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Prospective short term comparison of outcomes after single or double puncture arthrocentesis of the temporomandibular joint

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Abstract

Our aim was to compare the single puncture technique for arthrocentesis of the temporomandibular joint (TMJ) with the double puncture technique and to evaluate the short-term effects of a single puncture. Forty patients were randomly divided into two groups: the first was treated by single puncture, and the second with double puncture, arthrocentesis. During the one-month follow-up period the visual analogue and verbal scales for pain, maximal mouth opening, and satisfaction were evaluated within each group and between the two groups. Both groups recorded significant improvements compared with the baseline values in almost all outcome variables. There were no significant differences between the groups. Arthrocentesis of the TMJ was successful with both techniques.

Keywords: Temporomandibular joint; Arthrocentesis; Double puncture; Single puncture

Introduction

Arthrocentesis of the temporomandibular joint (TMJ) was first described in 1991, and is a simple, non-invasive, inexpensive, and efficient procedure.[1] Traditionally two cannulas are inserted through two separate puncture sites, one for the inflow of the lavage solution, and the other for the outflow. Because the cannulas must triangulate and be placed exactly in the upper joint space for the procedure to be effective, it can sometimes be challenging.[2] In particular, blind insertion of the second (outflow) cannula can sometimes be difficult, which means that if lavage fails the operation takes longer, the patient is uncomfortable, and there may be increased postoperative morbidity and possible damage to the facial nerve.[2,3]

The most important aims of arthrocentesis of the TMJ are to eliminate inflamed synovial fluid, release the disc, reduce pain, and mobilise the joint by flushing the upper joint space. To do this effectively with few complications, new techniques are required to simplify the procedure.[4] The complexities surrounding the concepts of techniques of arthrocentesis of the TMJ mean that a new classification was required.[5] According to this new classification, techniques of arthrocentesis of the TMJ are divided into two groups: single puncture arthrocentesis, in which a cannula is inserted into the joint space through a puncture site, and double puncture arthrocentesis, in which two needles are inserted through two separate puncture sites. Single puncture in turn is also divided into types 1 and 2.[5] In type 1, inflow and outflow go through the same cannula and lumen, as first described in 2008,[3] and in type 2 inflow and outflow go through the same cannula system but use different ports and lumens, as first described in 2007.[6]

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A search of published studies produced only one in which the single puncture type 1 technique was compared with the double puncture technique,[7] and we could find no paper that compared single puncture type 2 with the double puncture. The purpose of this study was to compare these techniques using a visual analogue scale (VAS) and verbal rating scale (VRS) for pain, maximal mouth opening, and patients' satisfaction.

Patients and methods

Patients with stage 3 and 4 disorders of the TMJ based on the Wilkes classification [8] with clinical findings of pain, or sounds in the TMJ, or both; and restriction, or locking, or both, of mouth opening; and symptoms that had not resolved after at least three months' treatment with splints; were included in the study. Panaromic radiographs of the TMJ were obtained for 40 patients, who were randomly divided into two groups using a system of sealed envelopes. Twenty patients who had had a single puncture type 2 made up one group, and 20 who had had double puncture arthrocentesis the other. Patients with systemic, viral, fungal, or bacterial infections, addiction to alcohol or drugs, or who were uncooperative, were excluded.

Medical and dental histories were recorded, including general personal information, and the TMJ was examined. Preoperative maximal mouth opening (mm), and VAS and VRS of existing pain were recorded. For maximal mouth opening the incisal edges of the upper and lower incisors was used as reference points and the distance was measured with a ruler. All patients used a VAS to assess their pain, which ranged from 0 (no pain) to 100 (the worst pain possible). The VRS was rated as 0=no pain, 1=mild pain, 2=moderate pain, 3=severe pain, and 4=very severe pain. Patiens' satisfaction was also rated as: 0 = not satisfied, 1=satisfied, and 2 =very satisfied. Occlusal stabilisation splints were prepared before the procedures, all of which were done under local anaesthesia. To attain consistent surgical techniques and treatment, all procedures were by one of the two surgical investigators.

In all cases the skin was first disinfected with povidone iodine, and then local anaesthesia introduced with 2% articaine hydrochloride 1–2 ml (DS Forte Ultracain®; Sanofi Aventis) by injecting it into the joint cavity and withdrawing the needle gently.

For the double puncture arthrocentesis, two points were marked - the first was 10 mm anterior and 2 mm inferior, and the second was 20 mm anterior and 6 mm inferior, to the tragus on the canthal-tragal line. After the insertion of the two 20-gauge needles into the upper joint, the joint was transfused under low pressure with a flow of Ringer's lactate 100 ml.

For the single puncture type 2, we redesigned and manufactured a device in which two 20-gauge needles were soldered in a Y-shape with the openings facing outwards (Fig. 1). The device was packaged separately, sterilised in the autoclave, and used as a disposable item. We used the first reference point marked for the double puncture technique, and the inflow and outflow went through the same cannula but through different ports. In addition, the joint was transfused under low pressure with a flow of Ringer's lactate100 ml.

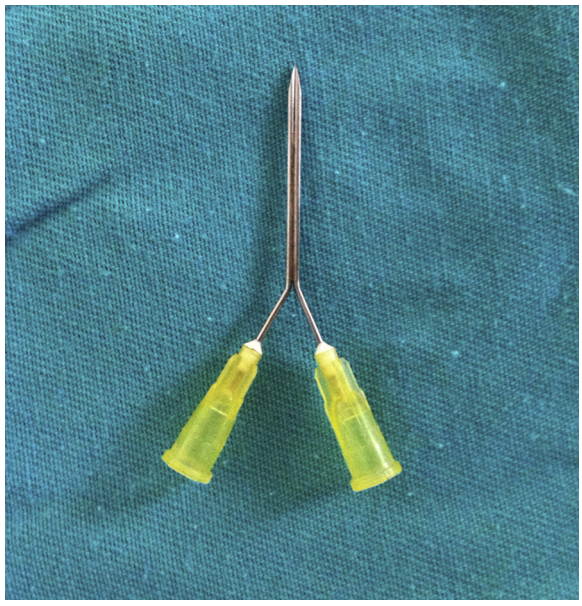

Fig. 1. Type 2 device for single-puncture arthrocentesis.

No medication was injected into the joint at the end of either procedure. Postoperative anti-inflammatory drugs were prescribed for seven days, and the patients were advised to use their occlusal stabilisation splints, which we prepared preoperatively, for at least eight hours a day. All patients had their maximal mouth opening measured, and the VAS and VRS pain scores recorded, on day one, at one week, and at one month postoperatively. The surgeon evaluated their satisfaction immediately, and one month after the procedure.

We used SPSS (version 15.0, SPSS Inc, Chicago, USA) for statistical analysis. and the significance of differences within the groups was evaluated with the Wilcoxon sign test.

The significance of differences in preoperative and postoperative maximal mouth opening, pain scores, and patients' satisfaction were compared with the Mann-Whitney U test. Probabilities of less than 0.05 were accepted as significant.

Results

The characteristics of the patients in the two groups are shown in Table 1.

Table 2 shows that though maximal mouth opening had increased significantly in both groups at the end of the one-month follow-up period, there were no significant differences between them.

Pain measured on the VAS decreased significantly in the single puncture group at all intervals, but in the double puncture group there was no significant difference between preoperatively and postoperative day 1. Table 3 shows that