

**Original**

## Temporomandibular joint injection with corticosteroid and local anesthetic for limited mouth opening

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**Abstract:** It is unclear whether temporomandibular joint (TMJ) injections with local anesthetic and corticosteroid are an effective first-line management modality for patients with limited mouth opening. The purpose of this study was to determine the effectiveness of TMJ injections in patients with disc displacement without reduction (DDWOR), i.e. closed lock, at the University of Southern California Orofacial Pain and Oral Medicine Center. A retrospective chart review was conducted using a database of over 4000 patient records from 2003-2010. We identified 17 patients (16 female; 1 male) between the ages of 16 and 70 years who had been diagnosed with DDWOR and received a TMJ injection. Active mouth opening before injection ranged between 15 and 40 mm (average 29 mm), and active mouth opening after injection and manual mobilization ranged between 25 and 50 mm (average 39 mm). The average increase in mouth opening after injection and manual mobilization was 10 mm ( $P = 0.0004$ ). TMJ injection with corticosteroid and local anesthetic is suitable as an alternative first-line management modality for DDWOR. (*J Oral Sci* 53, 321-325, 2011)

Keywords: temporomandibular joint injection; arthrocentesis; closed lock; disc displacement without reduction.

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### Introduction

According to the American Academy of Orofacial Pain (AAOP), disc displacement without reduction (DDWOR), i.e. closed lock, is an altered or misaligned disc-condyle relationship that is maintained during mandibular translation. The disc is non-reducing or permanently displaced, and when the condition is acute it is characterized by sudden, marked limitation of mouth opening due to jamming or fixation of the disc secondary to disc adhesion, deformation, or dystrophy (1). Associated signs of DDWOR include deflection to the affected side on opening, limited laterotrusion to the contralateral side, and lack of prior click or pop in the affected joint.

The widely accepted practice for managing DDWOR includes arthrocentesis followed by manual mobilization of the jaw to improve mouth opening. Several independent studies have shown that arthrocentesis is effective in improving mouth opening in patients with DDWOR (2-7). A meta-analysis of surgical treatments for the temporomandibular joint (TMJ) published in 2003 reported that the most reliable evidence supports the use of arthrocentesis and arthroscopy for DDWOR patients (8).

In contrast, TMJ injection is a relatively uncommon means of managing DDWOR. Studies of TMJ injections have focused on decreased pain after injection in patients with both pain and limited mouth opening secondary to

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inflammatory disorders of the joint, such as arthritis and capsulitis (9-16). One study focused on improvement in mouth opening after TMJ injection with hyaluronic acid in patients with DDWOR (17). It is unclear if TMJ injections using local anesthetic and corticosteroid followed by manual mobilization of the jaw is effective as a first-line treatment for patients with limited mouth opening secondary to DDWOR. Therefore, the objective of this study was to determine average improvement in active mouth opening after a TMJ injection with local anesthetic and corticosteroid in DDWOR patients seen at the Orofacial Pain and Oral Medicine Center at the Herman Ostrow School of Dentistry of University of Southern California (USC OFP-OM Center) in Los Angeles, California, USA between June 2003 and December 2010.

### Materials and Methods

A retrospective chart review was conducted using information on 4000 patients treated from June 2003 through December 2010, which was obtained from the electronic medical record database (SOAPware, Fayetteville, AZ, USA) at the USC OFP-OM Center. The study was approved by the University of Southern California University Park Institutional Review Board and Ethics Committee (USC UPIRB #UP-07-00416) and was performed in accordance with the ethical standards established in the 1964 Declaration of Helsinki. Using the chart searcher function in the SOAPware program and the appropriate search terminology, we identified all patients who had received a diagnosis of DDWOR from either faculty or a resident under the supervision of faculty. A thorough history and head and neck exam was performed for every patient to confirm the diagnosis.

A panoramic radiograph was obtained to rule out any possible bony pathology, such as arthritis or tumors, that may have contributed to the limitation of mouth opening. Inclusion criteria included a history and clinical presentation that satisfied the AAOP criteria for DDWOR (1). Patients with limited mouth opening due to muscle trismus, trigger points, fractures, condylar ankylosis, or other systemic conditions were excluded after a thorough diagnostic work-up.

TMJ injection was performed in the affected joint either during the first or second visit by a resident under the supervision of faculty. The preauricular skin was cleaned with an alcohol swab before the injection of 1 ml of 2% lidocaine HCl (Xylocaine, 20 mg per ml, AstraZeneca Inc., Mississauga, ON, Canada) and 0.5 ml of triamcinolone acetonide (Kenalog 40, 40 mg per ml, Bristol-Myers Squibb Company, Princeton, NJ, USA). A 3-ml Luer-Lock syringe with a 23-gauge needle was used to withdraw the 2% lidocaine HCl solution and the triamcinolone acetonide solution from the respective vials (Fig. 1a). The injection was performed using a 27-gauge needle. The preauricular skin was disinfected using a 70% isopropyl alcohol pad or 10% povidone-iodine pad, and the patient was asked to open the mouth as wide as possible. The needle was inserted into the superior joint space, behind the condyle and beneath the zygoma, and passed in until three fourths of the needle was in the joint space (Fig. 1b). The solution of lidocaine HCl and triamcinolone acetonide was injected into the space after negative aspiration, and an ice pack was applied to the joint after the injection. Five minutes after the procedure, the patient was assessed for any signs of facial palsy, and manual mobilization of the jaw was performed to

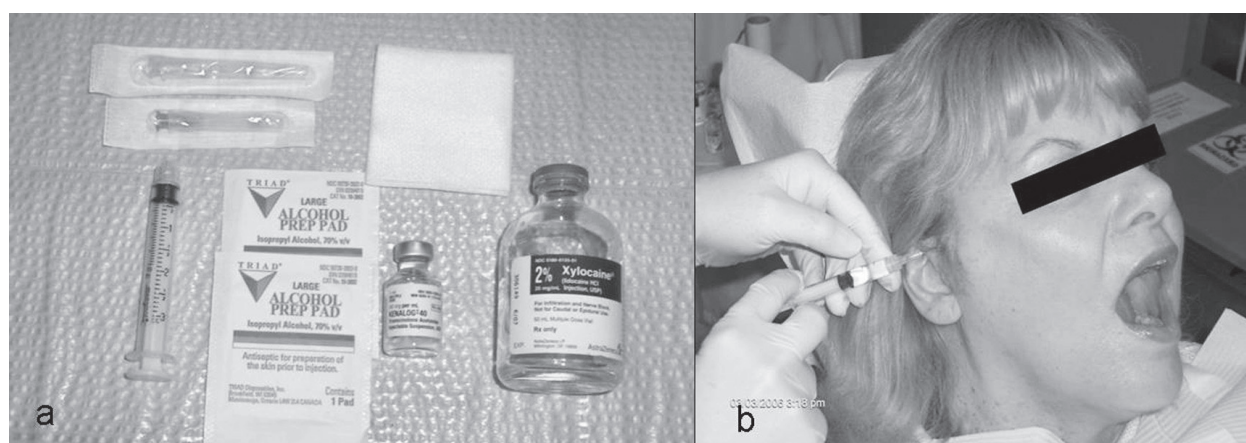


Fig. 1 TMJ injection. Setup shows 23- and 27-gauge needles, 3-ml Luer-Lock syringe, 70% isopropyl alcohol pad, gauze, and vials of triamcinolone acetonide and 2% lidocaine HCl (a); One ml of 2% lidocaine HCl and 0.5 ml (20 mg) of triamcinolone acetonide is injected into the TMJ at the right superior joint space of the patient after preparing the skin with povidone-iodine (b)

improve mouth opening. Patients received instruction on passive stretching exercises to improve mouth opening, and active mouth opening measurements were recorded during a follow-up visit at 1 week.

Data analysis was performed using Microsoft Office Excel and GraphPad InStat software. The two-tailed paired *t*-test was used to calculate *P* values.

## Results

We identified 84 patients who had received a joint injection for either pain secondary to TMJ arthritis and capsulitis or limited opening secondary to DDWOR. From this group a total of 17 patients (16 female; 1 male) between the ages of 16 and 70 years (mean 34.4 years) had received a diagnosis of DDWOR (13 with DDWOR with continuous locking and 4 with DDWOR with episodic locking of the TMJ). All patients had limited mouth opening, defined as less than or equal to 40 mm at the time of injection. The left TMJ (11 patients) was more frequently affected than the right side (6 patients). During the patients' first visit to the OFPOM center, the initial treatment for DDWOR was TMJ injection with local anesthetic and corticosteroid (6 patients), physical therapy (5 patients), anti-inflammatory medications (5 patients), and skeletal muscle relaxant (1 patient). TMJ injection was given to eight patients during their second visit and three patients during their third visit. No patient received more than one joint injection. Active mouth opening before injection ranged from 15

to 40 mm (average 29 mm; SD 6.51), and active mouth opening after injection and manual mobilization ranged from 25 to 50 mm (average 39 mm; SD 6.54) (Fig. 2). The average increase in mouth opening was 10 mm ( $P = 0.0004$ ). Visual analog scales (VASs) for pain were only available for 14 patients. VAS score ranged from 4 to 10 (average 8) on a scale of 10 before injection and from 2 to 7 (average 4) after injection; the difference was not statistically significant. Only one patient developed temporary facial palsy, which persisted for 3 hours. The patient's facial nerve function was normal during the follow-up visit.

## Discussion

Hyaluronic acid, a viscous polysaccharide and a major component of synovial fluid, has been widely studied in the management of DDWOR and arthritis of the TMJ and has been shown to be safe for intraarticular use in the TMJ (2,12-14,17). Most practitioners have preferred hyaluronic acid to intraarticular corticosteroids due to the reported adverse effects of corticosteroid injections in the knee joint, which include septic arthritis, postinjection "flare", local tissue atrophy, tendon rupture, cartilage damage, flushing, and increased blood glucose level (18). These adverse effects are relatively uncommon in the TMJ (11,13,14,19,20), and we did not observe any of the above adverse effects in our patient sample. Also, a recent systematic review showed that hyaluronic acid and glucocorticoids had the same short-term and long-

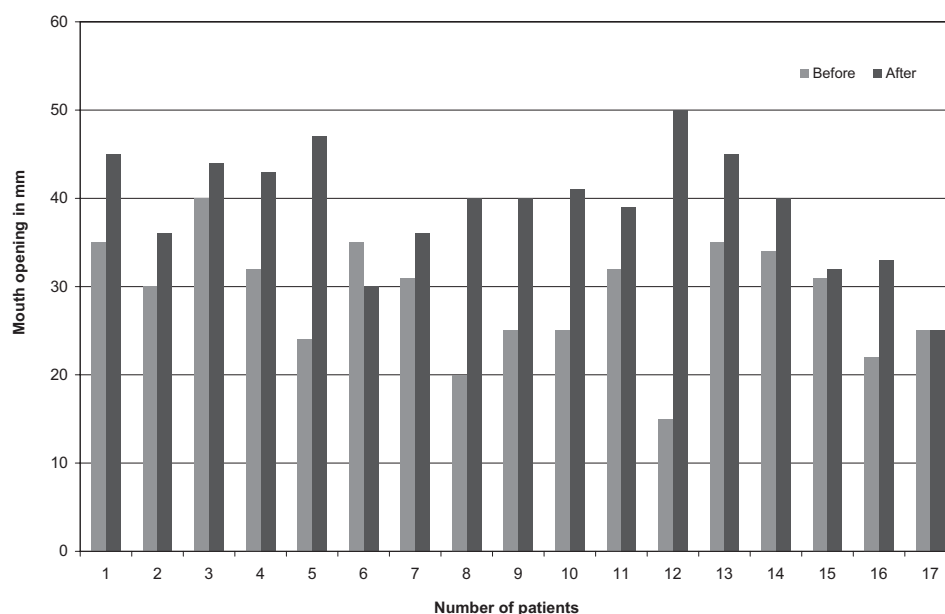


Fig. 2 Active mouth opening before and one week after TMJ injection. X axis: total number of patients; Y axis: active mouth opening in millimeters (preinjection values in light gray; postinjection values in dark gray)

term effects on improvement of symptoms, clinical signs, and overall condition of TMJ disorders (21).

In our study, only one patient developed temporary facial palsy due to local anesthetic blockage of the facial nerve, which runs below the neck of the condyle. This can occur when the needle is not completely inserted into the superior joint space and the anesthetic solution diffuses into the pre-auricular skin. Wenneberg et al. (11) reported that the long-term (8-year follow-up) effects of intraarticular injections of corticosteroids were good and that there were no radiographically identifiable adverse effects in the TMJ. Indeed, erosions of the bony articular margins of the TMJ that were observed radiographically before treatment were found to be remineralized at follow-up, which suggests bony remodeling of the joint.

We prefer to use triamcinolone acetonide because of: (1) Cost—hyaluronic acid is more expensive than corticosteroids, most patients seen in our center cannot afford hyaluronic acid, and most health insurance companies in the United States do not reimburse the cost of hyaluronic acid for TMJ injections; (2) Anti-inflammatory potency—steroids are more potent anti-inflammatory agents than hyaluronic acid; and (3) Duration of action—triamcinolone acetonide is a particulate ester preparation of steroid that requires hydrolysis by cellular esterases to release the active moiety and consequently should last longer in the joint than hyaluronic acid or non-ester steroid preparations like dexamethasone sodium or betamethasone sodium (22). Also, when comparing TMJ injections to arthrocentesis, it is important to bear in mind that the latter is an outpatient procedure that requires sedation, surgical assistance, and operating room conditions, all of which increase the cost of the procedure. In contrast, TMJ injection does not require sedation, operating room set-up, or assistance and is an inexpensive outpatient procedure for patients with DDWOR.

Yeung et al. (17) investigated the efficacy of hyaluronic acid injections without manual mobilization in patients with DDWOR. They noted a statistically significant reduction in pain intensity in the third postoperative week, but active mouth opening decreased from an average of 39 mm to 36 mm at one month after injection. In contrast, we found a statistically significant improvement in active mouth opening (average 10 mm;  $P = 0.0004$ ) and a decrease in pain scores (average 4 points; not statistically significant) in patients with DDWOR one week after injection with manual mobilization plus passive stretching exercises for the jaw. In comparison with the present findings, studies assessing the efficacy of arthrocentesis or arthroscopy for DDWOR have reported similar improvements in average active mouth opening

(range 5 to 10 mm) (4-7,23,24). Our use of manual mobilization after TMJ injection may explain why patients in our study population had a greater increase in mouth opening as compared with the study by Yeung et al. (17). Our results should be interpreted with caution, however, as we do not have long-term follow-up data on mouth opening and pain scores.

A limitation of our study is that this is not a randomized double-blind controlled trial. We hope that the data from this study will lead to such a study comparing TMJ injection with corticosteroid to TMJ injection with hyaluronic acid or arthrocentesis. Such a prospective trial is necessary to compare and contrast the efficacy of these procedures for DDWOR.

In conclusion, our results suggest that there is a significant improvement in active mouth opening after TMJ injection plus manual mobilization and that TMJ injection with corticosteroid and local anesthetic is an effective first-line alternative to hyaluronic acid injection and arthrocentesis in patients with DDWOR. Additional, prospective studies are needed to confirm the effectiveness of TMJ injection with corticosteroid for DDWOR.

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