) is one of the most frequent cause of TMD. TMJ ID is defined as a progressive disorder which usually starts as clicking associated with normal opening (anterior disc displacement with reduction), to a stage where clicking gradually ceases but restricted mouth opening ensues (closed lock).⁴ TMJ ID is usually characterized by pain, clicking, deviated jaw and limitation of jaw movement.⁵ Many conservative approach have been proposed throughout the years among which are occlusal splint therapy, physiotherapy, complimentary medication

and occlusal treatment.⁶ In the past treatment of TMJ ID that did not respond to conservative measure was surgical recontouring and repositioning of the disc.⁷

Nitzan et al.⁴ first describe the TMJ arthrocentesis as the simplest and effective minimal invasive modalities for treatment of TMJ closed lock. Irrigation of the superior joint compartment will results in creation of hydraulic pressure, which will release the displaced disc and thereby re-establish normal maximal mouth opening. With the intend to extend the indication of TMJ arthrocentesis, a technique of providing the injection of hyaluronic acid at the end of articular lavage was purposed.⁶ Intra-articular corticosteroid are occasionally injected to alleviate the intracapsular inflammation.⁸ Unfortunately, intra articular corticosteroid injection has an unpredictable prognosis and also cause local side effect on the joint.⁹ Hyaluronic acid has been proposed as an alternative therapeutic agent with same therapeutic effect, that improve and restore normal lubrication in joint, provides nutrition to the vascular articulating disc and stabilize the joint.^{10,11}

The purpose of this cross-sectional study was to find out the effect of arthrocentesis with injection of hyaluronic acid in the treatment of TMJ ID for the full restoration of TMJ function.

Materials and methods:

The study involved 25 patients (14 females and 11 males; age range 13 to 50 years; mean 25±8.4 years) who were referred to department of Oral and Maxillofacial Surgery,

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BSMMU, Bangladesh from January 2008 to December 2009. The diagnostic groups had anterior disc displacement with reduction (ADDR) and anterior disc displacement without reduction (ADDwOR) proved by MRI. Patients with symptoms of TMJ pain, clicking, and mouth opening less than 35 mm and lateral jaw movement less than 5mm for duration from 1 month to 1 year who failed to respond to conservative measures were included in the study. Patients responding to conservative therapy, giving history of hard tissue injuries, ankylosis and medically unfit for treatment were excluded from the study.

All patients were given conservative therapy for 2 weeks before arthrocentesis, which included non-steroidal anti-inflammatory drugs (NSAID), muscle relaxant, anxiolytics, soft diet, occlusal splint and lifestyle modification.

Each patient completed a questionnaire evaluating TMJ pain, joint clicking, and maximum mouth opening. TMJ pain assessed using visual analog scale (VAS) in a 10 cm line with one end labeled with no pain and another end with severe pain. Maximum mouth opening (MMO), lateral excursion, protrusion were measured with millimeter scale and clicking sound assessed by palpating the joint during opening and closing of mouth.

Informed written consent were taken from the patients and arthrocentesis was done in the Oral and Maxillofacial department outdoor under local anaesthesia .

Procedure of Arthrocentesis:

Patient was placed in supine position with head in opposite direction. The pre-auricular area of the affected site was prepared aseptically with betadin solution. Auriculotemporal nerve was blocked through the skin just anterior to the junction of the tragus and ear-lobe. The needle was advanced behind the posterior aspect of the condyle in anteromedial direction to depth of 1cm and 1.5 ml of 1:80000 lignocain with adrenalin was deposited.

A line was drawn from mid tragus of ear to lateral canthus of eye. First point was marked 12 mm anterior from tragus and 2 mm downward in the tragal canthal line. Second point was marked 22 mm anterior and 6mm downward in the same line. A 21 gauge needle was inserted from first point upward, inward and forward at 45 degree angle to all plane corresponding posterior joint compartment and approximately 2 ml ringers lactate solution deposited to distend the upper joint compartment (UJC). A second needle was inserted in second point backward, upward and inward to correspond the area of articular eminence to establish a free flow of irrigating solution from the UJC. The joint was irrigated with at-least 200 ml of ringer's lactate solution. During the procedure patients were advised to close and open the mouth to distend the joint and then at

the end of lavage 1 ml of hyaluronic acid was injected. Both needles were removed and all the parameters for TMJ functions were measured and data recorded on follow up chart. Patients were advised on soft diet and NSAID prescribed for 2 weeks.

Post-operatively follow up were given on the 2 weeks, 1 month, 3 months and 6 months with all the parameters for TMJ functions measured with same technique. The collected data were analyzed and comparison made between pre-operative values and post operative follow up values. The criteria for success was no pain or minimal pain(pain less than 2), clicking absent and maximum mouth opening more than 38mm. Data were processed and statistically analyzed using SPSS (statistical package for social science) version 16.

Results:

In the study 25 patients were included (14 females and 11 males), with their mean age 25 ± 8.4 yrs (range from 13-50 years). 12 patients had ADDwR and 13 patient had ADDwOR. All patients were given same modalities of treatment and followed- up for 6 months. Pre treatment, immediately after treatment and at follow up data were collected and entered into computer carefully and meticulously for the analysis in SPSS version 16. The evaluation between different follow up was done by paired 't' test and mcnemar chi square test. The result was considered significant if p value was <0.05 .

The subjective data elicited from VAS scores showed significant reduction in pain from mean 6.8 ± 2.02 to 2.1 ± 1 at 6 months follow up. Maximal mouth opening improves from mean 28.4 ± 4.68 mm to mean 41.2 ± 1.99 mm at 6 months follow up. Lateral excursion improved from mean 5.0 ± 2.09 mm to mean 6.8 ± 1.0 mm. Similarly, TMJ clicking disappear significantly.

The final outcome of the study showed 84% reduction in pain, 92% improvement in MMO and clicking absent in 80% of patients.

Table I

Age distribution of the patients (n=25)

Age in years	Number of patients	Percentage
≤ 20	7	28.0
20-30	15	60.0
31-40	2	8.0
41-50	1	4.0
Mean \pm SD	25.0	± 8.4
Range (min-max)	(13	-50)

The mean age of the patients was 25.0 years with standard deviation ± 8.4 years with ranged from 13 to 50 years. Maximum patients were in 20-30 year age group.

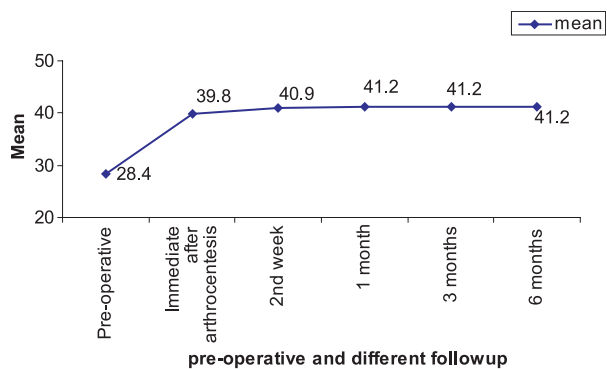


Fig.-1: Line diagram showing the outcome of MMO at different follow-up

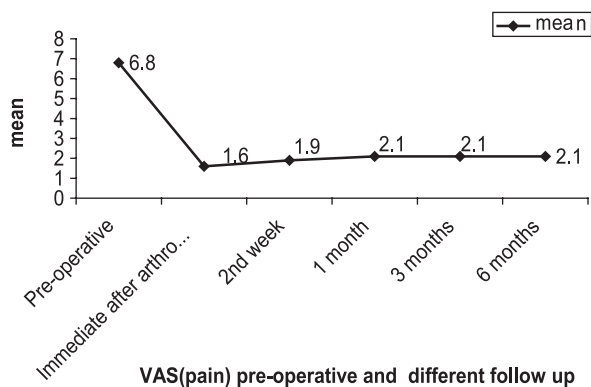
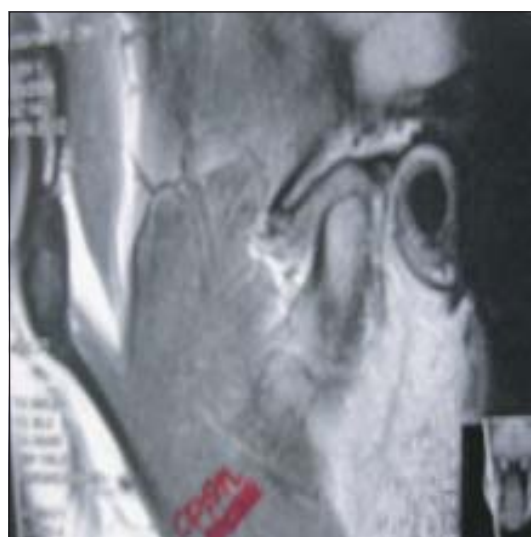
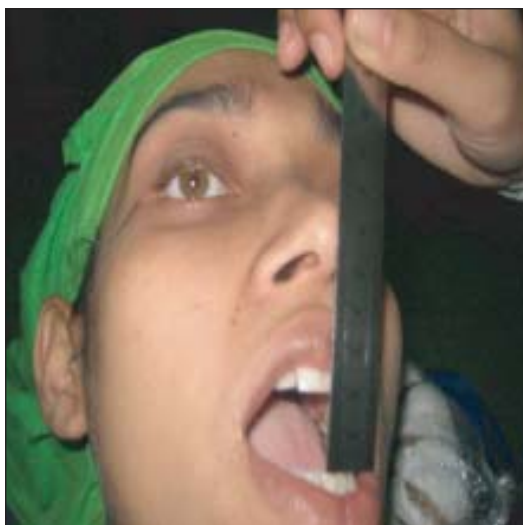


Fig.-2: Line diagram showing the outcome of VAS (pain) at different follow-up



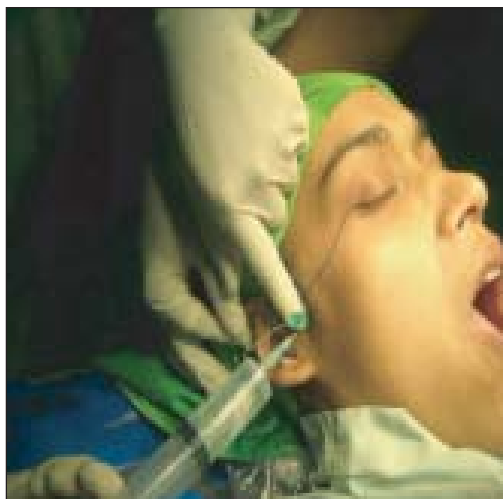
MRI showing anterior disc displacement in close and open view



Pre operative oral opening 20mm



Marking points for arthrocentesis



Lavage of upper joint compartment



Oral opening after arthrocentesis 40mm

Discussion:

The effectiveness of arthrocentesis with injection of hyaluronic acid in treatment of internal derangement of the TMJ in this study was based on 3 clinical parameters: increase in MMO, reduction in pain and clicking sound during function.

Many researcher and clinician have reported the results of series of patient treated with arthrocentesis and they are uniformly positive. Nitzan et al.⁴ describe the high success rate of 91% in 17 cases treated with arthrocentesis only. Frost et al.¹² reviewed 40 treated cases and concluded that the procedure is quite reliable and satisfy both the clinician and patient in acute TMJ locking but frequently unsatisfactory in chronic cases. Hosaka et al.¹³ in 3 months up follow up study reported 74% success rate. Murakami et al.¹⁴ in a 6 months follow up reported 70% success rate. Al-Belasy & Dolwick¹⁵ reported in their review study that no medication was used for intra articular injection in four studies, steroid was used in 14 studies and hyaluronic acid was used in 2 studies. Alpaslan & Alpaslan¹⁶ found that patient with internal derangement benefited from arthrocentesis with or without injection of hyaluronic acid in terms of relief of pain. But they reported that arthrocentesis with hyaluronic acid injection seems to be superior to arthrocentesis alone.

Alpaslan & Alpaslan,¹⁶ showed improvement in MMO in patient treated with arthrocentesis with hyaluronic acid was from mean 34.31 ± 9.81 mm to 42.35 ± 6.05 . similarly Yeung et al.¹⁷ in 27 patient in 6 month duration with same technique showed improvement in MMO from mean 38.2mm to 39.8mm. In this study, improvement in MMO was from mean 28.4 ± 4.68 mm to 41.2 ± 1.99 mm (94%) and the

result was significant ($p=0.001$) and similar to the previous study.

Alpaslan & Alpaslan,¹⁶ showed improvement in lateral jaw movement from 8.16 ± 2.10 mm to 9.14 ± 1.23 mm and showed intensity of pain decreased significantly ($p<0.05$). Yeung et al,¹⁷ showed improvement in lateral jaw movement from mean 7.4mm to 8.2mm and decreased in pain in VAS from mean 4.2mm to mean 2.6mm. In this study, lateral jaw movement increases from mean 5.0 ± 2.09 mm to 6.80 ± 1.00 mm and the result was significant ($p=0.001$). similarly, pain decreased in VAS from mean 6.8 ± 2.02 to 1.6 ± 0.64 .

Yeung et al.¹⁷ showed reduction in joint clicking was significant in 6 month duration ($p<0.05$). Sato et al.¹⁸ in retrospective cohort study with clicking present in 59 patients showed absent of clicking in 52 patients (88%). In our study, clicking reduced in 20 patients (80%) and result co-relate with previous study.

Conclusion:

Arthrocentesis with injection of hyaluronic acid in the treatment of TMJ internal derangement is least invasive procedure with fewest complications. The study showed satisfactory results in restoration of TMJ functions in patients with TMJ ID, who were refractory to the conservative methods and psychologically depressed due to lack of proper treatment.

Thus, it may be the preferred treatment for the patient suffering with TMJ ID who were refractory to conservative methods.

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