

## Arthrocentesis versus conservative treatments for TMJ dysfunctions: A preliminary prospective study

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### Abstract

**Background and objective:** The temporomandibular disorders present with a variety of signs and symptoms which include pain in the joint and its surrounding, jaw sounds, limited jaw opening, jaw deviation and headache. The aim of this study was to compare the results and efficacy of arthrocentesis with those of conservative treatments for temporomandibular joint disorders.

**Methods:** In a clinical comparative prospective study, 45 patient of both sexes were enrolled in this study according to inclusion criteria's. The arthrocentesis group consisted of 22 patients (31 joints). The conservative treatment group consisted of 23 patients (34 joints). For both groups, pretreatment and four months post treatment parameters (visual analogue scale for pain, maximum mouth opening and joint sounds score) were recorded.

**Results:** The results revealed that highly statistically significant difference between all pretreatment and forth months post treatment parameter means for both groups ( $P < 0.001$ ). Both arthrocentesis and conservative treatments were effective. There was a highly statistical significant difference between the four months post treatment parameter means for both groups ( $P < 0.001$ ). Arthrocentesis was superior to conservative treatments. The overall success rate was 87.1% for arthrocentesis and 55.9% for conservative treatments.

**Conclusion:** Both conservative treatment and arthrocentesis are effective in the treatment of temporomandibular joint dysfunctions. However, arthrocentesis seems to be superior.

**Keywords:** Arthrocentesis, Conservative treatment, TMJ dysfunctions.

### Introduction

The term "temporomandibular disorders" (TMD), is a collective term embracing a number of clinical problems characterized by (1) facial pain in the region of the TMJ and/or the muscles of mastication, (2) limitation or deviation in the mandibular range of motion, and (3) TMJ sounds during jaw movement and function.<sup>1</sup> Many conservative approaches to the treatment of TMD have been proposed through the years, among which are occlusal splint therapy, physiotherapy, pharmacotherapy, and occlusal treatments.<sup>2</sup> The adoption of conservative treatment modalities is based on the assumption that non-reversible and invasive therapies are not indicated to treat symptoms in the absence of a well

identified pathogenetic pathway.<sup>3</sup> Medications are often prescribed for managing the symptoms associated with TMD. Patients should understand that these medications may not offer the cure to their problem but can be valuable adjunctive aid when prescribed as part of a comprehensive program. Mild analgesics, nonsteroidal anti-inflammatory drugs (NSAIDs), antianxiety agents, tricyclic antidepressants, and muscle relaxants are medications used as part of initial treatment.<sup>3</sup> Temporomandibular joint (TMJ) arthrocentesis consists of lavage of the upper joint space of the TMJ, aiming primarily to remove necrotic tissue, blood and pain mediators from the joint.<sup>4</sup> Nitzan et al. (1991) first described TMJ arthrocentesis as the simplest form of

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surgery in the TMJ, aiming to release the articular disc and to remove adhesions between the disc surface and the mandibular fossa by means of hydraulic pressure from irrigation of the upper chamber of the TMJ.<sup>5</sup> Arthrocentesis has low morbidity, few risks and low cost compared to other TMJ surgical interventions, and may be conducted under local anesthesia in an outpatient clinic setting.<sup>6</sup> Indications for arthrocentesis described in medical literature are: dislocation of the articular disc with or without reduction, limitations of mouth opening originating in the joint, joint pain and other internal derangements of the TMJ.<sup>5,7</sup> Arthrocentesis is also indicated for closed lock, open lock, synovitis, rheumatoid arthritis, osteoarthritis and adhesions.<sup>8</sup> Arthrocentesis is now increasingly recognized as first line surgical intervention in patients who do not respond to conservative management. The physical action of lyses and lavage in the superior joint space rather than repositioning the disc is thought to be responsible for the success of this procedure.<sup>5,9</sup> This has led to the use of TMJ arthrocentesis as a relatively less invasive alternative.<sup>5</sup>

## Methods

In a clinical comparative prospective study, 45 patients of both sexes were enrolled in this study suffering from TMJ pain, TMJ sound and limitation of mouth opening from January 1, 2010 to August 31, 2010 in Rizgary Teaching Hospital/Department of Oral and Maxillofacial Surgery and Khanzad Specialized Dental Polyclinic. Based on simple clinical evaluation, patients were grouped under a global diagnosis of TMJ pain and dysfunction syndrome. The patients were then divided into two groups:

1. The arthrocentesis group consisted of 22 patients (31 joints). They all were with limited maximum mouth opening (MMO<35mm), TMJ pain, and TMJ click. They also had failed conservative treatments for at least 3-6 months.

2. The control conservative treatment group consisted of 23 patients (34 joints). They all were with limited maximum mouth opening (<35mm), TMJ pain, and TMJ click. None of these patients has had full and/or correct course of conservative treatment.

Before commencement of arethrocentesis or conservative treatment, each patient has had full TMJ examination to record the inter-incisal opening (MMO). The pain was evaluated by the use of the visual analogue pain scale (Merskey,1973),<sup>21</sup> and the clicking was recorded by score: (0=no sound heard even by stethoscope, 1=mild sound heard just by stethoscope, 2=moderate click that can be felt by palpation, and 3=severe sound audible by the patient or others).<sup>15</sup> Each patient belong to the arthrocentesis group had a total of 300-400 ml of Ringer lactate solution used to lavage the upper joint compartment. This was achieved after the insertion of two needles into the upper joint space. Accurate placement of these needles was aided by drawing a line from the lateral canthus of the eye to the mid-point of tragus of the ear (Holmlund-Helsing line). The input needle was placed 2 mm below this line at a point 10 mm forward of the mid-tragus. When properly positioned, as indicated by the feeling of back pressure within the syringe then the joint was distended with 2 mL of Ringer lactate, the output needle was inserted into UJC 10 mm bellow tragal-canthal-line at 20mm anterior from the mid-tragus. When both needles correctly positioned in the joint, the injected fluid will exit through the other needle, Figure 1 and 2. The patients were given a post-operative analgesia of 200 mg of celecoxib as two times daily for two weeks. They had a course of physiotherapy commenced immediately after the arthrocentesis to promote and maintain the improvement in the mandibular opening, and they were instructed to take soft diet for at least one month, after which they could turn to normal diet. Those patients belong to the conservative group were

treated only with medications, home exercise and dietary instructions. All of them took celecoxib for one month and 2mg diazepam tablet at bed time for three weeks.

The follow-up visits for both study groups were as follow:

First visit (1 month post treatment) all parameters were recorded.

Second visit (2 months post treatment) all parameters were recorded.

Third visit (3 months post treatment) all parameters were recorded.

Fourth visit (4 months post treatment) all parameters were recorded.

The success criteria implemented in this study included:

1. Significant improvement in MMO  $\geq$  40mm.

2. Significant improvement in pain level on VAS  $\leq$  3.

3. Absence of joint sound (score=0).

A case is considered as failure when two or more of the above mentioned criteria were not fulfilled.



**Figure 1:** both needles in correct position.



**Figure 2:** The Ringer lactate fluid is injected through the inflow needle.

**Statistical analysis:**

The paired t-test was used in this study to compare between the efficacy of the arthrocentesis and the conservative treatments within each group. This intragroup comparison was made between the pretreatment and the fourth month post treatment parameter means. The unpaired t-test was used to compare between the fourth month post treatment parameter means of both treatment groups. This intergroup comparison was undertaken to find out which treatment modality was superior to the other.

**Results****1. Arthrocentesis group:**

It has been shown that, after arthrocentesis, the maximum mouth opening has increased, and both of the pain and joint sounds have decreased (Table 1).

Success rate after arthrocentesis:

It is felt that, when dealing with joint treatment, the sample size is considered as the number of the joints rather than the

number of patients.

According to the success criteria, four joint arthrocentesis (out of 31 TMJ arthrocentesis) were considered as failure (one was bilateral and the remaining two were unilateral). The success rate was, therefore, equal to 87.1%.

**2. Conservative treatment group:**

It has been shown that, after conservative treatment, the maximum mouth opening has increased, and both of the pain and joint sounds have decreased (Table 2).

Success rate after conservative treatments:

According to the success criteria, 15 joints (out of 34 joints) were considered as failure (6 were bilateral and 3 were unilateral). So the success rate was 55.89%.

Intergroup comparisons:

Table 3 shows the comparison of mouth opening, joint pain and sound between conservative and arthrocentesis four months means after treatment. The differences were statistically significant ( $P < 0.05$ ).

**Table 1:** Mouth opening, joint pain and joint sound at baseline and fourth months post treatment means

Variables (Parameters)	Pretreatment	Four months post treatment means	p value
MMO(mm)	27.27 ± 4.939	42.09 ± 4.450	<0.001*
VAS pain	7.05 ± 1.527	1.13 ± 1.167	<0.001*
Joint sounds	1.72 ± 1.120	0.14 ± 0.351	<0.001*

**Table 2:** Mouth opening, joint pain and joint sound at baseline and fourth months post treatment means after conservative treatment

Variables (Parameters)	Pretreatment	Four months post treatment means	p value
MMO(mm)	27.65 ± 4.141	39.60 ± 3.320	<0.001*
VAS pain	7 ± 1.809	1.86 ± 1.217	<0.001*
Joint sounds	1.65 ± 1.152	0.61 ± 0.783	<0.001*

**Table 3:** Comparison of mouth opening, joint pain and sound between conservative and arthrocentesis four months means

Variables	Arthrocentesis	Conservative treatment	p value
MMO(mm)	42.09 ± 4.450	39.60 ± 3.320	0.048*
VAS pain	1.13 ± 1.167	1.86 ± 1.217	0.045*
Joint sounds score	0.14 ± 0.351	0.61 ± 0.783	0.013*

\* Highly significant

## Discussion

This study compared the efficacy of conservative treatment method and arthrocentesis of four months follow-up periods. It was found that both conservative treatment and arthrocentesis were effective, but the arthrocentesis yielded significantly better outcomes than the conservative treatment. The follow-up period ranged from 4 to 11 months, with a mean of 8.5. In a five-year retrospective evaluation of temporomandibular joint arthrocentesis, it was found that there were no significant differences between the results of a follow-up of less than 20 months regarding the relief of pain, TMJ dysfunction, and range of MMO.<sup>10</sup> This indicates that the long-term success rates are comparable to short-term success rates. So, the follow-up period in this study can be compared with long term follow-up periods.

### 1. Arthrocentesis group:

The pretreatment MMO ranged from 15-35 mm with a mean of  $27.27 \pm 4.939$  mm while four months post treatment MMO ranged from 33-50 mm with a mean of  $42.09 \pm 4.450$  mm. A significant improvement was observed between pretreatment and four months post treatment MMO. This is in agreement with results of Murakami *et al.*<sup>11</sup> It was proposed that lavage and lysis of the UJC would eliminate the vacuum effect and alter the viscosity of the synovial fluid thereby aiding translation of the disk and condyle.<sup>5,12</sup> The mechanism of arthrocentesis is clear: lavage and lysis may well remove the causal substances from the synovial space. It may also alter the intra-articular pressure, particularly in a closed locked TMJ, by adding more fluid, which will allow more condylar mobility.<sup>13</sup> The mean of the pretreatment VAS pain value was  $7.05 \pm 1.527$ , whereas the mean of the four months post treatment VAS pain value was  $1.13 \pm 1.167$ . A statistically significant difference between these values was observed. This is in agreement with those reported by Murakami *et al* which was  $6.9 \pm 4.4$  of the pretreatment mean of VAS pain value.<sup>11</sup> Removal of inflammatory

mediators in the joint by arthrocentesis may contribute to reduction of pain.<sup>14</sup> The mean of the pretreatment joint sound score was  $1.72 \pm 1.120$  and the mean of the four months post treatment joint sound score was  $0.14 \pm 0.351$ . A highly ( $P < 0.001$ ) statistically significant difference between these values was observed. This is in accordance with results reported by Önder *et al.* (2009).<sup>15</sup> According to the success criteria four joint arthrocentesis (out of 31 TMJ arthrocentesis) were considered as failure; one case was bilateral and the remaining 2 were unilateral. So the success rate was 87.1%. The success rate of the present study was in the range reported by other researchers which was 60%-100%.<sup>16-18</sup> We think that this fluctuation in success rate generally was due to:

1. Because some parameters were recorded by patients themselves like VAS pain and VAS jaw dysfunction, which greatly affect the results.

2. Because the TMD was multifactorial in nature.

### 2. Conservative treatments group:

The pretreatment MMO mean was  $27.65 \pm 4.141$  mm while four months post treatment MMO mean was  $39.60 \pm 3.320$  mm. A significant improvement was observed between pretreatment and four months post treatment MMO. This is in accordance with results of Diraçoglu *et al.* (2009),<sup>19</sup> but not in accordance with results reported by Önder *et al.* (2009)<sup>15</sup> who observed no statistically significant improvement of MMO between preoperative and postoperative values. However, unlike in this study where the physiotherapy has been used in addition to occlusal splint and medication, Önder *et al* only used occlusal splint and medications.<sup>15</sup> The mean of the pretreatment VAS pain value was  $7 \pm 1.809$ , whereas the mean of the four months post treatment VAS pain value was  $1.86 \pm 1.217$ . A statistically significant difference between these values was observed. Murakami *et al* demonstrated significantly favorable results in pain and dysfunction with nonsurgical treatment modalities<sup>11</sup>. The

Mean of the pretreatment joint sound score was  $1.65 \pm 1.152$  and the mean of the four months post treatment joint sound score was  $0.61 \pm 0.783$ . A highly statistically significant difference between these values was observed. This is not in accordance with results reported by Önder *et al* as they observed no statistically significant decrease in joint sound between preoperative and postoperative values.<sup>15</sup> According to the success criteria, 15 joints (out of 34 joints) were considered as failure; six cases were bilateral and three cases were unilateral. So the success rate was 55.9%. This was in range reported by others like Murakami *et al* who reported a success rate of 56.6%<sup>11</sup>, and Sato *et al*.<sup>20</sup>

### 3. Intergroup comparisons:

In this study, the MMO, joint sound and pain were significantly better with arthrocentesis group than conservative therapy. This is because by arthrocentesis a mechanical clearance and removal of pain mediators and destruction of fibrous adhesions within the joint can be achieved. These results were in agreement with those reported by Murakami *et al*<sup>11</sup>, and Dıraçoğ˘lu *et al*<sup>19</sup>. Arthrocentesis is a method that is easily tolerable by patients and is less invasive compared to other surgical methods and arthroscopy. It is observed in this study that it increases in the MMO, decreases in the joint sound, improvement in jaw dysfunction and pain relief in a short time. In addition, it is simple procedure, with little morbidity and easily performed in an outpatient setting.

### Conclusion

We conclude that early treatment either with conservative methods or with arthrocentesis are beneficial in treatment of temporomandibular joint dysfunctions. However, arthrocentesis seems to be superior.

### Conflicts of interest

The authors report no conflicts of interest.

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