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Original Research Article

Investigation of The Clinician Satisfaction For the Single-Puncture and Double-Puncture Arthrocentesis of Temporomandibular Joint

Tek Girişli ve İki Girişli Temporomandibular Eklem Artrosentezine Yönelik Klinisyen Memnuniyetinin Değerlendirilmesi

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ABSTRACT

Aim: The aim of this study was to evaluate the clinician satisfaction of single-puncture arthrocentesis and double-puncture arthrocentesis in cadavers.

Materials and Method: The study was conducted on 10 fresh cadaver temporomandibular joints bilaterally. Single-puncture arthrocentesis was randomly conducted on one side chosen by coin toss and double-puncture arthrocentesis on the other side. The main outcome variable was clinician satisfaction and measured using 0-10 point Likert scale.

Results: Twenty arthrocentesis procedures were completed. The mean clinical satisfaction scores for single-puncture arthrocentesis and double-puncture arthrocentesis were 8.1 and 4.8, respectively. A statistically significant difference was found between the techniques in terms of main outcome variable, and it was significantly lower in double-puncture arthrocentesis (p=0.001).

Conclusion: Single-puncture arthrocentesis showed higher clinician satisfaction compared to double-puncture arthrocentesis.

Keywords: Arthrocentesis; Clinician satisfaction; Double puncture arthrocentesis; Temporomandibular disorder; Temporomandibular joint

ÖZET

Amaç: Bu çalışmanın amacı kadavralarda uygulanan tek girişli artrosentez ve çift girişli artrosentez yöntemlerinin klinisyen memnuniyeti üzerine etkisinin değerlendirilmesidir.

Gereç ve Yöntem: Çalışma on taze kadavranın temporomandibular eklem bölgeleri üzerinde çift taraflı olarak gerçekleştirilmiştir. Rastgele seçilen bir tarafta tek girişli artrosentez, diğer tarafta ise çift girişli artrosentez işlemi uygulanmıştır. Ana sonuç değişkeni klinisyen memnuniyeti olarak belirlenmiş olup Likert ölçeği (0-10 arası) ile kaydedilmiştir.

Bulgular: Yirmi artrosentez işlemi gerçekleştirilmiştir. Ortalama klinisyen memnuniyet skorları tek girişli ve çift girişli artrosentez yöntemleri için sırasıyla, 8.1 ve 4.8 olarak saptanmıştır. Teknikler arasında ana sonuç değişkeni açısından istatistiksel olarak anlamlı fark saptanmış olup, çift girişli artrosentez yönteminde klinisyen memnuniyeti daha düşük olarak belirlenmiştir (p=0.001).

Sonuç: Tek girişli artrosentez iki girişli artrosenteze göre daha yüksek klinisyen memnuniyeti ile ilişkili bulunmuştur.

Anahtar Kelimeler: Artrosentez; Çift girişli artrosentez; Klinisyen memnuniyeti; Temporomandibular bozukluk; Temporomandibular eklem

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INTRODUCTION

Arthrocentesis of the temporomandibular joint (TMJ) to alter the joint's structure has been described as a simple and extremely efficient procedure.[1] The objectives of arthrocentesis of TMJ are to release the adhesions, reduce pain, and increase mandibular motion.[1-4] The procedure is the simplest of all surgical treatments to manage the TMJ internal derangements, TMJ osteoarthritis, and TMJ disorders that are refractory to conservative treatment.[5-8]

Several studies have reported the beneficial effects of arthrocentesis on pain intensity scores, mandibular range of motion, psychological status, and patient satisfaction.[9-11] Two needles have conventionally been inserted through two separate puncture sites for lavage of the solution; however, incorrect introduction of a second needle may result in problems, such as fluid leakage into the underlying tissues, an increase in the duration of the procedure, postoperative morbidity, and patient discomfort.[9,12] To overcome these challenges, from the introduction of arthrocentesis to the present, various clinical recommendations to create an even less-invasive procedure have been proposed;[4,13-17] however, the introduction of the new techniques resulted in complicated terminology in the literature. Senturk and Cambazoğlu[18] have proposed that TMJ arthrocentesis techniques can be classified as two groups—single-puncture arthrocentesis (SPA) and double-puncture arthrocentesis (DPA). In SPA a single-needle or a double-needle cannula is used for inflow and outflow of the lavage solution from one puncture point.

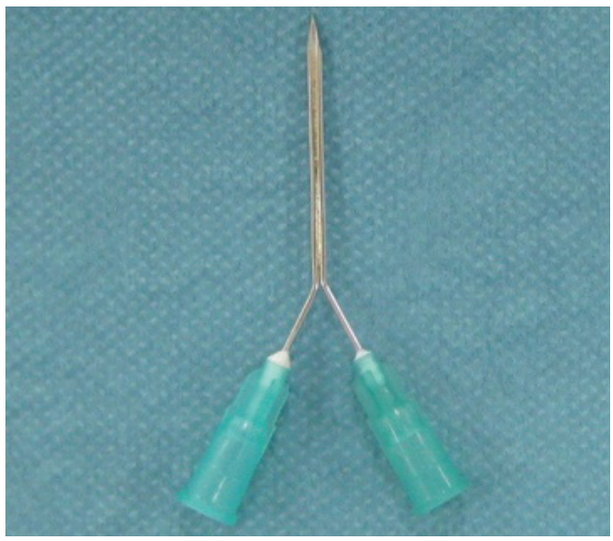

Figure 1. Y-shape device which single-puncture arthrocentesis was performed

Several distinguished studies from the literature have compared different arthrocentesis techniques according to various parameters as; maximal mouth opening, pain, puncture-related complications, and irrigation efficiency.[19-25] To obtain more precise results for determining the technique in clinical environment; clinician satisfaction should also be compared. The aim of this study was to evaluate the clinician satisfaction of single-puncture arthrocentesis (SPA) and double-puncture arthrocentesis (DPA) in cadavers.

MATERIALS AND METHOD

The present study was approved by the Gülhane Scientific Research Ethics Committee (registration date/number; 20.01.2022/2022-49) and conducted on fresh cadavers that were selected for the study according to specific criteria, such as no damage to TMJ, mouth opening between 40 and 50 mm, and the presence of teeth. The cadavers that had TMJ damage, an inadequate mouth opening, or edentulous were excluded.

The preauricular areas were disinfected with 10% povidone–iodine solution, after which they were marked from mid-tragus to lateral canthus. Anatomical reference points were determined as follows: the first point, 7 mm anterior and 2 mm inferior and the second point, 10 mm anterior and 2 mm inferior to the tragus on the cantho–tragal line for DPA15 and 10 mm anterior and 2 mm inferior to the tragus on the cantho–tragal line for SPA. For DPA, 21-gauge needles were used. Two needles have conventionally been inserted through above mentioned anatomical points. SPA was conducted using a Y-shaped device that contained two 21-gauge needles (Figure 1). After determining the anatomical entry points, For each cadaver, SPA was applied on one side and DPA on the other side (Figure 2). The sides chosen for the procedures were selected randomly using the toss of a coin. A 20-mL saline solution was injected to upper cavity of TMJ for performing arthrocentesis. All procedures were performed by SSE and MFS. The primary outcome variable was the clinician satisfaction regarding the technique used. Clinician satisfaction were measured using 0-10 point Likert scale.

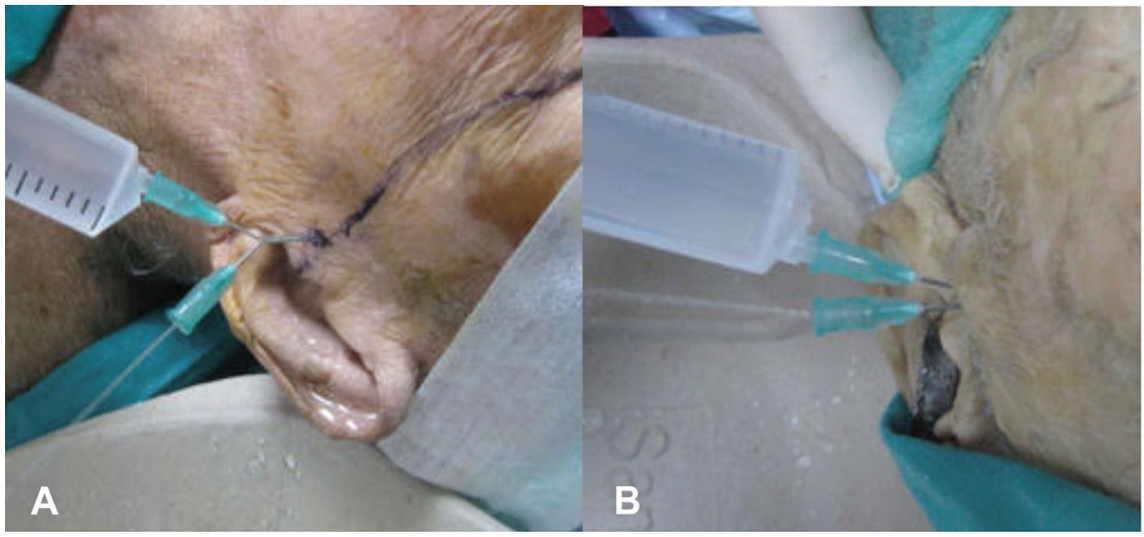

Figure 2. A) Single-puncture arthrocentesis (SPA) and B) double-puncture arthrocentesis.

Statistical methods

Statistical analyses were conducted using SPSS v. 26 (IBM Corp., Armonk, NY, USA) at a significance level of $p < 0.05$. The distribution of the data was analyzed using the Shapiro–Wilk normality test. When the data distribution was not in accordance with a normal distribution, comparisons between clinician satisfaction values of SPA and DPA were conducted using the Mann–Whitney U test. The mean, standard deviation, median, minimum and maximum were provided as descriptive statistics.

RESULTS

Twenty arthrocentesis procedures were completed. The clinician satisfaction scores are presented in Table 1. The mean clinical satisfaction scores for SPA and DPA were 8.1 and 4.8, respectively. Comparisons between SPA and DPA techniques are provided in Table 2. The Mann–Whitney U test showed that there was a statistically significant difference between the clinician satisfaction scores of the SPA and DPA techniques (p=0.001). The SPA technique showed higher clinician satisfaction scores.

Table 1. Clinician satisfaction scores for single-puncture arthrocentesis (SPA) and double-puncture arthrocentesis (DPA).

	SPA	DPA
Cadaver 1	7	5
Cadaver 2	9	4
Cadaver 3	9	6
Cadaver 4	8	4
Cadaver 5	8	5
Cadaver 6	8	4
Cadaver 7	7	5
Cadaver 8	8	5
Cadaver 9	8	6
Cadaver 10	9	4

Table 2. Comparison of clinical satisfaction scores for single-puncture arthrocentesis (SPA) and double-puncture arthrocentesis (DPA).

Technique	Mean	Std. Dev.	Median	Min.	Max.	Z	*p.
SPA	8.10	0.74	8.00	7.00	9.00	-3.847	0.001
DPA	4.80	0.79	5.00	4.00	6.00		

* Mann-Whitney U test
Std Dev: Standard deviation

DISCUSSION

Arthrocentesis is the simplest form of surgical treatment for the management of TMJ internal derangements, TMJ osteoarthritis, degenerative temporomandibular disorders, and conditions refractory to conservative treatment.[5-8] Several studies have shown that both arthrocentesis techniques have beneficial effects on pain intensity scores, articular sounds, and mandibular range of motion;[19-24] however, there is no consensus on the superiority of one over the other. A systematic review has reported that SPA techniques are as clinically effectual as DPA in terms of pain intensity; maximum mouth opening; and other outcome variables, such as duration of surgery and patient satisfaction; however, the researchers have underscored the necessity of well-designed randomized controlled trials that will compare the two techniques.[21] Studies reported that SPA has shown to be more advantageous than DPA from the point of lower surgery duration and ease of the procedure. Additionally patient satisfaction regarding arthrocentesis procedure were evaluated several studies; provided by arthrocentesis in terms of clinical parameters, quality of life or specific criterias as pain reduction, chewing ability, postoperative recovery and the fulfillment of expectations.[9,26,27]

Clinician satisfaction regarding arthrocentesis may depend on various factors such as comfortable flow during lavage, short procedure time, stability of needles at puncture points; therefore, this value could be related to the success of the arthrocentesis procedure and clinical efficiency. Despite the above-mentioned distinguished studies that investigated the efficiency of SPA versus the conventional DPA techniques with regard to the parameters chosen, there was limited data that compared the SPA technique with the conventional DPA technique in terms of clinician satisfaction. Sindel *et al*.[25] have defined the SPA technique as a reasonable alternative for DPA and have underscored the advantages of easier application in cases in which conducting the DPA technique becomes challenging. Various studies have reported that SPA is advantageous owing to ease of procedure;[19,22,24] however, to our knowledge, there has been no study that compared SPA with conventional DPA in terms of clinician satisfaction. In the present study, SPA was compared with DPA for clinician satisfaction. A statistically significant difference was found between the techniques, and it was significantly lower in DPA (p=0.001). Single-puncture arthrocentesis showed higher clinician satisfaction. We would like to state that the points that contribute to increasing clinician satisfaction in SPA are the short preparation time for the procedure due to the single needle puncture point and the ease of application owing to the Y-shaped cannula. However, the speed of lavage during SPA and DPA were similar.

The study has some limitations. A relatively small sample size is the main limitation. Secondly TMJ arthrocentesis is only compared in terms of clinician satisfaction. Prospective studies that comparing SPA and DPA by using different parameters, in a larger sample size should be conducted.

CONCLUSIONS

The results of this study have demonstrated significant differences between SPA and conventional DPA in terms of clinician satisfaction in cadavers. Single-puncture arthrocentesis showed higher clinician satisfaction. The authors suggest that there is a need to increase the level of awareness and knowledge regarding SPA technique among oral and maxillofacial surgeons.

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