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Clinical Paper
TMJ Disorders

Long-term evaluation of single-puncture temporomandibular joint arthrocentesis in patients with unilateral temporomandibular disorders

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Abstract. The purpose of this study was to evaluate the long-term effects of the single-puncture arthrocentesis (SPA) technique. Forty-two patients with unilateral temporomandibular joint disorders (TMDs) were treated by SPA. Thirty-eight of these patients completed 1–24 months of follow-up (short-term group) and 21 completed 11 months or longer of follow-up (long-term group). The two groups were evaluated statistically for pain (visual analogue scale), maximum mouth opening, lateral excursion, and protrusion. Both follow-up duration groups showed significant improvements when compared to baseline levels for almost all of the outcome variables ($P < 0.05$). Single puncture temporomandibular joint arthrocentesis is an effective treatment method over both the short and long term.

Key words: temporomandibular joint; arthrocentesis; single puncture; long term.

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Arthrocentesis of the temporomandibular joint (TMJ) is regarded as a simple, minimally invasive, inexpensive, and highly effective procedure[1]. The procedure is performed using two cannulae inserted at two separate puncture sites[1]. TMJ arthrocentesis involves irrigation of the superior joint space for removal of synovial fluid and other elements from the joint. Various techniques to improve the efficacy and minimize complications of TMJ arthrocentesis have been developed and described in the literature[2–7]. TMJ arthrocentesis with a single cannula was first described in 2007[2].

Şentürk and Cambazoğlu have classified TMJ arthrocentesis techniques according to the number of puncture sites as either single-puncture arthrocentesis (SPA) or double-puncture arthrocentesis (DPA)[8]. Within the category SPA, there is further classification according to the

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number of needles: type 1 is a single-needle cannula method in which the inflow and outflow occur through the same cannula and lumen; type 2 is a double-needle or dual-needle cannula method in which the inflow and outflow occur through the same cannula but different lumens[8]. The SPA procedure requires only one puncture, and there are more chances of locating the needle in the same upper joint space. SPA has provided good results over the short term; however, there is little information on the relative efficacy of this procedure over the long term. A search of previously published studies did not identify any research in which SPA was evaluated over the long term (more than 1 year).

The purpose of this study was to provide more data covering both a shorter and a longer follow-up period, focusing on the effectiveness of type 2 SPA. This was assessed through the measurement of pain on a visual analogue scale (VAS) and maximum mouth opening (MMO), lateral excursion, and protrusion.

Materials and methods

A prospective case–control study was performed involving 42 patients who presented with symptoms of a unilateral TMJ disorder (TMD). These patients underwent SPA at the Department of Oral and Maxillofacial Surgery, Süleyman Demirel University, between May 2014 and October 2016. The local ethics committee approved this study, and all participants signed a consent agreement after being informed about the study design.

Patients with stage 3 TMDs based on the Wilkes classification[9], restrictions in mouth opening and/or locking, and symptoms that had not resolved after conservative treatments such as medical or splint therapy, were included in this study. Magnetic resonance imaging (MRI) of the TMJ was performed for all of the patients for the radiological diagnosis of any TMDs. The 42 patients who were followed-up over a short-term period were assigned to group 1. A subgroup of these patients were followed-up over a long-term period ($n = 21$, group 2). Any patients with a haematological or neurological disorder, inflammatory or connective tissue disease, malignant disease in the head and neck region, history of previous TMJ surgery, and/or patients who were not cooperative or who were lost to follow-up were excluded from the study.

Preoperative jaw movements, including MMO, lateral excursion, and protrusion (all measured in millimetres), and the degree of pain during function and relaxation (measured with the VAS) were recorded. For the jaw movements, the incisal edges of the upper and lower central incisors were used as reference points and the distance was measured with a ruler. All of the patients used the VAS to record their level of pain, which could range from 0 (no pain) to 10 (the worst pain possible). Occlusal acrylic splints were fabricated before the arthrocentesis for all of the patients, and all of the arthrocentesis procedures were performed under local anaesthesia. For standardization, the surgical interventions were performed by one surgical investigator (M.F. S.).

Before performing the arthrocentesis, the skin was first disinfected with povidone iodine. Local anaesthesia was performed with 4% articaine and 1:100,000 adrenaline (DS Forte Ultracain; Sanofi Aventis).

A type 2 SPA was used in all cases. A redesigned and manufactured device was used, in which two 21-gauge needles were soldered into a Y-shape with the openings facing outwards (Fig. 1). Each device was packaged separately, sterilized in an autoclave, and used as a disposable item.

A reference point was marked 10 mm anterior and 2 mm inferior to the tragus on the canthus–tragus line. Inflow and outflow was through the same cannula, but different ports. In addition, the joint was washed under low pressure with a 100 ml flow of lactated Ringer's solution to eliminate the catabolites present in the synovial fluid (Fig. 2).

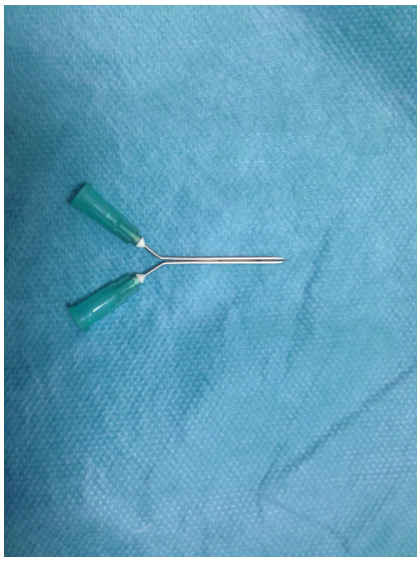

Fig. 1. Type 2 single puncture arthrocentesis device.

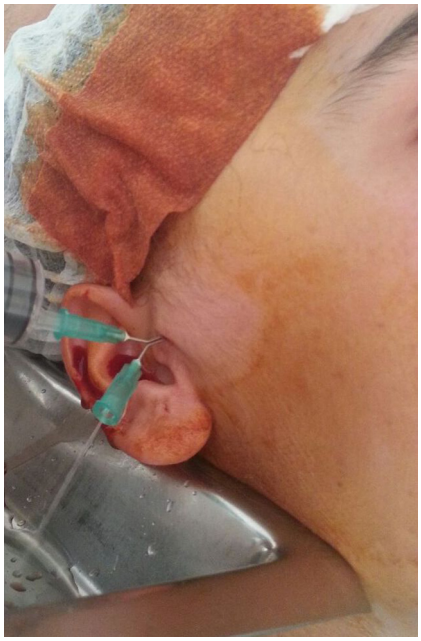

Fig. 2. Type 2 single puncture arthrocentesis procedure.

No intra articular injection was performed additionally to the SPA. After the SPA, regular daily activities, gentle range of motion exercises, and a soft diet were recommended. Postoperative anti-inflammatory drugs were prescribed for 7 days. The patients were advised to use the stabilization splint, which was prepared preoperatively, for at least 8 h per day. All of the patients were evaluated with regard to their jaw movements and VAS pain scores at 1 day postoperative, 1 week postoperative, and at the last follow-up.

IBM SPSS Statistics version 20.0 (IBM Corp., Armonk, NY, USA) was used for the statistical analysis. A Shapiro–Wilk test ($P < 0.05$) was used to determine whether the data were normally distributed. The preoperative and postoperative follow-up data for the groups were evaluated statistically by paired samples *t*-test or Wilcoxon signed rank test ($P < 0.05$).

Results

Four of the patients recruited into the group undergoing the short-term follow-up SPA protocol withdrew from the study due to time constraints that prevented them from attending the follow-up assessments. Therefore, a total of 38 patients completed the short-term SPA protocol. A subgroup of 21 patients completed the long-term SPA protocol.

The short-term group (group 1) included 38 adult patients (34 female, 4 male) with a mean age of 33.1 ± 13.9 years

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