



ISSN Print: 2394-7489
ISSN Online: 2394-7497
IJADS 2018; 4(3): 238-242
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www.oraljournal.com
Received: 19-05-2018
Accepted: 23-06-2018

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Original Research Article

Effectiveness of arthrocentesis for internal derangement of the temporomandibular joint: prospective study

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Abstract

Introduction: Internal derangement of the TMJ has been managed by various methods over the years. Many procedures have been developed to try to alleviate the pain and functional complaints of patients suffering from TMJ dysfunctions. The common methods are pharmacologic therapy, occlusal splints, arthroscopic surgery, arthrocentesis and Surgery. The aim of this study was to evaluate effectiveness of arthrocentesis in patients with internal derangement of the temporomandibular Joint.

Methodology: 10 patients with complaints of TMJ pain, limited mouth opening, clicking and lateral deviation were treated with arthrocentesis by saline. Pre and postoperative assessment included maximum mouth opening, pain, lateral deviation of jaw and clicking.

Results: The results were evaluated comparing pre-procedural, immediate post procedural, and 1st 3rd, 6th 9th months post procedural. After 9 months of follow up, mean improvements were seen in terms of mouth opening, TMJ pain, clicking and lateral deviation which were statistically significant.

Conclusion: Arthrocentesis proved to be effective for the treatment of internal derangement of TMJ.

Keywords: temporomandibular joint (TMJ), internal derangement, arthrocentesis

Introduction

Internal derangement of the TMJ has been managed by various methods over the years. Many procedures have been developed to try to alleviate the pain and functional complaints of patients suffering from TMJ dysfunctions. The common methods are pharmacologic therapy, occlusal splints, arthroscopic surgery, arthrocentesis and Surgery. Arthrocentesis by definition refers to the lavage of the joint space to release adhesions or anchored disc phenomenon & improve joint mobility (David Frost 1999) [1]. Arthrocentesis was first used by orthopedic surgeons for traumatic synovitis, haemarthrosis, pseudo gout, lupus erythematosus & septic arthritis [2].

Temporomandibular Joint arthrocentesis was first reported by Nitzan *et al.* [3,4] Arthrocentesis may be performed in cases with acute or chronic limitation of jaw motion due to anteriorly displaced disc, hypo mobility due to restriction of condylar translation, patients with chronic TMJ pain who show an adequate range of motion despite an anteriorly displaced disc, to manage pain & dysfunction, in patients who have undergone previous surgery that failed to relieve pain and limitation of function and in patients showing radiographic changes of degenerative arthritis [5, 6, 7]. The technique of TMJ arthrocentesis and lavage was described as a simple means of releasing the 'stuck' disc from the fossa by simple irrigation of the superior joint space under local anaesthesia on an outpatient basis [8, 9, 10].

Clinical use of arthrocentesis in the TMJ is a new procedure among other possibilities of treating joint dysfunction. There is, therefore, a need for studies on the indications, success rate, and complications of this procedure [11].

Materials and Method

This prospective randomized clinical study included total 10 patients (2 male and 8 female) with a age group 18-60 years (mean age 25.20±7.18) who visited to the department of Oral & maxillofacial surgery, with complaints of limited Mouth opening, TMJ pain and clicking sounds. Pre and postoperative clinical assessment included maximum mouth opening, pain, clicking and lateral movements 1, 3, 6 and 9 months.

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All data were recorded in a questionnaire by the examiner. Maximal mouth opening (M MO) as measured between the edges of the incisors. Visual analogue scale (1-10) was used for pre op and post operative self evaluation of pain. The range of lateral movements of the mandible was measured by the distance between the upper and lower midlines on lateral movements. Evaluation of the characteristics of limitation of jaw motion and the presence of joint noises judged clinically as presence or absent. Radiographic assessment included orthopantomogram (Fig 1), transcranial and transpharyngeal TMJ views (Figure2) & MRI (Figure 3).

Procedure: A line joining the tragus of the ear to the outer canthus of the eye was drawn on the patient's skin in relation to the affected joint. The first mark (point A) was made 10mm from the tragus and 0.5mm below the line. The second mark (point B) was marked 20mm from the tragus and 1mm below the line. An auriculotemporal nerve block was given using 2% lignocaine with 1:100,000 adrenaline using 26gauge needle. 20 gauge needle was introduced into the point A and

approximately 5ml of saline was injected to distend the upper joint cavity. Then another 20 gauge needle was introduced into the point B, 20ml syringe filled with normal saline was connected to inflow or point A needle. The upper joint compartment was irrigated with 200 to 300 mL of normal saline, allowing a free flow through the out flow needle. Inflow needle was then removed (Fig 4). On termination of the procedure, 1 mL of commercially available Dexona 8 mg given through the outflow needle and the needle withdrawn. The maximum mouth opening of the patients was measured using a sterile vernier calliper. Clinical evaluation of efficacy of this procedure was done on the basis of four parameters studied as: pre procedural, immediate post procedural, 1, 3, 6 and 9 months post procedural. Post-operative medications included tablet piroxicam 20 mg for 3days. A soft diet is recommended for the first few days, however active jaw opening exercises are encouraged immediately upon completion of the procedure.



Fig 1: Preoperative Orthopantomogram

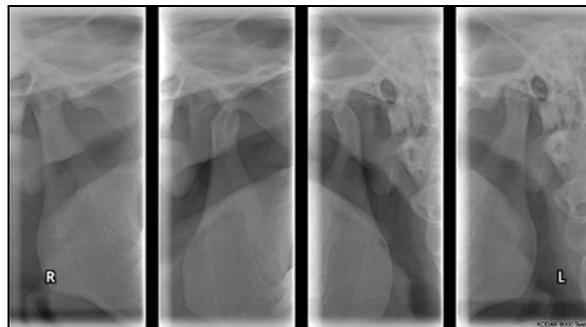


Fig 2: Temperomandibular Joint View

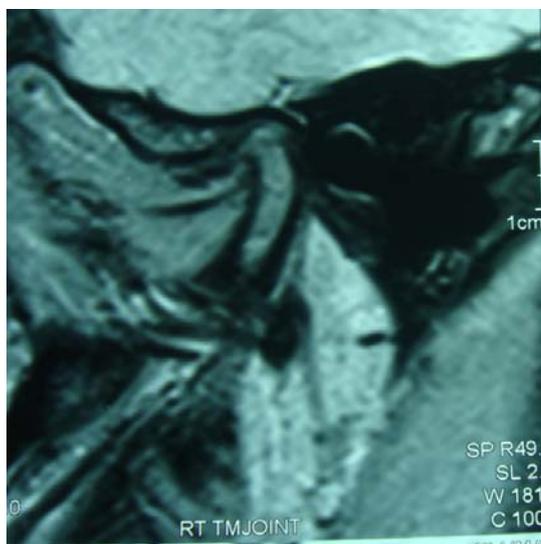


Fig 3: MRI showing anterior disc displacement



Fig 4: Lavage of Upper Joint Space with Saline



Fig 5: Pre-operative mouth opening



Fig 6: Mouth opening after arthrocentesis

Statistical Analysis: Student t test (two tailed, dependent) has been used to find the significance of study parameters on continuous scale with each group.

Results

The results were evaluated comparing pre-procedural, immediate post procedural, and 1st, 3rd, 6th & 9th months post procedural. After 9 months of follow up, mean improvements were seen in terms of mouth opening, (figure -5) TMJ pain, clicking and lateral deviation which were statistically significant.

The mean pain and maximal mouth opening score at the end of the 9th month was strongly significant with the p value for both groups being <0.001 (Table 1 and 2).

In terms of lateral moments, p value was 0.010 at the end of 9th month which has been proven to be moderately significant statistically (Table 3).

In terms of clicking, p value was 0.400 immediate after the treatment to 0.301 after 1month to 0.060 after 3 months to 0.060 at 6 month and to 0.003 at end of 9th month which has been also proven to be strongly significant statistically (Table 4).

Table 1: An evaluation of pain by visual analogue scale

Time points	VAS			
	Min-Max	Mean ± SD	Difference from Baseline	P value form pre-op
Pre-op	6-9	7.30±0.95	-	-
Immediate post op	3-7	5.30±1.57	2.00	<0.001**
1 st month	2-5	3.20±1.03	4.10	<0.001**
3 rd month	0-3	1.40±0.97	5.90	<0.001**
6 th month	0-4	1.20±1.32	6.10	<0.001**
9 th month	0-1	0.10±0.32	7.20	<0.001**

Table 2: An evaluation of mouth opening (mm)

Time points	Mouth Opening (mm)			
	Min-Max	Mean ± SD	Difference from Baseline	P value form pre-op
Pre-op	18-30	22.40±3.41	-	-
Immediate post op	28-36	31.70±2.91	9.30	<0.001**
1 st month	30-38	35.60±2.51	13.20	<0.001**
3 rd month	34-44	38.50±3.10	16.10	<0.001**
6 th month	34-41	38.80±2.39	16.40	<0.001**
9 th month	34-42	39.10±2.69	16.70	<0.001**

Table 3: An evaluation of based on Clicking.

Time points	Clicking			
	Present	Absent	% change of clocking condition	P value form pre-op
Pre-op	8(80.0%)	2(20.0%)	--	
Immediate post op	7(70.0%)	3(30.0%)	-10.0%	0.400
1 st month	6(60.0%)	4(40.0%)	-20.0%	0.301
3 rd month	3(30.0%)	7(70.0%)	-50.0%	0.060+
6 th month	3(30.0%)	7(70.0%)	-50.0%	0.060+
9 th month	1(10.0%)	9(90.0%)	-70.0%	0.003**

Table 4: An evaluation of lateral moments (mm).

Time points	Lateral Moments (mm)			
	Min-Max	Mean \pm SD	Difference from Baseline	P value form pre-op
Pre-op	2-4	3.00 \pm 0.82	-	-
Immediate post op	2-4	3.10 \pm 0.74	-0.100	0.343
1 st month	2-4	2.60 \pm 0.69	0.400	0.037*
3 rd month	2-3	2.50 \pm 0.53	0.500	0.015*
6 th month	2-3	2.40 \pm 0.52	0.600	0.005**
9 th month	2-3	2.30 \pm 0.48	0.700	0.010*

+ Suggestive significance (P value: 0.05<P<0.10)

* Moderately significant (P value: 0.01<P \leq 0.05)

** Strongly significant (P value: P \leq 0.01)

Discussion

Temporomandibular joint disorders (TMDs) are one of the most misdiagnosed and mistreated condition in the medical practice. Temporomandibular joint disorders 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 [12]. Internal derangement of the temporomandibular joint is one of the most frequent cause of temporomandibular joint disorder. TMJ internal derangement 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). TMJ internal derangement is usually characterized by pain, clicking, deviated jaw and limitation of jaw movement [13].

Symptomatic TMJ disease is accompanied by accumulation of certain markers in the synovial fluid such as; prostanoids, pro-inflammatory cytokines, matrix degrading enzymes, nitric oxide, serotonin, bradykinine, and neuropeptides. Because of the relatively avascular space of the intra-articular space, they may stay there for sometime [14].

Previous studies demonstrated that TNF α is produced locally by synovial tissue cells and may stimulate the production of other proinflammatory cytokines and play a pivotal role in the progression of inflammatory joint disease to destructive and non-destructive reactive arthritis [13].

Quinn *et al.* reported that internal derangement of the TMJ was often accompanied by the increased expression of COX-2 in both synovium and synovial fluid. This allows the accumulation of prostaglandins in synovial fluid, accompanied by peripheral vasopermeability, which may lead to the swollen synovium. Patients may become aware of limited jaw motion and associated pain around the TMJ in this stage [14].

The reason for limitation of mouth opening in all of our cases can be described by a theory by Nitzan and Dolwick which stipulates that sudden severe limited mouth opening is not caused by abnormal disc shape or position, but rather is the result of restricted gliding or forward translation of the condyle caused by the adherence of the disc to the fosse due to a reversible effect such as a vacuum, or possibly a yet to be determined change in synovial fluid consistency. Such events may occur as a result of sustained pressure applied to the joint. Effectively, the joint becomes 'stuck' by a suction cup effect resulting in sudden severe limitation of mouth opening [8]. Arthrocentesis has an intermediate place between the medical and the surgical forms of treatment. Ease, lower cost of materials and excellent published results so far include this technique in the international protocol for the treatment of TMJ dysfunction [11].

TMJ arthrocentesis is understood to include lavage of the upper joint space, hydraulic pressure and manipulation to release adhesions, or the "anchored disc phenomenon" or the suction cup effect, and improve motion, and the therapeutic injection of a steroid [1].

All of our cases showed improved mouth opening and relief from pain after arthrocentesis. Arthrocentesis has been claimed to alter the viscosity of the synovial fluid, there by aiding translation of the disc and condyle. In addition, high pressure arthrocentesis in combination with the shearing forces generated by joint manipulation is thought to release adhesions, there by enabling increased mouth opening. The analgesic effect is claimed to be secondary to the washing out of inflammatory mediators [15]. Thus allowing normal movement of the joint and expediting perfusion of nutrients and thus allowing some component of repair and adaptation. This may be the possible explanation for the relief of pain and improved mouth opening.

Conclusion

Temporomandibular joint arthrocentesis, the least invasive and the simplest of all surgical techniques, has proven to be highly successful in re-establishing normal function and reduction of pain in patients with internal derangement of TMJ. Patients with either disc displacement with reduction and closed lock were benefitted from arthrocentesis in this study. Arthrocentesis is a simple and minimally invasive procedure, does not involve the morbidity of GA and still maintains a track record of zero complications. It can be performed in the simplest of clinical settings and does not require major armamentarium. We emphasize that Arthrocentesis must be tried on every patient who requires surgery for Internal Derangement. However a long term follow-up study is required to establish arthrocentesis as a predictable method for treatment of internal derangement of TMJ especially closed lock.

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