Int. J. Oral Maxillofac. Surg. 2016; xxx: xxx–xxx
http://dx.doi.org/10.1016/j.ijom.2016.06.009, available online at http://www.sciencedirect.com

International Journal of Oral & Maxillofacial Surgery

Clinical Paper
TMJ Disorders

Is arthrocentesis plus platelet-rich plasma superior to arthrocentesis plus hyaluronic acid for the treatment of temporomandibular joint osteoarthritis: a randomized clinical trial

S. Cömert Kiliç[1], M. Güngörmüş[2]
[1]Ministry of Health, Department of Oral and Maxillofacial Surgery, Centre for Oral and Dental Health, Erzurum, Turkey; [2]Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Gaziantep University, Gaziantep, Turkey

S. Cömert Kiliç, M. Güngörmüş: Is arthrocentesis plus platelet-rich plasma superior to arthrocentesis plus hyaluronic acid for the treatment of temporomandibular joint osteoarthritis: a randomized clinical trial. Int. J. Oral Maxillofac. Surg. 2016; xxx: xxx–xxx.

Abstract. A randomized clinical trial was implemented in adult patients with temporomandibular joint osteoarthritis (TMJ OA). The sample comprised 49 osteoarthritic joints in 31 consecutive patients. Patients were divided randomly into two groups according to the treatment technique applied: the platelet-rich plasma (PRP) group patients underwent initial arthrocentesis plus PRP injection and then four consecutive PRP injections; the hyaluronic acid (HA) group patients underwent one session of arthrocentesis plus HA injection. The predictor variable was the treatment technique. The outcome variables included visual analogue scale (VAS) evaluations and maximum inter-incisal opening (MIO) measurements. Outcome variables were recorded preoperatively and at 12 months postoperative. Descriptive and bivariate statistics were computed and significance was set at $P < 0.05$. The PRP group included 32 joints in 18 subjects, and the HA group included 17 joints in 13 subjects. No statistically significant difference was observed between the groups for any of the changes in VAS parameters or MIO measurements. Both treatment techniques resulted in significant clinical improvements in all VAS parameters and painless MIO. These findings suggest that arthrocentesis plus PRP injections is not superior to arthrocentesis plus a single HA injection; thus PRP injection should not be considered as the first line treatment. Arthrocentesis plus HA injection would appear to be more acceptable for patients.

0901-5027/000001+07

Key words: arthrocentesis; intra-articular injection; platelet-rich plasma; hyaluronic acid; TMJ osteoarthritis.

Accepted for publication 13 June 2016

Osteoarthritis (OA) is a progressive chronic disease associated with damage to the cartilage and surrounding tissues. OA is generally characterized by pain, stiffness, and loss of function. Temporomandibular joint osteoarthritis (TMJ OA) is a common disorder among the population, is more prevalent in females than in males, and increases in prevalence with age.[1] Mechanical and biological events including overloading, bruxism, and unilateral chewing, as well as genetic factors and internal derangement are causative factors in the development of TMJ OA. TMJ OA causes not only focal degeneration of the joint cartilage, but also osseous erosion, sclerosis, flattening, and osteophyte formation at the joint margins.[2,3] Arthrocentesis has been used to improve jaw function and reduce pain in the treatment of TMJ dysfunction.[1]

Platelet-rich plasma (PRP) is a product of autologous blood and contains three- to eight-fold the concentration of platelets, which are obtained by sequestering and concentrating the blood by gradient density centrifugation. The concentrated platelets contain many growth factors.[4] It has been claimed that PRP has potential healing properties on new bone and cartilage through the recruitment, proliferation, migration, and differentiation of cells and its tissue remodelling, matrix production, and chondrogenic differentiation properties.[5]

Hyaluronic acid (HA), a glycosaminoglycan, is also called hyaluronan or hyaluronate. It is produced by chondrocytes and synoviocytes within any joint. The concentration and molecular weight of HA may gradually reduce to 35–50% in osteoarthritic joints, and this may result in osteoarthritic changes.[6] In such cases, some researchers propose the use of viscosupplementation to replace the low HA and to stimulate the production of endogenous HA within the joint.[7] Different injectable forms of HA have been used in degenerative joints, such as Synvisc, Hyalgan, Supartz, Orthovisc, Euflexxa, and Erectus; these have different origins, molecular weights, half-lives, and production methods.[8] Hyalgan has a low molecular weight (500,000–750,000 Da), and it also has potential healing properties such as triggering the proinflammatory cascade, enhancing proteoglycan synthesis, and promoting chondrocyte proliferation and differentiation.[9]

In a recent study, Hegab et al. applied intra-articular PRP (PRP group) or Hyalgan (HA group) injections in three sessions without arthrocentesis for the treatment of TMJ OA.[10] They found that the patients in the PRP group exhibited better outcomes than the patients in the HA group in terms of recurrence of pain and joint sounds at 6 and 12 months postoperatively.[10]

The purpose of this study was to compare the treatment outcomes of TMJ OA treated with one of the two treatment techniques: arthrocentesis plus PRP and arthrocentesis plus HA. It was hypothesized that arthrocentesis plus PRP injections would produce superior outcomes to arthrocentesis plus HA.

Materials and methods

To address the research purpose, a prospective randomized clinical trial was designed and implemented; this trial included patients with TMJ OA who underwent one of the two OA treatment protocols in the faculty of dentistry of a university in Turkey. The local ethics committee approved this study. Patients were informed about the study design. All participants signed an informed consent agreement.

The study population comprised all patients presenting for the evaluation and management of TMJ OA between May 2012 and September 2013. The diagnosis of OA was made according to the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD; axis I group IIIb) published by Schiffman et al.[11]

To be included in the study sample, patients had to meet the following criteria: (1) OA diagnosed clinically and with cone beam computed tomography (CBCT) evaluations, (2) age >16 years, (3) completion of one of the two treatment protocols for OA, and (4) adequate clinical data at baseline (preoperative) and postoperatively (at follow-up).

Patients were excluded as study subjects if they had a haematological or neurological disorder, inflammatory or connective tissue disease, malignant disease in the head and neck region, or had undergone previous TMJ treatment or craniofacial surgery not related to the treatment of OA. Furthermore, any individuals who had inadequate data (preoperative and at the end of the follow-up period) were also excluded.

The sample size was calculated based on a significance level of 0.05 and a power of 80% to detect a clinically meaningful difference of 4 mm in maximum interincisal opening (MIO). The power analysis showed that 11 patients were required in each group.

All patients were assigned randomly to one of the two treatment groups. Participants in the PRP group initially received arthrocentesis plus PRP injection and then four consecutive PRP injections into the TMJ following intra-articular anaesthesia at monthly intervals. The data obtained in the PRP group have been published previously,[5] and these data were used for the intra- and inter-group comparisons in the present study. In the HA group, participants received one session of arthrocentesis plus HA injection only.

The primary predictor variable in this study was the treatment technique. The other variables were age and sex of the subjects. The age and sex of the subjects were recorded, and the relationships of these variables with the predictor variables were considered in the statistical analysis.

Application of the arthrocentesis

Reference points were used when performing the arthrocentesis of the degenerative TMJ, which were similar to the points used in arthroscopic examination (lateral canthus–tragus). The skin surface of the pre-auricular region was disinfected with povidone–iodine solution. Two points were marked, the first at 10 mm anterior and 2 mm inferior to the tragus on the canthus–tragus line and the second at 20 mm anterior and 6 mm inferior to the tragus on the canthus–tragus line. Auriculo-temporal anaesthesia was performed with 4% articaine and adrenaline 1:100,000 (ultracaine DS Fort) injected into the joint cavity. Two 20-gauge needles were placed into the entry and exit points for washing. The arthrocentesis was performed with 100 ml of lactated Ringer's solution to eliminate the catabolites present in the synovial fluid. Once the arthrocentesis was completed, 1 ml of

Please cite this article in press as: Cömert S, Güngörmüş M. Is arthrocentesis plus platelet-rich plasma superior to arthrocentesis plus hyaluronic acid for the treatment of temporomandibular joint osteoarthritis: a randomized clinical trial, *Int J Oral Maxillofac Surg*