CASE REPORT

A Retrospective Study of Temporomandibular Joint Internal Derangement Treated with Arthrocentesis and Arthroscopy

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ABSTRACT

Introduction: Internal Derangement of the Temporomandibular Joint is an intra-articular condition in which there is a disruption in the normal relationship of the articular disc to the articular eminence and the condyle when the joint is at rest or in function. Patients may complain of pain and/or limitation of mouth opening. Treatment of internal derangement of temporomandibular joint includes arthrocentesis and arthroscopy. The aims of this retrospective study are to examine the efficacy of arthrocentesis and arthroscopy in the treatment of internal derangement of temporomandibular joint, specifically in relation to joint movement and pain. **Methods**: Twenty consecutive patients with internal derangement of temporomandibular joint seen in National Dental Centre of Singapore, from 2010 to 2011, were included in this study. Nine patients underwent arthrocentesis and 11 had arthroscopic lysis and lavage. The pre and postoperative pain score, in Visual Analogue Scale (0 to 10) and maximal inter-incisal opening were recorded to evaluate the effectiveness of both treatment modalities. The patients were reviewed one week and one month post-operation. The data obtained were statistically analysed. **Results**: Significant increase in postoperative mouth opening and reduction in pain were found in both groups of patients. In the arthrocentesis group, the mean increase in maximal inter-incisal opening was 13 ± 5mm and reduction of pain in VAS was 4.56 ± 1.74. For the arthroscopy group, the mean increase in maximal inter-incisal opening was 6.6mm ± 4.8mm and the reduction of pain was 2.5 ± 2.2. Duration of symptoms prior to treatment appeared to have influenced the treatment outcome of both treatments. **Conclusion**: Arthrocentesis and arthroscopy are effective in the treatment of internal derangement of temporomandibular joint. Factors that may influence treatment outcomes need to be investigated to provide more information on the predictability of arthrocentesis and arthroscopy.

Keywords: Arthrocentesis, Arthroscopy, Internal derangement, Temporomandibular joint disorder

INTRODUCTION

One of the most common forms of Temporomandibular Joint Disorder (TMD) is Internal Derangement (ID). It has been reported that 80% of patients with signs and symptoms of TMD have some form of ID of the temporomandibular joint (TMJ)[1]. ID is an intra-articular condition in which there is a disruption in the normal relationship of the articular disc of the TMJ to the articular eminence and the condyle when the joint is at rest or in function[2]. ID of the TMJ includes conditions like anchored disc phenomenon, disc displacement with reduction, painful click and closed lock. Patients with ID of the TMJ often complain of pain, joint sounds and limitation of mouth opening.

Most of the patients with ID can be successfully treated with non-surgical therapy[3]. Non-surgical therapy includes pharmacotherapy, TMJ splints and physical therapy. Patients who do not respond to non-surgical therapy may require more invasive procedures such as arthrocentesis and arthroscopy.

Arthrocentesis has been used successfully to treat ID of TMJ. It is a minimally invasive procedure with few complications. By definition, arthrocentesis is the process of aspiration of joint fluid. In the treatment of ID of TMJ, arthrocentesis involves introducing a needle to allow aspiration of joint fluids in the upper joint space and a second needle to allow lavage[4]. Lavage of the upper joint space

Table 1. Arthrocentesis Group.

No.	Age (yr)	Sex	TMJ	Diagnosis	Duration (Months)	Preo-op Pain (VAS)	Pre-op MIO (mm)	Post-op Pain (VAS)	Post-op MIO (mm)
1	23	F	LEFT	Closed lock	2	7	25	3	40
2	40	F	LEFT	Closed lock	1	7	28	2	40
3	21	F	LEFT	Closed lock	1	6	23	2	41
4	16	M	LEFT	Closed lock	1	6	27	0	45
5	22	M	RIGHT	Closed lock	9	7	29	6	32
6	24	F	RIGHT	Closed lock	1	7	25	0	39
7	34	F	LEFT	Closed lock	3	7	32	3	39
8	39	F	LEFT	Closed lock	1	7	25	3	40
9	37	F	RIGHT	Closed lock	1	6	25	0	40

forces apart the disc from the fossa and washes away inflammatory mediators. The procedure is particularly useful in cases of limited mouth opening due to an anteriorly displaced disc that cannot be reduced or due to disc adhesion. Significant improvement in joint movement and reduction of pain after treatment with arthrocentesis has been reported[5-8].

In 1975, Onishi reported the first arthroscopic examination of TMJ[9]. Since then significant advancement, both technological and technical, has been made in TMJ arthroscopy. A simpler arthroscopic technique of lysis and lavage of the TMJ was introduced by Sanders in 1986[10]. Many authors have since reported good clinical results treating ID of TMJ with arthroscopic lysis and lavage[11-14]. This technique allows adhesion that is formed between the disk and fossa to be released, thus freeing the disk, and allowing condylar translation. Further lavage of the joint space with normal saline can be done through the cannula.

MATERIALS

A total of 20 consecutive patients with ID of the TMJ treated with arthrocentesis or arthroscopy in the National Dental Centre Singapore by the author from 2010 to 2011, were included in this study. These patients presented with significant pain and/or limitation of mouth opening. Three patients were diagnosed with painful click and 17 were diagnosed with closed lock, either due to a displaced disc or anchored disc phenomenon. All the patients had undergone a period of at least three to eight weeks of unsuccessful non-surgical treatment. All were prescribed a course of NSAIDs and muscle relaxant. A bite-raising splint was issued to nine of the patients who gave a history of bruxism. A dental panoramic tomograph was taken for all patients to exclude any dental cause for their pain/limitation of mouth opening.

The choice of either arthrocentesis or arthroscopy was based on the author's clinical judgement. Generally, arthroscopic lysis and lavage of the TMJ were carried out in patients with long-standing symptoms and in those with signs/symptoms that in the opinion of the author warranted an arthroscopic examination of the TMJ. Patients with early onset of ID of TMJ were generally indicated for arthrocentesis.

Nine of the patients (7 females, 2 males) had arthrocentesis of TMJ. The age range of this group of patients was 16 to 40 years (mean 28.4 ± 9.0 years). The other 11 (8 females, 3 males) had TMJ arthroscopic lysis and lavage. Their ages ranged from 20 to 63 years (mean 39.9 ± 16.2 years). The duration of symptoms for the arthrocentesis group ranged from one month to nine months (mean of

Table 2. Arthroscopy Group.

No.	Age (yr)	Sex	TMJ	Diagnosis	Duration (Months)	Preo-op Pain (VAS)	Pre-op MIO (mm)	Post-op Pain (VAS)	Post-op MIO (mm)
1	45	F	LEFT	Painful click	1	7	38	2	42
2	41	F	LEFT	Closed lock	3	6	30	3	40
3	21	M	RIGHT	Painful click	24	7	55	1	47
4	20	M	LEFT	Painful click	1	7	47	1	45
5	61	F	LEFT	Closed lock	2	3	34	0	41
6	43	F	LEFT	Closed lock	72	8	23	8	23
7	22	M	RIGHT	Closed lock	9	7	32	7	45
8	63	F	RIGHT	Closed lock	1	6	30	2	39
9	43	F	LEFT	Closed lock	24	6	30	6	28
10	30	F	LEFT	Closed lock	5	6	32	1	41
11	46	F	RIGHT	Closed lock	14	6	28	1	38

2.2 months) and that for the arthroscopy group ranged from one month to six years (mean of 14.2 months).

Of the 20 patients treated in both groups, only patients with preoperative maximal inter-incisal opening (MIO) of less than 35mm were included in the assessment of the efficacy of the treatments in increasing joint movement. Only patients with a pain score of six or more were included for the assessment of effectiveness of the treatments to reduce joint pain. All nine patients who underwent arthrocentesis were included in the assessment of joint movement and pain (Table 1). Only eight out of 11 patients in the arthroscopy group were included in the assessment of joint movement, and 10 out of 11 were included in the assessment of pain (Table 2).

METHOD

Preoperative MIO and pain score, in the form of visual analogue scale (VAS) ranging from one to 10, were recorded. Both parameters were reassessed at one week and one month post-operation.

The procedure of arthrocentesis, done under local anaesthesia, involved inserting two 18-gauge needles, one at the posterior recess and the other at the anterior recess, of the upper joint space of the TMJ. A total of 200ml of saline was used to lavage the joint space (Fig. 1, see overleaf).

Arthroscopic lysis and lavage of the TMJ was done under general anaesthesia using a 3.2mm Stryker 30° arthroscope (Fig. 2, see overleaf). A blunt trocar was inserted into the cannula and used for lysis of adhesions. A blind sweeping action of the trocar extending from the anterior recess to the posterior recess of the TMJ was applied to break and free the adhesions (Fig. 3, see overleaf). Lavage of the upper joint space of the TMJ was done with 200ml of saline via the cannula (Fig. 4, see overleaf).

Postoperative care included NSAIDs, physical therapy and soft diet. Patients who brux and were habitual clenchers were instructed in the continued use of their occlusal splints.

The paired *t*-test was used to compare the preoperative and postoperative differences in MIO and pain score. Linear regression was used to evaluate the relationship between the duration of symptoms and the treatment outcome.

RESULTS

The Arthrocentesis Group

A significant improvement in joint movement ($P < 0.0001$) and reduction in pain ($P < 0.0001$) was observed in this group of patients. The mean preoperative MIO was 26.56 ± 2.74mm. Following

Fig.1 TMJ Arthrocentesis

Fig.2 TMJ Arthroscopy

Fig.3 Blunt trocar used for lysis of the joint space

Fig.4 Lavage during TMJ arthroscopy

treatment with arthrocentesis and at one-month review, the mean postoperative MIO was 39.56 ± 3.36mm. The mean increase in MIO was 13 ± 5mm.

The mean preoperative pain score on VAS was 6.67 ± 0.50. Following treatment and at one-month review, the mean postoperative pain score was 2.11 ± 1.96. The mean reduction in pain on VAS was 4.56 ± 1.74.

The Arthroscopy Group

In this group, a significant improvement in joint movement was recorded (P <0.006). The mean preoperative MIO was 30.25 ± 3.73mm. Following treatment with arthroscopy and at one-month review the mean postoperative MIO was 36.88 ± 7.43mm, with a mean increase in MIO of 6.6mm ± 4.8mm.

There was also significant reduction in pain after treatment (*P* <0.015). The mean preoperative pain score on VAS was 6.00 ± 1.41 and the mean postoperative pain score after treatment and at one-month review was 3.50 ± 3.07, with a mean reduction in pain of 2.5 ± 2.2 on a VAS.

DISCUSSION

Although this is a retrospective study with a small sample size, interestingly, the results of this study are comparable to other similar studies.

Al-Belasy and Dolwick[15] did a review on the efficacy of arthrocentesis on the treatment of TMJ closed lock and reported an overall success rate of arthrocentesis as 83.2%. In this study, eight out of nine (88%) patients achieved increased joint movement and good pain reduction after treatment with arthrocentesis.

In the arthroscopy group of patients, six out of eight (75%) patients had significant improvement in jaw movement and eight out of 10 (80%) patients achieved significant postoperative pain reduction, after arthroscopic lysis and lavage.

In this study, the preoperative duration of symptoms was found to influence the treatment outcome of both arthrocentesis and arthroscopy. In both groups, patients who had a shorter duration of symptoms had better outcome in terms of postoperative MIO. In the arthrocentesis group, patients who had a shorter duration of symptoms responded with significantly more pain reduction.

Emshoff and Rudich found similar correlation[16] in their study. They concluded that the effectiveness of arthrocentesis in pain reduction was less successful in patients with chronic TMJ pain than in non-chronic patients. Israel et al[17] in their study to determine the differences in treatment outcome of patients receiving early versus late arthroscopic treatment of the TMJ, found that patients who had early treatment had better surgical outcomes than those who had delayed treatment.

The two patients in this study who did not respond to the arthroscopic treatment had limited mouth opening for six years and two years, respectively. Long-standing pathology without treatment at the opportune time may allow the progression of the disease, leading to intra-articular adhesions, fibrosis and deformity of the disc. Extensive adhesions may render lysis and releasing of the disc more difficult in these patients. These would directly affect the treatment outcomes.

Murakami et al[18] in their study found that arthrocentesis was as effective as arthroscopy in the treatment of closed lock of the TMJ, but they concluded that arthrocentesis should be indicated for patients with acute closed lock and should not be an alternative to arthroscopy. Goudot et al[19] found that arthrocentesis and arthroscopy were both effective in the treatment of TMD, but arthroscopy was more effective in improving mouth opening. The authors suggested that arthroscopy should be reserved for patients with long-standing duration of symptoms and joints that require additional diagnosis. In this study, the treatment outcome of the arthroscopy group appeared to be inferior to the arthrocentesis group. However, this result may not be accurate because the study sample was small and the patients were not randomised.

Arthrocentesis and arthroscopy are not without risks. Generally, the potential complications of arthroscopy can also occur in arthrocentesis, but the incidence and extent of complications are less in arthrocentesis[5]. Damage to the facial and auriculotemporal nerves, perforation of the external auditory canal and tympanic membrane and breach of base of skull[20] have been reported as complications after arthroscopy. Transient facial nerve paralysis caused by local anaesthesia, swelling of the preauricular area due to fluid extravasation may result from arthrocentesis. No complication was encountered in both the arthrocentesis and arthroscopy groups in this study.

CONCLUSION

The results of this study show that arthrocentesis and arthroscopy when done correctly and with correct patient selection are effective in increasing joint movement and decreasing pain in patients with ID of the TMJ. The complications associated with these minimally invasive techniques are rare. Future studies to investigate the factors that may affect the treatment outcome of both treatment modalities will contribute to further knowledge, thus making the treatments more predictable.

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