Efficacy of Temporomandibular Joint Arthrocentesis on Mouth Opening and Pain in the Treatment of Internal Derangement of TMJ—A Clinical Study

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Abstract

Purpose This study was designed to investigate the efficacy of arthrocentesis on mouth opening and pain in the treatment of temporomandibular joint (TMJ) internal derangement patients.

Materials and Methods Fifteen males and 25 females aged between 18 and 37 years comprised the study material in the department of oral and maxillofacial surgery at Govt Dental College Srinagar (India). The patients' complaints were limited mouth opening and TMJ pain. Arthrocentesis was performed under aseptic conditions. Clinical evaluation of the patients was done before the procedure, and 1 week and 4 months post-operatively. Intensity of TMJ pain and maximal mouth opening were recorded at each follow-up visit.

Results There was significant improvement in mouth opening and reduction in pain scores in the post-operative period.

Conclusions Arthrocentesis is a simple and safe procedure for patients of internal derangement with closed lock for improving mouth opening and decreasing pain.

Keywords Internal derangement · Arthrocentesis · TMJ

Introduction

Internal derangement is a general orthopaedic term implying a mechanical fault that interferes with the smooth

action of a joint [1]. Internal derangement is thus a functional diagnosis, and for TMJ, the most common internal derangement is displacement of the disc [2–7]. Most often the disc displaces in an anterior, anterolateral, or antero-medial direction. The posterior band of the disc prolapses anteriorly, relative to the superior surface of the condyle, instead of remaining in position between the condyle and glenoid fossa. As a consequence, the condyle is positioned under the posterior disc attachment rather than under the disc, and the condyle closes on the posterior attachment (bilaminar zone or retrodiskal tissues) rather than on the disc itself. The central thin part of the disc lies inferior to the articular tubercle. Studies have shown that the disc frequently is also displaced in a medial or lateral direction [8–11]. Posterior disc displacement does occur, but it is rare. Clinical trials suggested splint therapy, arthrocentesis, arthroscopic lysis and lavage, and arthrotomy to be effective on TMJ related signs and symptoms; in terms of therapy [12].

Lysis and lavage of the TMJ were first done using arthroscopy by Ohnishi [13], but because it was found that visualisation of the joint is not necessary to accomplish these objectives, arthrocentesis was developed as a modification of TMJ arthroscopy [14, 15]. It was then found that the mechanical lysis of adhesions and lavage of the TMJ was often successful in treating various internal derangements. Lavage of the upper joint compartment forces the flexible disc apart from the fossa, washes away degraded particles and inflammatory components, and decreases the intra-articular pressure whenever the joint is inflamed. Arthrocentesis has been reported to reduce joint pain, improve function, and reduce clicking. It is most commonly used to treat patients with anterior disc displacement without reduction (closed lock) and disc adhesion. It is also used as a palliative for acute episodes of degenerative or

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Fig. 1 The entry points for the needle below Holmlund–Hellsing Line

rheumatoid arthritis [14–16]. Therefore the following study was designed to study arthrocentesis as a method of treatment for internal derangement (Fig. 1).

Materials and Methods

The present study was carried out in the department of Oral and Maxillofacial Surgery, Govt Dental College, Srinagar. Forty patients were chosen for our study. This included 25 female patients and 15 male patients. The age ranged from 18 to 37 years. Detailed examination and investigations were done and all the patients diagnosed with temporomandibular joint internal derangement- closed lock were selected for the study. The study was approved by the Chairman Department of Oral & Maxillofacial Surgery and World Medical Association. Declaration of Helsinki was strictly followed for the study. A written and verbal consent was obtained from the patients for treatment and associated complications, after the treatment outcome was fully explained to them. Visual Analogue Scale was used to score pain and the grading was done from 1 to 10 where 1 denoted no pain at all and 10 denoted very severe pain. These values were recorded pre-operatively, at 1 week and after 4 months post-operatively. The maximal mouth opening (MMO), was evaluated and recorded pre-operatively and post-operatively in millimetres (mm).

Procedure

The procedure was carried in total aseptic conditions. The ear and preauricular skin over the TMJ was prepared and draped with topical antiseptic solution. A line was drawn from the lateral canthus to the most posterior and central point on the tragus (Holmlund–Hellsing Line) [17]. The posterior point of entry is located along the canthotragal

line 10 mm from the middle of the tragus and 2 mm below the canthotragal line [14]. This is the approximate area of the maximum concavity of the glenoid fossa. The distance is about 25 mm from skin to the centre of the joint space [14]. The anterior point of entry is placed 10 mm further along the canthotragal line and 10 mm below it. This marking indicates the site of the eminence of the TMJ. The auriculotemporal nerve was blocked with about 2 ml of local anesthetic and a 18-gauge needle was used for introduction into the superior joint space at the glenoid fossa (posterior mark). Approximately 2 ml of Hartmann's (Ringer's lactate) solution was then injected to distend the superior joint space. A second 18-gauge needle was inserted into the distended compartment in the area of the articular eminence to establish a free flow of the solution through the superior joint space. A syringe filled with Hartmann's solution was then connected to one of the needles, and fluid was injected into the superior joint space (Fig. 2). The second needle provided an outflow for the solution which was collected in a kidney dish. A total of 100 ml of solution was used to lavage the superior joint space.

After the lavage was completed the needles were removed, the patient's jaw was gently manipulated by the clinician in the vertical, protrusive and lateral excursions to help further free the disc and break the adhesions. The patients were then followed with the same protocol.

Results

All the patients were observed for 4 months. The pre-operative mouth opening ranged from 18 to 27 mm with a mean of 23.7 mm (Table 1). The VAS pain score ranged from 4 to 8 (Table 2). The post-operative MMO ranged from 27 to 37 mm at 1 week with a mean of 33.475 mm and same increased to a range of 32–46 mm with a mean of 41.05 mm at 4 month follow-up (Table 1). On follow-up the VAS score decreased to a range of 1–4 (mean 2.45) on 1 week then to 1–2 (mean 1.225) at 4 month follow-up (Table 2). All the patients noticed improvement in their chief complaints. No complications were recorded.

Discussion

Published in 1991 by Nitzan [18] the technique of TMJ arthrocentesis and lavage with manipulation has gained widespread acceptance, as a simple and effective technique for the treatment of acute persistent closed lock of the TMJ that is refractory to more conservative measures. The idea of TMJ arthrocentesis and lavage was first borne out of the successful use of TMJ arthroscopy not only as a diagnostic

Table 1 The pre-operative and post-operative mouth opening of patients in mm

Patient	Pre-operative mouth opening	Post-operative mouth opening (1 week)	Post-operative mouth opening (4 months)
1	27	35	45
2	21	33	42
3	19	30	42
4	23	34	42
5	26	35	44
6	23	33	41
7	25	37	43
8	27	35	43
9	19	32	39
10	20	36	40
11	25	33	43
12	24	36	44
13	27	36	45
14	24	36	42
15	18	27	32
16	19	29	39
17	26	37	43
18	23	33	45
19	27	37	46
20	26	27	41
21	19	32	41
22	27	34	42
23	20	35	39
24	23	34	41
25	27	36	40
26	25	33	40
27	20	32	38
28	26	34	41
29	21	27	39
30	27	36	41
31	25	32	39
32	24	34	41
33	23	32	40
34	19	34	39
35	26	32	40
36	25	32	38
37	27	35	40
38	26	34	40
39	25	36	41
40	24	34	41
Mean	23.7 mm	33.475 mm	41.05 mm

tool, but also as a therapeutic technique resulting in remarkable improvement in pain, jaw opening and function in selected patients through the simple process of lavaging the superior joint space [19]. Hydraulic pumping

Fig. 2 Arthrocentesis with two needles in place

procedures described by Murakami and popularized by Nitzan have also won a place in the therapeutic management of TMJ. 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 [20].

In our study, mean VAS score was 6.45 and mean MMO was 23.7 mm before treatment. In the post treatment phase the mean VAS pain score dropped to 2.45 at 1 week and then to 1.225 at 4 month period, whereas mean mouth opening improved to 33.475 mm at 1 week and to mean value of 41.05 mm at 4 month time period, which indicates significant improvement in patient symptoms and complaints. The results of the our study compare favourably with the findings of other authors describing the successful use of arthrocentesis and hydraulic distension in patients with a clinical diagnosis of closed-lock or disc displacement without reduction [21–24]. The results of this study are in conformity with the findings of the initial clinical trial that TMJ arthrocentesis and lavage with manipulation is an effective technique for the treatment of acute persistent closed lock of the TMJ in terms of significantly improving maximum mouth opening and jaw function, and reducing pain. In addition to the effective treatment of acute closed lock, it has also been suggested that TMJ arthrocentesis and lavage may further be useful for the management of osteoarthritis, early rheumatoid arthritis and acute intracapsular trauma with haemarthrosis of the TMJ [22]. Complications of TMJ arthrocentesis and lavage, include extravasation of fluid into surrounding tissue, facial nerve injury (0.7–0.6 %) [25–27], fifth nerve deficit (0.1–2.4 %) [25], otic injury (0.5–8.6 %) [25, 26], preauricular haematoma, superficial temporal artery aneurysm, arteriovenous fistula, transarticular perforation, intracranial perforation, extradural haematoma, parapharyngeal swelling, and intra-articular problems [28].

In summary TMJ arthrocentesis and lavage with manipulation is a simple, less invasive and less expensive

Table 2 The pre-operative and post-operative pain scores of patients on VAS scale

Patient	Pre-op pain (VAS)	Post-op pain (VAS) 1 week	Post-op pain 4 months
1	7	3	1
2	6	4	1
3	5	2	1
4	8	3	2
5	7	3	1
6	8	4	2
7	6	2	1
8	6	2	1
9	8	3	1
10	5	1	1
11	7	3	1
12	8	3	2
13	6	2	1
14	5	1	1
15	7	3	1
16	8	4	1
17	5	3	1
18	6	1	1
19	8	2	1
20	7	3	1
21	5	2	2
22	8	3	1
23	6	2	1
24	7	2	1
25	7	3	2
26	5	2	1
27	5	1	1
28	6	2	2
29	8	3	2
30	7	2	1
31	4	1	1
32	5	2	1
33	6	3	1
34	8	5	2
35	6	2	1
36	7	2	1
37	5	1	1
38	6	2	1
39	6	3	2
40	8	3	1
Mean	6.45	2.45	1.225

technique with low morbidity that should be considered as an effective and efficient alternative to more invasive surgical procedures in a selected group of patients.

Conclusion

The most important aims of lysis and lavage of the TMJ are to eliminate inflamed synovial fluid, to release the disc, to reduce the pain, and to enable mobilisation of the joint by flushing the upper joint space. TMJ arthrocentesis seems to be a safe alternative in patients of internal derangement of closed lock with less complications.

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