Int. J. Oral Maxillofac. Surg. 2017; xxx: xxx–xxx
http://dx.doi.org/10.1016/j.ijom.2017.01.018, available online at http://www.sciencedirect.com

International Journal of Oral & Maxillofacial Surgery

Clinical Paper
TMJ Disorders

Comparison of the effectiveness of three different treatment methods for temporomandibular joint disc displacement without reduction

U. Tatli[1], M. E. Benlidayi[1], O. Ekren[2], F. Salimov[1]
[1]Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Çukurova University, Adana, Turkey; [2]Department of Prosthodontics, Faculty of Dentistry, Çukurova University, Adana, Turkey

U. Tatli, M.E. Benlidayi, O. Ekren, F. Salimov: Comparison of the effectiveness of three different treatment methods for temporomandibular joint disc displacement without reduction. Int. J. Oral Maxillofac. Surg. 2017; xxx: xxx–xxx.

Abstract. The aim of this study was to compare the effectiveness of three treatment methods for unilateral temporomandibular joint (TMJ) disc displacement without reduction (DDwoR). One hundred and twenty patients with unilateral TMJ DDwoR were assigned randomly to one of three treatment groups (40 patients in each): group 1 received arthrocentesis, group 2 received stabilization splint therapy following arthrocentesis, and group 3 received splint therapy only. The groups were compared in terms of pain (visual analogue scale), joint function (maximum mouth opening and laterotrusive movements), disability and psychological status (validated questionnaire), and success rates. These were recorded before treatment and during follow-up after treatment (1, 3, and 6 months). The between-group and within-group differences in the data were analyzed statistically. The baseline characteristics were similar in all groups ($P > 0.05$). Significant improvements were noted in all parameters compared to baseline values in all groups (all $P < 0.01$). Groups 1 and 2 showed comparable outcomes that were superior to those of group 3. Arthrocentesis reduces pain and functional impairment more rapidly and effectively than splint therapy. Simultaneous splint application has no additional effect on the effectiveness of arthrocentesis for the treatment of unilateral DDwoR.

Key words: arthrocentesis; disc displacement without reduction; stabilization splint; TMJ.

Accepted for publication 23 January 2017

Temporomandibular disorders (TMDs) are considered the major cause of orofacial pain.[1] Internal derangement (ID) of the temporomandibular joint (TMJ), which is classified as disc displacement with or without reduction, is one of the disorders of the TMJ that is frequently seen. Displacement of the articular disc can result in decreased joint space, joint noise (clicking, popping, or crepitation), arthritis, condylar resorption, inflammation, and compression of the bilaminar tissue, all of which can cause various degrees of pain and dysfunction.[2] Untreated or inadequately treated ID can cause

0901-5027/000001+07

Please cite this article in press as: Tatli U, et al. Comparison of the effectiveness of three different treatment methods for temporomandibular joint disc displacement without reduction, *Int J Oral Maxillofac Surg* (2017), http://dx.doi.org/10.1016/j.ijom.2017.01.018

chronic disc displacement, which may lead to deformation of the disc and breakdown of the fibrocartilage covering the condyle and fossa, resulting in osteoarthritis of the TMJ.[3] Disc displacement without reduction (DDwoR) is the worst subgroup of ID of the TMJ. It is a clinical condition in which the joint disc is dislocated from the condyle and does not return to its normal position during joint movement. Macro- and micro-trauma are the most common causes of DDwoR.[1] Pain and restricted range of mandibular motion are the most frequent symptoms of DDwoR.[2]

Treatment methods for DDwoR fall into two categories: conservative methods and surgical methods. Conservative treatments include manipulation, medication, modification of habits, physical therapy, and splint therapy.[1] Surgical treatments include arthrocentesis, arthroscopy, and open joint surgeries.[4,5]

The contemporary treatment strategy for ID of the TMJ consists of conservative methods initially. If there is no response to conservative methods, arthrocentesis is generally performed as a second-step therapy. Splint therapy is used to reduce the excessive loading on the joint, relax the masticatory muscles, and support the adaptation of the articular structures and regenerative processes in the joint.[1,6] Splint therapy is often successful, but the length of time required to reach a pain-free normal range of joint function is sub-optimal.[7] Thus this treatment sequence may delay the achievement of efficient therapy and the arthropathy may become worse and more persistent. Alternatively, arthrocentesis removes degradation products and inflammatory mediators directly and quickly, and healing is rapid.[8–10] Promising results have been reported with the use of arthrocentesis as an initial treatment method in DDwoR.[11,12]

The first-line treatment for DDwoR has been debated in the literature. A number of studies have evaluated the effectiveness of splint therapy, arthrocentesis, and a combination of these two methods for the treatment of TMDs.[11–17] However, studies comparing these three treatment methods are very rare. Thus, the aim of this prospective clinical study was to evaluate and compare the effectiveness of three different treatment modalities (arthrocentesis, splint therapy following arthrocentesis, and splint therapy only) on pain, function, and disability and psychological status of patients with unilateral DDwoR. The second aim was to explore whether simultaneous splint therapy has an additional effect on the effectiveness of arthrocentesis.

Materials and methods

Patient recruitment and definitions

This prospective clinical study was performed in the temporomandibular disorders clinics of the faculty hospital. The study protocol was approved by the ethics committee of the university hospital. The patients were informed about the study protocol and provided written informed consent to participate.

The inclusion criteria for the study were clinical and magnetic resonance imaging (MRI) diagnosis of unilateral TMJ DDwoR, and persistent pain after 2 weeks of daily non-steroidal anti-inflammatory (exclusion of acute inflammatory pain) and muscle relaxant drug consumption, a soft diet, and physical exercises (exclusion of patients with mainly myogenous symptoms). Patients with a diagnosis of systemic rheumatic disease, myalgia, degenerative joint disease, or collagen vascular disease, those who were pregnant, and patients who had medical contraindications, were unwilling to receive one of the study treatments, had undergone prior open TMJ surgery, had a malocclusion, or were aged <16 years were excluded from the study.

The clinical diagnosis was made based on the clinical Diagnostic Criteria for Temporomandibular Disorders (DC/TMD).[2] TMJ DDwoR was diagnosed by a history of reduction in mouth opening (unassisted maximum inter-incisal mouth opening <35 mm), mandibular opening with assistance increased by ≤ 3 mm over unassisted opening, and TMJ pain during palpation and/or function. A previous history of click, click disappearance, and decreased mouth opening must have coincided.

A sample size calculation was performed for the main outcome measure. In order to obtain a power of 0.80, 108 patients were required (estimated effect size 0.20), which resulted in 36 patients per group. Considering data loss due to dropouts, a 10% increase in sample size was added, resulting in 40 patients in each group.

The patients who met the inclusion criteria were assigned randomly to the treatment groups using randomization software (QuickCalcs; GraphPad Software Inc., La Jolla, CA, USA).

Treatment groups

Patients assigned to group 1 were treated with arthrocentesis plus sodium hyaluronate injection. Arthrocentesis was performed under local anaesthesia, which was achieved using intra-articular and overlying skin anaesthesia (2 ml of 5% bupivacaine hydrochloride (Marcaine; AstraZeneca, Istanbul, Turkey)). A 21-gauge needle was inserted into the upper joint space via a posterolateral approach.[18] In this technique, the first needle puncture is made 10 mm anterior to the tragus and 2 mm inferior to an imaginary line connecting the tragus and lateral canthus. After superior joint space distension with 2 ml isotonic sodium chloride, a second needle was placed approximately 5 mm anterior to the first needle. The joint was then washed with 120 ml of isotonic sodium chloride. Finally, injection of 2 ml of sodium hyaluronate (Orthovisc; Biomeks, Istanbul, Turkey) was performed. All arthrocentesis procedures were performed by the same surgeon.

Patients assigned to group 2 were treated with a stabilization splint following arthrocentesis plus sodium hyaluronate injection. An intraoral hard acrylic splint was prefabricated before the arthrocentesis. Following the arthrocentesis, the patients were instructed to use the oral appliance during the night and also for 1 or 2 h in the daytime for 6 months, to get used to the desired jaw position. The splint treatment was performed by the same experienced prosthodontist, as described by Okeson.[1] The contact points of all teeth were provided at centric occlusion. A canine protective occlusion was prepared for laterotrusive and protrusive jaw movements.

Patients assigned to group 3 were treated with a stabilization splint only. The splints were prefabricated and used as mentioned above.

All participants were instructed to use pain medication when needed (ibuprofen 600 mg).

Data collection

All patients completed the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) Axis II biobehavioural questionnaire at baseline and at 1, 3, and 6 months thereafter, in order to evaluate the intensity of pain, pain-related disability, and psychological status. The RDC/TMD questionnaire was translated into Turkish, and the authors approved its back-translation.[2] The questionnaire is available at the Web site of the RDC/TMD International Consortium (http://www.rdc-tmdinternational.org).

The clinical records of the patients were also collected at baseline and at 1, 3, and 6 months thereafter. Clinical assessments involved the standardized evaluation of

Please cite this article in press as: Tatli U, et al. Comparison of the effectiveness of three different treatment methods for temporomandibular joint disc displacement without reduction, *Int J Oral Maxillofac Surg* (2017), http://dx.doi.org/10.1016/j.ijom.2017.01.018