

Modified Prolotherapy: A Ray of Hope for Temporomandibular Joint Disorders

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Abstract

Background: Temporomandibular joint (TMJ) disorder is one of the most common causes of orofacial pain and dysfunction. Prolotherapy is a promising approach in the management of temporomandibular disorder (TMD), especially in refractory cases where conservative management has failed and in patients where surgical management is not possible. **Aims:** The aims of the study are to determine the effectiveness of 12.5% dextrose prolotherapy in the management of TMJ disorders. **Methods:** Patients suffering and diagnosed cases of TMDs were included in the study. Prolotherapy was performed using 12.5% dextrose and 2% lidocaine on the subjects. **Results and Conclusion:** Data obtained will be subjected to statistical analysis, and a conclusion will be arrived at.

Keywords: Dextrose, Prolotherapy, Temporomandibular disorders, Temporomandibular joint.

INTRODUCTION

Temporomandibular disorders (TMDs) are a group of conditions defined by anatomical, histological, and/or functional abnormalities of the muscular and/or articular components of the temporomandibular joint (TMJ). They are characterized by pain located over the TMJ or surrounding tissues and functional limitations of jaw movements such as chewing difficulty, jaw fatigue, grinding of teeth, tension about the jaw, or clicking with jaw motion.^[2] In anterior TMJ dislocation, the mandibular condyle becomes displaced from the glenoid fossa and is locked anterior to the articular eminence. This leads to discomfort and inability to close the mouth. TMJ dislocation is classified depending on the onset and frequency of dislocation to acute, chronic recurrent, or subluxation or according to the direction of the dislocated condyle to superior, medial, lateral, anterior, or posterior dislocation which can occur bilateral, or unilateral.^[5]

The incidence of the first painful TMDs is 3–4% per annum and primarily affects young and middle-aged adults with a prevalence of 5–10%.^[1,6] While its natural history is not well studied, TMDs have been reported as recurrent in 65% and chronic in 19% of the affected population. Treatment and research of TMD are complicated by the varied etiology and diagnostic criteria, which have been organized as the research diagnostic criteria/TMD (RDC/TMD) and classified by likely etiology. The extent to which RDC/TMD classification can inform guideline-driven care is not yet known.^[8]

Prolotherapy is an injection therapy used to treat chronic ligament, joint, capsule, and tendon injuries. George S. Hackett coined the term “Prolotherapy” in the 1950s from the Latin “proli-” meaning “off spring.” Prolotherapy is also known as non-surgical tendon ligament and joint reconstruction, growth factor stimulation injection, sclerotherapy, and regenerative injection therapy.

The goal of this treatment is to stimulate the proliferation of collagen at the fibro-osseous junctions to promote non-surgical soft tissue repair and relieve pain. Prolotherapy reinitiates the inflammatory process and stimulates the healing process. In our study, we use hypertonic dextrose which acts by osmotic shock, by dehydrating cells locally at the injection site to initiate the inflammatory process.

MATERIALS AND METHODS

Patients were selected from the outpatient department of Sri Balaji Dental College, Yenkapally, Moinabad who reported with TMJ pain. Pre-operative evaluation of patients was done

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using clinical examination and panoramic evaluation. Patients reported clinical symptoms of recurrent TMJ dislocation such as multiple episodes of inability to close mouth due to lockjaw in the open position, difficulty in swallowing and speech, excessive mandibular movements and pain on palpation, and depression noted in the preauricular area. The patients were advised for 12.5% dextrose prolotherapy as management. The procedure was explained to the patient and written consent was obtained for the same. Follow-up was carried out after the procedure at the intervals of 1 week, 2 weeks, 1 month, 3 months, 6 months, and 1 year.

Inclusion criteria are patients previously diagnosed with internal derangement of TMJ and who did not respond to the conservative treatment. Patients suffering from internal derangement of TMJ were included in the pilot study. The criteria for inclusion in this study were adult patients between 20 and 40 years old with recurrent dislocation of TMJ more than 2 times in the last month. The criteria for exclusion were patients with neurological conditions, parafunctional habits, allergic to lidocaine and dextrose, Ehlers–Danlos syndrome, or patients taking anticoagulant drugs.

We conducted a study on 2 patients suffering from TMJ disorder who were treated with prolotherapy, the solution consisting of 1 part of 50% dextrose (0.75 mL); 2 parts of lidocaine (1.5 mL); and 1 part of warm saline (0.75 mL). This consists of drawing up 0.75 mL of 50% dextrose, 0.75 mL of sterile water, and 1.5 mL of 2% lignocaine leading to a solution of about 12.5% concentration of dextrose.

The standard program is to repeat the injections 3 times at 2-week intervals, which totals four injection appointments over 6 weeks with a 3-month follow-up. Hypermobility of the TMJ and maximal mouth opening were assessed at each follow-up appointment.

The following clinical parameters were used to evaluate the outcome of prolotherapy:

1. Maximum mouth opening as distance in mm between the incisal edges of maxillary and mandibular central incisors
2. Presence of pain Visual Analog Scale (VAS)-TMJ pain was rated from 0 (no pain), 1–3 (mild pain), 4–6 (moderate pain), 7–9 (severe pain) to 10 (worst pain) on a VAS.
3. Frequency of dislocation
4. Right laterotrusion (mm)
5. Left laterotrusion (mm)
6. Protrusion (mm)
7. Presence or absence of clicking/grating/popping sounds.

Injection technique

The skin surface of the preauricular area was disinfected with a betadine surgical scrub solution. Local anesthesia to the skin was obtained with an infiltration technique of 2 mL of lidocaine 2%. Access to the superior joint space was attained by asking the patient to close the anterior teeth on a small bite block or 1 cm thickness of dental cotton rolls which enables

translation of the mandibular condyles down the anterior slope of the glenoid fossa. The point of needle insertion was marked on the skin with an indelible pencil midway between the tragus of the ear and the posterior aspect of the condyle. The syringe needle was directed superiorly and anteriorly toward the apex of the glenoid fossa into the superior joint space until contact of the needle with the periosteum was reached. 1 mL of solution was gradually injected into the superior joint space. As shown in Figure 1a and b.

The posterior joint space was located by cleansing the skin immediately anterior to the ear with alcohol and palpating the lateral pole of the condyle as the patient opened and closed the jaw. We locate the anterior joint space by the slight depression just anterior to the condyle when the mouth is closed and mark this point. We palpate the masseter attachment along the inferior border of the zygomatic arch and mark the area of the masseter that is most tender to palpation. 1 mL of the solution was deposited at each of the locations. While injecting in the posterior joint space, the patient asked to bite on the bite block. The bite block was removed and the patient asked to close the mouth for the anterior joint space. The patients were administered injections once a week for 2–4 consecutive weeks.^[7,10]

After the injection, the patients were prescribed paracetamol (acetaminophen) 500 mg, one tablet every 4 h as needed, and were advised to avoid the use of other analgesic and anti-inflammatory drugs during treatment. They were also instructed to have a soft diet for 2 weeks and to avoid opening their mouth wide.

During each appointment, the Visual Analog Scale for pain and the amount of mouth opening without pain and maximal mouth opening with pain were noted. Results show a steady decline in the pain during the 4 visits. An increase in the amount of mouth opening without pain was noted between the first and second visit after which it stabilized. Maximal mouth opening with pain showed a steady increase during the 4 visits.

RESULTS

Both patients tolerated the prolotherapy injection well with no serious complications. The transient facial palsy caused by the



Figure 1: (a) Illustration of the markings for penetration of the needle, (b) Illustration of the skin point for penetration of the needle

anesthetic effect of lignocaine in a patient following a second injection, diminished within 2 h post-operatively. The patients asked for paracetamol (acetaminophen) immediately following injection but this sensation disappeared spontaneously after 2–3 days without further treatment. The mean (range) duration of follow-up was 18 (13–24) months. At the 4-week appointment, both patients were given a second injection because though they described improvement, they still claimed to have the sensation of hypermobility of the joint and audible clicking sounds.

The results of the present study suggest that the treatment technique resulted in significant improvements for all VAS parameters. They constituted tertiary outcomes, but these side effects diminished over the course of several weeks with the prescription of drugs. Similar, side effects have been reported in other studies using dextrose prolotherapy for TMJ hypermobility.^[10]

DISCUSSION

The purpose of this study was to assess the efficacy of modified dextrose prolotherapy for the treatment of recurrent dislocation of the TMJ. The main characteristics of the modification were the simplified injection, the high-strength proliferant, and the flexible treatment procedure. The superior space of the TMJ has been considered to be an essential site for interventional treatment of recurrent dislocation. To improve the therapeutic effects, research workers have also described multiple sites of injection in the superior joint space and pericapsular tissues. Significant reductions in maximal mouth opening have been reported by patients treated with arthrocentesis and deposition of irritant agents, but this was explained by the histological finding of progressive fibrosis of the sub synovial connective tissue. Although this was supposed to stabilize the joint and prevent dislocation, the limited mouth opening actually restricted oral functions.

It is presumed that prolotherapy may trigger an immune response, activating granulocytes and macrophages to release growth factors sufficient to stimulate cell growth or cell production, leading to fibroblast proliferation followed by matrix production and collagen deposition. The new collagen undergoes contraction, pulling the “loosened” ligament/tendon tighter. Different proliferant irritants have been suggested for prolotherapy of the hyper-mobile joint. Dextrose was selected as the proliferant in the present study because it is the most common proliferant used for prolotherapy. Dextrose is readily available and inexpensive when compared with other proliferants, and it also has a good safety profile. Different concentrations of dextrose ranging from 10% to 50% have been used as the prolotherapy agent for TMJ hypermobility.^[4] Dextrose concentrations >10% have been shown to be effective; thus, 12.5% dextrose was chosen for the present study due to its inflammatory capacity. It is generally recognized that dextrose may have inflammatory or non-inflammatory mechanisms. A dextrose concentration of more than 10% works partly by

inflammation.^[3,4] Histopathological findings 24 h after an injection included hemorrhage, inflammation, necrosis, and vascular changes in the ligaments and adjacent soft tissues at the sites of injection. There was evidence of repair at 2 weeks, with fibrosis and other signs of regeneration at the injection sites. The selection of a different solution would be empirical. We hypothesize that higher concentrations of dextrose have a longer hypertonic effect and induce a stronger tissue repair reaction. The standard 50% concentration of dextrose is usually considered to be too irritating to use directly, but the results of our study show that successive injections of 2% lignocaine and 50% dextrose in equal amounts result in no serious discomfort or temporary or permanent damage to the facial or auriculotemporal nerves. Patients felt only tightening of the joint after the first injection. The appreciable therapeutic benefit was confirmed after more than 1-year follow-up.

Different local anesthetics have been added to the hypertonic dextrose to protect the patients from the pain of dextrose injections.^[3,4] Articaine hydrochloride and mepivacaine (in the case of allergy) were the local anesthetics used in the present study. Because these agents do not prevent the inflammatory effect, paracetamol was prescribed for the relief of post-operative pain in this study. Injections have generally been given on three to five separate occasions to obtain the therapeutic effect.^[7,9] In this study, dextrose injections were given in three sessions, each a month apart, in all patients.

CONCLUSION

Prolotherapy is a low-cost, simple, effective treatment that should be considered for the refractory cases of TMJ pain before the surgery. There are only minimal quality data available on TMJ prolotherapy and more high-quality randomized studies need to be done to conclusively determine the efficacy of prolotherapy for TMJ.

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