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A modified single-puncture technique for temporomandibular joint arthrocentesis using a peripheral intravenous catheter: Case Report

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Abstract

Arthrocentesis is a minimally invasive surgical procedure widely used for the management of inflammatory temporomandibular joint (TMJ) disorders. Although the conventional two-needle technique has been well established for over two decades, recent modifications have introduced single-puncture arthrocentesis to reduce procedural morbidity. This report describes a modified single-puncture technique employing a dual-peripheral intravenous catheter assembly. The proposed modifications facilitate effective joint lavage, improve procedural efficiency, and offer technical advantages over previously described single-puncture arthrocentesis methods.

Keywords: Arthrocentesis, TMJ disorder, Single Puncture, Peripheral intravenous catheter

Introduction

Arthrocentesis of the temporomandibular joint (TMJ) was first introduced in 1991 by Nitzan et al.[1] and has since gained widespread acceptance among clinicians involved in the management of temporomandibular joint disorders. It is widely regarded as the first-line surgical intervention for patients who fail to respond to conservative treatment modalities, including physical therapy, occlusal splint therapy, pharmacologic pain management, and lifestyle or behavioural modification. Arthrocentesis is classified as a minimally invasive procedure and can be readily performed in an outpatient or office-based setting. The technique facilitates irrigation of the superior joint space and promotes lysis of intra-articular adhesions through hydraulic distension, thereby improving joint mobility and reducing pain.

The conventional arthrocentesis technique employs two needles introduced through separate puncture sites. Accurate triangulation and precise placement of both needles within the superior joint space are essential for procedural efficacy. One needle functions as the inflow conduit for the lavage solution, whereas the second serves as the outflow channel. Despite its widespread use, this technique may be technically demanding. In particular, blind placement of the second (outflow) needle can be challenging and may require multiple attempts. Repeated capsular punctures of the temporomandibular joint are frequently necessary, increasing the risk of extra-articular extravasation of the irrigating solution and compromising the intra-articular hydraulic pressure required for effective lysis of adhesions.

This case report describes a modified single-puncture arthrocentesis technique utilising two 21-gauge peripheral intravenous catheters, which are readily available in most clinical settings. The catheters are configured to provide independent inflow and outflow channels through a single capsular entry point, thereby facilitating effective joint lavage while minimizing capsular trauma. This technique is adapted from the method originally described by Datarkar, Purohit, and Relan in 2023.[2]

Case Report

A 22-year-old female patient presented to the Department of Oral and Maxillofacial Surgery at Dr. R. Ahmed Dental College and Hospital with a chief complaint of pain in the right temporomandibular joint region associated with restricted mouth opening. The patient reported a history of clicking in the right temporomandibular joint for approximately five years, accompanied by progressive limitation in mouth opening and a persistent dull ache in the right preauricular region over the preceding three months. Wide mouth opening and masticatory movements were identified as aggravating factors.

On examination, mouth opening was restricted to 1.8 cm (Fig. 1), jaw deviation to the right and extreme tenderness during palpation over the right TMJ. The patient was prescribed a combination of aceclofenac (100 mg) and thiocolchicoside (4 mg), administered orally three times daily for a duration of three days. Concurrently, a structured regimen of mandibular mobility exercises was initiated following the initial clinical visit. This conservative management resulted in a marked reduction in pain, although mild functional discomfort persisted after one week. In view of the incomplete symptomatic resolution, the patient was subsequently scheduled for temporomandibular joint arthrocentesis under local anesthesia.

Figure 1: Pre-operative picture with 1.8cm maximum mouth opening

Details about the modified needle:

In this technique, two 21-gauge peripheral intravenous catheter needles were utilized. Depth reference markings were made on each needle at 25 mm, 30 mm, and 35 mm using a sterile surgical marker, with the 25-mm mark corresponding to the maximum permissible depth of intra-articular insertion. Beyond the 35-mm mark, the needles were rigidly joined using self-polymerizing acrylic resin to create a single integrated device. One needle was contoured to a 45° angulation at the 35-mm reference point, while the second needle was maintained in a straight configuration to facilitate ease of manipulation and optimize inflow–outflow dynamics (Fig. 2). The assembled device was sterilized using ethylene oxide gas prior to clinical use.[2]

(source: Datarkar A, Purohit S, Relan P. Novel Modification of the Use of Peripheral Intravenous Catheters for Single Puncture Arthrocentesis of Temporomandibular Joint: A Technical Note. J Maxillofac Oral Surg. 2023 Mar;22(1):119-121. doi: 10.1007/s12663-021-01684-0. Epub 2022 Jan 18. PMID: 36703647; PMCID: PMC9871099.)

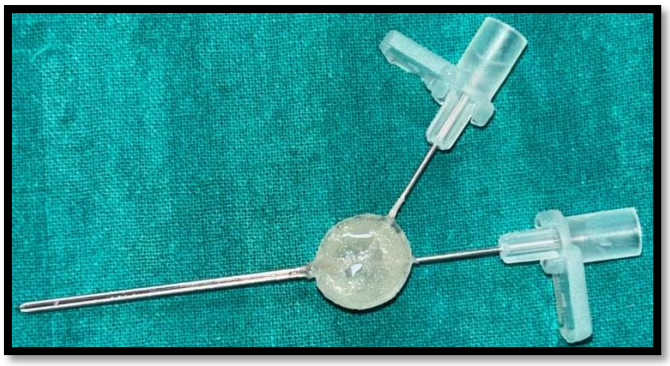

Figure 2: Modified Single-Puncture TMJ Arthrocentesis devive

Procedure

- The preauricular skin over the TMJ was prepared with topical antiseptic solution and draped.
- Following administration of an auriculotemporal nerve block, the temporomandibular joint was insufflated with a 2ml solution of lidocaine and normal saline. Surface landmarks were identified by drawing a line from the lateral canthus to the most posterior and central point of the tragus (Holmlund–Hellsing line; Fig. 3). The point of entry was located along this canthotragal line, approximately 10 mm anterior to the midpoint of the tragus and 2 mm inferior to the line, through which the superior joint compartment was accessed. The distance is about 25 mm from the skin to the center of the joint space.
- Subsequently, approximately 300 mL of Ringer's lactate solution was infused into the superior joint space using a 10-mL syringe, followed by manual manipulation of the mandible. To achieve adequate intra-articular hydraulic distension prior to establishment of effective outflow, the bevels of the needles were oriented such that the needle tips remained closely approximated while the bevel openings faced in opposite directions.
- After the lavage was completed, the needles were removed, and the patient's jaw was gently

manipulated by the clinician in the vertical, protrusive, and lateral excursions to help further free the disc and break the adhesions. The patient was then followed with the same protocol.

- Preoperative and postoperative pain levels and maximal mouth opening were assessed at 1 week, 1 month, and 4 months following the procedure. Clinical evaluation demonstrated a marked reduction in pain scores, accompanied by a progressive improvement in mandibular function, with significant gains observed as early as the first postoperative week. The preoperative maximal interincisal opening measured 1.8 cm and increased to 3.0 cm at 1 week (Fig. 4), 3.5 cm at 1 month, and 4.0 cm at the 4-month follow-up.

Figure 3A:

Figure 3B:

Figure 3C:

Figure 3: (a) A line was drawn from the lateral canthus to the most posterior and central point on the tragus (Holmlund–Hellsing Line); (b) The point of entry is placed 10 mm further along the canthotragal line and 2 mm below it; (c) Approximately 2ml solution of lidocaine and normal saline was then injected to distend the superior joint space and lavage was performed.

Figure 4: 1 week post-operative maximum mouth opening (3cm)

Discussion

The conceptual basis of temporomandibular joint arthrocentesis and lavage emerged from the successful application of TMJ arthroscopy, which demonstrated therapeutic benefits in addition to its diagnostic utility. Arthroscopic intervention was shown to produce substantial improvements in pain, mandibular range of motion, and overall joint function in selected patients,

largely attributable to lavage of the superior joint compartment. Temporomandibular joint arthrocentesis is currently understood to encompass several therapeutic mechanisms, including irrigation of the upper joint space, application of intra-articular hydraulic pressure, and mandibular manipulation to disrupt adhesions and overcome the "anchored disc phenomenon" or suction-cup effect, thereby facilitating improved joint mobility. In selected cases, adjunctive intra-articular corticosteroid injection may further enhance clinical outcomes [4,5,6].

The observations in the present case report are consistent with the findings of early clinical trials demonstrating that temporomandibular joint arthrocentesis combined with lavage and mandibular manipulation is an effective therapeutic modality for the management of acute persistent closed lock of the TMJ. Reported outcomes include significant improvements in maximal mouth opening and overall mandibular function, along with a substantial reduction in pain levels. Beyond its established role in the treatment of acute closed lock, TMJ arthrocentesis and lavage has also been proposed as a beneficial intervention in the management of other intra-articular disorders, including osteoarthritis, early-stage rheumatoid arthritis, and acute intracapsular trauma associated with hemarthrosis of the TMJ [7,8,9].

Reported complications associated with temporomandibular joint arthrocentesis and lavage include extravasation of irrigating fluid into the surrounding soft tissues; injury to the facial nerve (reported incidence, approximately 0.6–0.7%); sensory disturbances involving the trigeminal nerve (0.1–2.4%); and otic complications (0.5–8.6%). Additional local and regional complications include preauricular hematoma, superficial temporal artery aneurysm, arteriovenous fistula formation, transarticular perforation, intracranial perforation with resultant extradural hematoma, parapharyngeal space swelling, and other intra-articular sequelae [10,11,12,13].

Şentürk and Cambazoğlu proposed a classification system for temporomandibular joint arthrocentesis techniques based on the number of puncture sites employed, categorizing them into single-puncture arthrocentesis (SPA) and double-puncture arthrocentesis. Within the SPA category, techniques are further classified according to the number of needles utilized: Type 1, which involves a single-needle cannula method, and Type 2, which employs a dual-needle or double-lumen cannula through a single puncture site [3]. The technique described in the present case report corresponds to the Type 2 single-puncture arthrocentesis approach, but using two peripheral intravenous catheter [2]. The modified intravenous catheter–based arthrocentesis technique described in this report represents a simple, cost-effective, and reliable approach to single-puncture temporomandibular joint arthrocentesis. A principal advantage of this method lies in the use of standard peripheral intravenous catheters, which are routinely employed for vascular access in healthcare settings and are therefore widely available across medical facilities worldwide, rendering the technique economically favorable.

The single-puncture approach minimizes soft tissue trauma by limiting capsular penetration to a single entry point, thereby reducing procedural complexity and patient morbidity. Additionally, the presence of separate inflow and outflow channels allows for more efficient joint lavage, while the 45° angulation of one catheter facilitates improved access, device stability, and ease of intra-articular manipulation.

Conclusion

The primary goals of temporomandibular joint lysis and lavage are the elimination of inflammatory synovial

contents, release of intra-articular adhesions, reduction of pain, and restoration of joint mobility. Temporomandibular joint arthrocentesis represents a safe and minimally invasive treatment option for patients with internal derangement presenting as closed lock. The present case report highlights that single-puncture arthrocentesis using a modified intravenous catheter technique is simple to perform, minimizes capsular trauma, and allows effective joint lavage through separate inflow and outflow channels, with the additional advantage of improved access and device stability afforded by the angulated catheter design.

Reference

1. Nitzan DW, Dolwick MF, Martinez GA (1991) Temporomandibu lar joint arthrocentesis: a simplified treatment for severe, limited mouth opening. J Oral Maxillofac Surg 49(11):1163
2. Datarkar A, Purohit S, Relan P. Novel Modification of the Use of Peripheral Intravenous Catheters for Single Puncture Arthrocentesis of Temporomandibular Joint: A Technical Note. J Maxillofac Oral Surg. 2023 Mar;22(1):119-121. doi: 10.1007/s12663-021-01684-0. Epub 2022 Jan 18. PMID: 36703647; PMCID: PMC9871099.
3. Guarda-Nardini L, Manfredini D, Ferronato G. Arthrocentesis of the temporomandibular joint: a proposal for a single-needle technique. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2008; 106(4):483–486. doi: 10.1016/ j.tripleo.2007. 12.006.
4. Talaat W, Ghoneim MM, Elsholkamy M. Single-needle arthrocentesis Shepard cannula versus double-needle arthrocentesis for treating disc displacement without reduction. CRANIO®. 2016 doi: 10.1080/ 08869634.2015.1106810.
5. Holmlund A, Hellsing G. Arthroscopic surgery of the temporomandibular joint Internal derangement with persistent close lock. Oral Surg Oral Med Oral Pathol. 1986; 62:361. doi: 10.1016/0030-4220(86) 90282-3.
6. Rehman K-U, Hall T: Single needle arthrocentesis. Br J Oral Maxillofac Surg [Epub ahead of print] October 31, 2008. doi: 10.1016/j.bjoms.2008.09.014
7. Alkan A, Bas B: The use of double-needle canula method for temporomandibular joint arthrocentesis: Clinical report. Eur J Dent 1:1792, 2007
8. Emshoff R, Rudisch A. Are internal derangements and osteoarthrosis linked to changes inclinical outcome measures of arthrocentesis of the temporomandibular joint? J Oral Maxillofac Surg 2003;61:1162-7.
9. Nishimura M, Segami N, Kaneyama K, Sato J, Fujimura K. Comparison of cytokine level in synovial fluid between successful and unsuccessful cases in arthrocentesis of the temporomandibular joint. J Oral Maxillofac Surg 2004;62:284-7.
10. Carlsson GE. Epidemiology and treatment need for temporomandibular disorders. J Orofac Pain 1999; 13:232-7.
11. Greene CS. The etiology of temporomandibular disorders implications for treatment. J Orofac Pain 2001;15:93-105.
12. S¸entürk MF, Cambazo˘ glu M. A new classification for temporo mandibular joint arthrocentesis techniques. Int J Oral Maxillofac Surg 2015;44:417–8.
13. Tozoglu S, Al-Belasy FA, Dolwick MF. A review of techniques of lysis and lavage of the TMJ. Br J Oral Maxillofac Surg 2011;49: 302–9.