

# Arthroscopy versus arthrocentesis

## *A retrospective study of disc displacement management without reduction*

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### ABSTRACT

**Objectives:** To compare the outcome of arthroscopic surgery and arthrocentesis of internal derangement (disc displacement without reduction) of the temporomandibular joint (TMJ).

**Methods:** The charts of 48 patients with TMJ derangement and treated with arthroscopy or arthrocentesis were included in this study carried out in a specialized private clinic in Beirut, Lebanon, between January 2001 and July 2005. Inclusion criteria included patients with a history of clicking followed by a sudden onset of limited mouth opening without clicking, a complaint of TMJ pain with mouth opening or chewing difficulty, or both, or a positive magnetic resonance imaging diagnosis of TMJ disc displacement without reduction. Patients with limited mouth opening caused by only muscle spasm, prior TMJ surgery, bilateral joint involvement, or serious systemic diseases were excluded from the study. Twenty-eight patients underwent arthroscopy (group one) and 20 patients were treated with arthrocentesis (group 2).

**Results:** Both methods showed a significant reduction in pain and an increase in maximal mouth opening on follow up ( $p < 0.01$ ). There was no statistical difference between the methods.

**Conclusion:** Further research should be conducted before one can definitely determine if real benefits are achieved through surgery in TMJ articular disorders. Within the limits of this study, less invasive procedures are highly recommended.

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Formerly, open temporomandibular joint (TMJ) surgery was the only alternative treatment in internal derangement after conservative treatment failed to give positive results. The aim was either to change the morphology or position of the disc, or to totally remove it,<sup>1,2</sup> with significant postoperative risks.<sup>3</sup> In the past decade, arthroscopic surgery of the TMJ has been introduced as an alternative minimally invasive procedure.<sup>4,5</sup> Arthrocentesis of the TMJ was first described by Nitzan et al,<sup>6</sup> as a “relatively easy, minimally invasive, and highly efficient procedure” and is currently widely used in the treatment of various internal derangements as well as diagnostic purposes.<sup>7,8</sup> It may be performed under local anesthesia for outpatients, with or without sedation, and its main purpose is to clear the joint of tissue debris, blood, and pain mediators that are believed to be byproducts of intra-articular inflammation.<sup>9</sup> Many studies reported success rates as high as 80-90% with arthroscopic lavage and lysis for the management of patients with painful limitation of mouth opening resulting from closed lock of the TMJ.<sup>10-12</sup> Other studies also reported similar success rates for arthrocentesis.<sup>7,8,13</sup> The aim of this study was to compare the outcome of arthroscopic surgery and arthrocentesis of internal derangement of the TMJ using a retrospective study design. The null hypothesis was that there is no difference between the outcomes of arthroscopy and arthrocentesis in patients complaining from disc displacement without reduction.

**Methods.** Fifty-seven patients (12 men and 45 women) were included in this study. A review of the patient's records (medical

charts) with internal TMJ derangement and treated with arthroscopy or arthrocentesis was undertaken. The patients were all treated between January 2001 and July 2005 at a specialized private clinic in Beirut, Lebanon. The ethical approval from the Hopital Dieu, Beirut, Lebanon was obtained. The inclusion criteria considered patients with TMJ pain with mouth opening, chewing difficulty, or a positive magnetic resonance imaging (MRI) diagnosis of TMJ disc displacement without reduction, limited mouth opening caused by muscle spasm only, a history of clicking with subsequent sudden onset of limited mouth opening with no clicking, and no history of TMJ surgery, bilateral joint involvement, or serious systemic disease. In all cases, coronal and sagittal MRI sections were performed to locate the disc with precision and assess the extent of the lesion. The regular procedure at the specialized clinic included questionnaires featuring dichotomous responses regarding the presence of symptoms as well as pre- and postoperative visual analogue scales (VAS) for pain intensity. Patients were asked to make an appointment for clinical examination. Parameters such as age, gender, diagnosis, joint pain (VAS; 0 = no pain and 10 = most pain), and maximal mouth opening (MMO) were recorded. The treatment plan began with an occlusal therapy as described by Nassif and Al-Ghamdi<sup>14</sup> using an anterior deprogrammer device, later converted to a centric relation occlusal device and selective occlusal equilibration, if required. As both treatments were possible for each case, the procedures were explained to the patients who chose accordingly. Thirty-two preferred arthroscopy (group one) and 25 underwent arthrocentesis (group 2). Diagnosis and surgical procedures followed conventional textbook guidelines.<sup>15</sup> All arthroscopy operations were performed under general anesthesia. A double portal arthroscopic technique was used in all cases, and lysis of the adhesion was performed when needed. Electrocoagulation of the synovitis areas and copious irrigation of the superior joint space and shortening of the retrodiscal ligament was carried out by electrocautery. Final instillation of 5 ml of sodium hyaluronate at the end of the procedure was performed. Arthrocentesis procedures were performed under local anesthesia with 3% carbocaine and intravenous sedation. The procedure consisted of inserting 2 18-gauge needles to the upper joint space and lavage of the upper joint space with 200 ml of lactated Ringer's solution. In cases where disc reduction was not obtained spontaneously, cleaning of the retrodiscal space was performed followed by a relaxation of the contracted anterior attachment. Upon completion of the procedure, one needle was withdrawn and 5 ml of sodium hyaluronate was injected into the upper joint space. In all cases, non-steroidal anti-inflammatory

drugs were prescribed along with muscle relaxants for 2 weeks, and the patients were advised to perform range of motion exercises on daily basis. Follow up of the patients ranged between 18-24 months. The same clinician that did the preoperative examination performed the postoperative assessment. The retrospective analysis was performed, and the data collected using customized forms. Descriptive statistics for categorical and continuous variables were calculated. Comparison of the mean values of the variables was made using one-way analysis of variants. Statistical significance was set at  $p < 0.05$ . All statistical analyses were carried out by means of Statistical Package for Social Science software, version 12 for Windows (Chicago, IL, USA).

**Results.** Nine patients were excluded from the study for failure to attend the recall sessions. Eight male and 40 female patients, age ranging between 16-45 years ( $31.36 \pm 7.44$  for group one, and  $30.6 \pm 7.61$  for group 2) remained in the study. The duration of chief complaints before consultation ranged between 1-2 years for all patients. The chief complaint for most patients was pain (85%). Regarding pain, preoperative and postoperative mean values were  $5.71 (\pm 1.86)$  and  $2.32 (\pm 1.49)$  for arthroscopy, and  $5.75 (\pm 1.80)$  and  $2.55 (\pm 1.36)$  for arthrocentesis. Regarding maximal mouth opening, preoperative and postoperative values were  $32.07 (\pm 11.05)$  and  $40.68 (\pm 11.79)$  for arthroscopy, and  $31.75 (\pm 12.10)$  and  $41.60 (\pm 10.93)$  for arthrocentesis. Arthroscopy resulted in a significant reduction in pain ( $p < 0.01$ ) as well as a significant increase in maximal mouth opening ( $p < 0.01$ ). No significance was found between the methods for any of the measured parameters.

**Discussion.** The null hypothesis may be accepted, as there was no significant difference in the therapeutic success rate of arthrocentesis and arthroscopy at 24 months. The results showed significant reduction in pain and dysfunction scores, and significantly higher MMO than baseline values in patients with internal derangement at the 24 months follow up in both groups. These results are in accordance with the results reported by Fridrich et al.<sup>16</sup> However, although the number of subjects was sufficient regarding the main research question, it was too small in respective subgroups to draw conclusions regarding differences related to gender and age groups. Success rate of arthrocentesis has been reported in several recent studies, Carvajal and Laskin<sup>13</sup> reported 91% of long-term success rate in patients with disc displacement without reduction. Hosaka et al<sup>17</sup> reported that the success rate for arthrocentesis increased up to 70% at 6 months follow up, and it increased to 78.9% over 3 years follow up in patients with TMJ closed lock. Other

authors had previously reported improved success rates. In 1991, Nitzan et al<sup>18</sup> reported a 91% success rate after treating patients with severe limited mouth opening with arthrocentesis. Frost and Kendell<sup>19</sup> reported on the effects of arthrocentesis in patients presenting with acute closed lock, chronic closed lock, chronic displaced disc with reduction, and the results found were excellent, good, and intermediate as pain levels on VAS reduced to less than 10% and tolerable by the patient, and improved range of motion and function. In another study, Nitzan et al<sup>20</sup> reported that mean inter-incisal jaw opening after arthrocentesis was higher than that after arthroscopic surgery. Based on these findings, it was postulated that intra-articular scar formation could be created by surgical arthroscopy. Alpaslan et al<sup>21</sup> showed that arthrocentesis for the treatment of TMJ internal derangements offers favorable long-term stable results with regards to increasing maximal mouth opening and reducing pain and dysfunction. Dimitroulis et al<sup>8</sup> reported that the treatment efficacy of arthrocentesis was the same compared with successful conventional non-surgical treatment and arthroscopic surgery as well. Another study reported that both arthrocentesis and arthroscopy give good results upon treating patients with closed lock.<sup>22</sup> This is in accordance with the findings of this study.

The mechanism of arthrocentesis in improving the clinical symptoms is still unclear. The release of negative pressure on the disc, release of adhesions, and reduction in surface friction and viscosity of the synovial fluids are all suggested as possible reasons. Pain decrease after arthrocentesis was shown to be related to the reduction of inflammatory components and pain mediators in situ, allowing normal joint movement.<sup>19</sup> In the present study, non-surgical treatment failed to give good results, while both arthrocentesis and arthroscopy proved to be an efficient procedures in TMJ closed lock management. Standard clinical protocol requires that following postoperative assessment and if clinical symptoms of failing disc reduction are reported (pain, chewing discomfort), further MRI examination should be performed and a second arthrocentesis should be scheduled 3 months later (after the disappearance of the inflammatory response of the first surgery). In case the second procedure should also be unsuccessful, classic open surgery has to be performed. However, no relapse was noted in the present study.

The development of TMJ arthroscopic surgery had filled the clinical void between non-surgical treatment and open arthrotomy. Later, arthrocentesis has been used to treat TMJ internal derangements that fail to improve following a reasonable course of non-surgical therapy.<sup>22</sup> In a recent study, Undt et al<sup>23</sup> concluded that there cannot be any clear indication for either one of the treatment

modalities as similar results were noted following open or arthroscopic TMJ surgery. Nevertheless, arthroscopic surgery is a minimally invasive procedure resulting in a short or no hospitalization time when compared with open joint surgery, and as such is preferred by many surgeons.<sup>24</sup> Furthermore, a recent study emphasized that arthrocentesis (even less invasive than arthroscopy) and hydraulic distention of the TMJ have proven to be an effective modality in treating patients exhibiting clinical findings consistent with the diagnosis of disc displacement without reduction.<sup>25</sup> They concluded that TMJ effusion might prove to be an important prognostic determinant of successful arthrocentesis. Future research should consider the recommendation of prospective better clinical trials in the management of TMJ internal derangement. Within the limitations of this study, arthrocentesis can be recommended as an efficient procedure for management of disc displacement without reduction of the temporomandibular joint.

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