Review Article

Is Arthrocentesis of Temporomandibular Joint with Corticosteroids Beneficial? A Systematic Review

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Abstract:

Background: Temporomandibular disorders (TMDs) are musculoskeletal conditions that can inhibit the normal function of temporomandibular joints (TMJs) and affect the patient's quality of life, negatively. Arthrocentesis (AC) is a minimally invasive surgical procedure used for treating TMDs. The aim of present paper is to evaluate the advantages of administrating corticosteroid (CS) during AC by reviewing high quality released articles.

Material and Methods: Searching on Cochrane Library, Web of Science, Google Scholar, PubMed, Pro Quest, and Scopus databases were performed with focusing on proper key words. Related titles and abstracts, up to April 2023, were screened and selected based on inclusion criteria. The full text of all randomized controlled trials (RCTs) was extensively read and subjected to quality assessments.

Results: After initial search, a total of 2067 articles were included into the study. Finally, 7 studies were reliable enough in methodology and randomization to be included into the study. All of the observed studies showed improvements in jaw functions and pain relief with no statistical differences in both AC and control groups. One study reported painless maximum incisal opening in CS group than the control group.

Conclusions: Based on available RCTs, the AC of TMJ with CS seems to result in similar findings to other therapeutic drugs, with no significant differences.

Keywords: Arthrocentesis, corticosteroid, temporomandibular joints, temporomandibular joint

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INTRODUCTION

Orofacial pain can be severe and includes cases of intractable pain as well as acute pain. The most frequent source of orofacial pain is dental disease. Among other sources are musculoskeletal, vascular, neurovascular, and neuropathic disorders.1 musculoskeletal sources of orofacial pain are comprised of joint disorders and muscle disorders, although joint and muscle symptoms frequently

occur simultaneously. Pain arising from joint disorders is termed 'arthralgia'.

Causes of arthralgia would include mechanical nerve compression secondary to articular disc displacement, neurogenic inflammation, secondary to intra-articular changes and synovitis, adhesions, or arthritis. Historically, the displaced disc was considered the primary cause of arthralgia, but the observations that arthroscopy and arthrocentesis of the superior joint compartment reduce or eliminate pain in patients with a permanently displaced disc, without repositioning the displaced disc, have disproved the displaced disc as the cause of arthralgia. Another possible cause for arthralgia may be mechanical trauma from repetitive extreme loading (i.e., habitual jaw-clenching, bruxism), causing transient hypoxia. The hypoxia may create oxygen-derived free radicals that activate a variety of biochemical changes, leading to arthralgia.2

The current treatment modalities focus on alleviating pain and improving function. Arthrocentesis is a minimally invasive procedure aimed at removing inflammatory and pain mediators from the joint cavity solely by the intraarticular flow of saline. In addition to arthrocentesis, corticosteroids are commonly added to further reduce pain and jaw stiffness.3 Corticosteroids modify the vascular response during the inflammatory process and inhibit enzymes and the actions of inflammatory cells. Their use in the TMJ remains controversial regarding their efficacy and unknown duration.

The aim of the current study was to test the additional effect on pain and jaw stiffness of a short-acting corticosteroid (dexamethasone) following an arthrocentesis procedure in the TMJ.

Methods

Study design:

To enhance structural reporting of the articles, the reviewing setting was in accordance to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Fig.1)

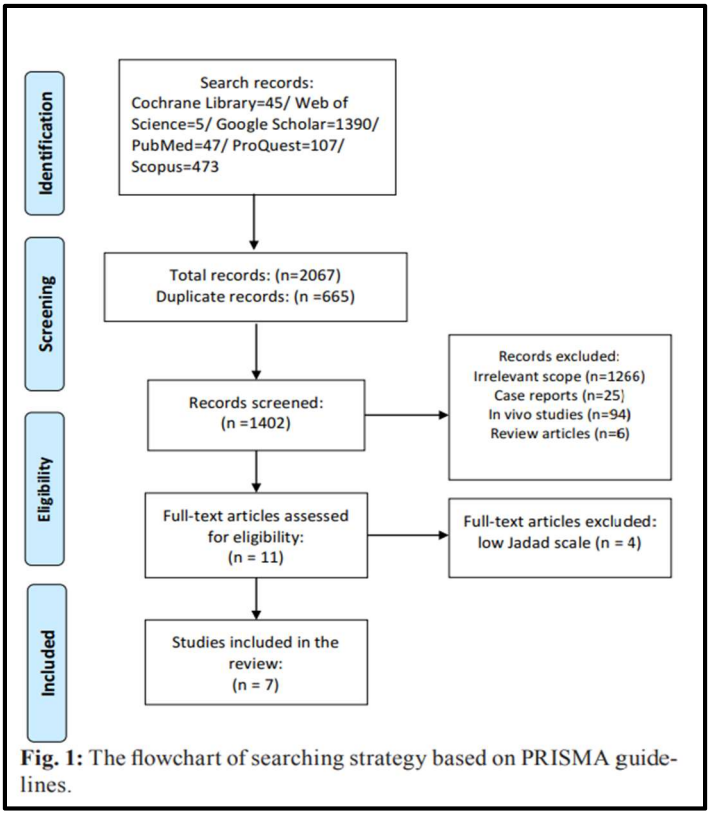

Fig. 1: The flowchart of searching strategy based on PRISMA guidelines.

Firstly, a clinical question was defined for screening the qualified clinical studies based on PICO: Patients with any kinds of TMDs (P, population) who underwent AC with CS (I, intervention), compared to other methods of TMD therapy (C, comparison) that causes the improvement of signs and symptoms (O, outcome). A data search was performed using Cochrane Library, Web of Science, Google Scholar, PubMed, ProQuest, and Scopus databases of articles, based on the defined MeSH and non-MeSH terms in simple or multiple conjunctions. The searching procedure was conducted manually up to December 2017, then Endnote software version 7 (Thomson Reuters, NY, USA) was used for final confirmation, cross matching, and avoiding any missing of data. Two independent reviewers (A.D and F.A) qualified the eligible articles to review. To select the studies, all obtained English language reports were reviewed, and titles and abstracts were screened for relevance. The review articles and references from different studies were used to identify relevant articles. In the case of disagreement between reviewers, a discussion was undertaken until mutual agreement was reached. Reviewers' agreement was tested with the

Cohen κ test by use of MedCalc software (MedCalc Software, Ostend, Belgium) (kappa score = 0.89).

The studies were subjected to Jadad Score Calculation for Critical Appraisal and lowering the risk of biases. They were classified as follow: 1-2 low quality, 3 moderate, and 4-5 high quality. The full text of relevant abstracts was obtained and selected using the following inclusion and exclusion criteria.

Inclusion criteria:

- English language randomized clinical trials (RCTs) and prospective studies that investigated the effect of TMJ AC with CS
- Clinical research on at least 5 patients
- Maintaining the standard indications and guidelines of AC procedure
- Performed at least one standard test for evaluating clinical effects or side effects of CS

Exclusion criteria:

- Case reports
- Animal studies
- Studies with missing data
- Repeatedly published studies; the last version was included
- Studies in languages other than English
- Studies with Jadad score of < 3 (for eliminating the risk of biases)

The initial literature search yielded on 2067 articles in which 1402 articles remained after removing duplicates. After the first screening based on the title and abstract, 11 studies were found eligible which reached to 7 studies after excluding high risk article. Full-texts of the all articles were reachable for initiating reviewing process.

Data Extraction:

The following data were collected for each study: author, year, study design, participants (age, gender), method of TMD diagnosis, administered CS and dosage, the monitoring tests before and after AC, clinically significant outcomes. After gathering information, the possibility of preparing a meta-analysis was judged by an independent statistician and epidemiologist. As the collected data were vastly heterogeneous (like different corticosteroid drugs with different dosages, different diagnosis of TMD, different clinical test on the patients, and etc.) no meta-analysis were prepared.

DISCUSSION

Temporomandibular disorders (TMDs) are musculoskeletal conditions that can inhibit the normal Function of temporomandibular joints (TMJs) and affect the patient's quality of life, negatively. The treatment of the temporomandibular joint (TMJ) is still controversial.1 The TMD is a wide terminology in which conditions disturbing the masticatory function are included. The internal derangement is described as displacement of the articular disc in association with clicking and popping sounds.4 The most common cause is trauma, which results in an immediate displacement of the disc or chronic dysfunction, which results in degenerative changes in the articular surfaces, increased friction, and gradual disc displacement. It has always been an operative challenge. The AC has been shown to be an effective method in the treatment of patients showing clinical findings in the diagnosis of internal TMJ derangement.5 TMJ arthrocentesis represents a form of minimally invasive surgical treatment in patients suffering from internal derangement of the TMJ, especially closed lock.6 It consists of washing the joint with the possibility of depositing a drug or other therapeutic substance. Arthrocentesis of the temporomandibular joint is a method at the boundary between conservative and surgical therapy. It is usually performed on an out-patient basis under local anaesthesia.7 It is used both in cases of acute block caused by displacement of the articular disc and also to treat degenerative inflammatory diseases of the joints.8

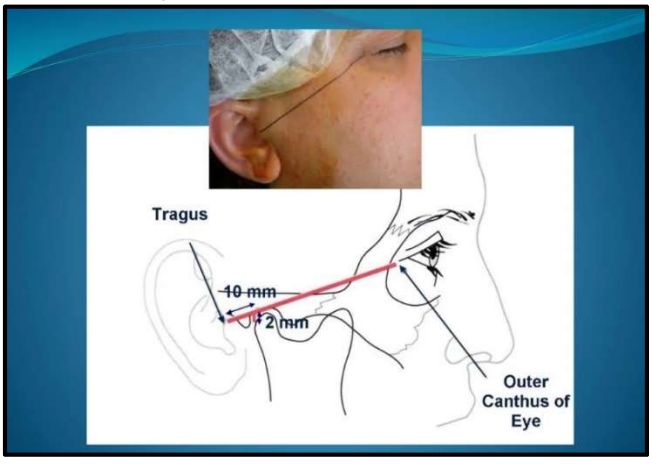

Fig .2 Anatomical Landmarks for Needle Entry

The main objective of arthrocentesis is to wash out inflammatory mediators, release the Disc, break adhesions, eliminate pain and improve joint mobility. Resolution of symptoms is due to the removal of chemical inflammatory mediators and changes in intra-articular pressure. It is a method with a minimum number of complications, it is simple and not demanding in terms of instruments, and it can be performed repeatedly. For this reason, it has become widespread and very popular in the treatment of internal disorders of the temporomandibular joint.9

Some researches were carried out regarding use of corticosteroids for AC. numerous clinical studies regarding this technique have been published. The aim of present paper is to evaluate the advantages of administrating corticosteroid (CS) during AC by reviewing high quality released articles.10, 11

As per the systematic review by Amin Davoudi, Hossein Khaki et al, regarding whether arthrocentesis of temporomandibular joint with corticosteroids is beneficial? They concluded according to the available RCTs on the role of CS during AC of TMJ, no significant result was found among CS groups and other groups (either control or other drugs). Only One Study reported painless maximum incisal opening in CS group than the control group. Although, reliable documents on effectiveness Of CSs during AC of TMJ are not vast enough for making more determinant conclusion, it seems that CS do not present better properties than other therapeutic Drugs during AC.12

J.J.R. Huddleston Slater, L.M. Vos et al, carried out Randomized Trial to compare the Effectiveness of Dexamethasone in TMJ Arthrocentesis. Twenty-eight participants with TMJ arthralgia were randomly Assigned to two groups of a parallel double-blind RCT. In both groups, an arthrocentesis procedure was carried out. In one group, the procedure was followed by the administration of a single-dose Intra-articular dexamethasone. In the other group, Saline was administered as a control. Follow-up Visits were scheduled after 1, 3, and 24 weeks. During each visit, TMJ pain (on a 100-mm VAS) And jaw stiffness (mouth opening in mm) was scored. In the statistical analysis, generalized estimating equation (GEE) models showed no differences between the two study groups, although pain and jaw stiffness were both reduced over 24 Weeks. They found, intra-articular dexamethasone following arthrocentesis did not improve the Procedure's effect in patients presenting with TMJ Arthralgia.13

Dexamethasone modifies the vascular response during the inflammatory process and inhibits both destructive enzymes and the actions of inflammatory cells.14 It has Been suggested that this decrease in inflammatory potency of the Synovial fluid would result in greater pain reduction, but this Study showed that the effect of dexamethasone contributed in a Minor way to that effect, if at all because of small sample sizes, this study was also unable to Identify any side-effects of dexamethasone.15 One uncertainty is the unknown working time of dexamethasone in the TMJ. Its Half-life of 36 to 72 hrs makes it unlikely that long-term effects can be expected. Their analyses also did not suggest a long-term Effect. However, these half-life effects do not count for all corticosteroids. Kenacort, for example, has a longer half-life and May have a longer lasting effect as compared with dexamethasone. Kenacort, however, is opaque white and is more difficult to test in a double-blind fashion. They concluded, intra-articular dexamethasone following an Arthrocentesis procedure did not improve the effect of the Arthrocentesis in patients presenting with TMJ arthralgia.16

Reza Tabrizi, DMD, Tuba Karagah et al, studied Outcomes of Arthrocentesis for The Treatment of Internal Derangement Pain, with or without use of Corticosteroids. Their study of two groups with Comparison of age, sex, and skeletal relationship did not Show any significant differences between the 2 groups. Results did not demonstrate any difference for click between the 2 groups. Comparison Of pain severity in T0, T1, and T2 between the 2 groups did not show any significant differences ($P < 0.05$). The repeat measure test revealed a significant change in T0, T1, and T2 for both groups ($P < 0.001$). MMO significantly changed between T0 and T1 and T0 and T6 in the 2 groups without any significant differences between them.17

They concluded that The AC is an effective procedure for a short-term reduction of pain in temporomandibular disorder cases. It seems that AC

using Ringer solution with or without corticosteroids may have the same effect on pain relief.

CONCLUSION

The AC is an effective procedure for a short-term reduction of pain in TMD cases. Although, various documents on effectiveness of CSs during AC of TMJ are present but they are not vast enough for making more determinant conclusion, it seems that CSs do not present better properties than other therapeutic drugs during AC and AC using Ringer solution with or without corticosteroids may have the same effect on pain relief.

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