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Healing by Inflammation - Prolotherapy

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ABSTRACT

Temporomandibular disorder (TMD) is a collective term used to describe a group of disorders related to temporomandibular region. It's considered to be the common cause for orofacial pain. With the advancement of research, prolotherapy is considered to be the one of the treatment modalities to treat TMD, when the conservative management fails.

Keywords: Temporomandibular joint; Temporomandibular disorders; Prolotherapy; Dextrose

1. INTRODUCTION

The mandibular joint, also known as the temporomandibular joint (TMJ), is an ellipsoid variety of synovial joint forming a bicondylar articulation. The common features of the synovial joints exhibited by this joint include a fibrous capsule, a disk, synovial fluid, and adjacent ligaments [1]. Temporomandibular joint (TMJ) disorder (TMD), a commonly used term to describe disorders causing pain and dysfunction of TMJ. TMD includes the causative agents of facial pain, headache and tinnitus, ear pain, but it is difficult to obtain an effective treatment. Restricted jaw movement, irregular jaw movement, and TMJ sounds such as clicking, popping, or crepitation are obvious symptoms of TMD [2].

Etiological factors precipitating TMD

Temporomandibular joint disorders can be precipitated by multiple factors. Enlisted etiological factors are stress, external trauma, bruxism, neoplasia, hypermobility disorder, development or growth abnormality, infection and idiopathic [3].

2. THERAPEUTIC APPROACHES

TMD's can be treated by following basic therapeutic approaches which include:

1. Eminectomy: Removal of the mechanical obstacles in the condylar path occurs, thereby permitting free movement of the condyle [4,5].
2. Intracapsular injection of sclerosing solutions [6].
3. Lateral pterygoid myotomy [7].
4. Scarification of the temporalis tendon [8].
5. Bone grafting augmentation [9].

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6. Application of a well-designed alloplastic impediment with vitallium mesh or titanium plates [10].

Anatomy of TMJ with its correlation with TMDS

The TMJ is divided into an upper and lower joint cavity by a fibro cartilaginous Articulating disc [11]. It is thicker posteriorly, thus making posterior dislocations more unlikely. Anteriorly, the disc is fused with the thin, loose, and fibrous joint capsule. The ligaments which contribute to the formation of the fibrous joint capsule and unite the articular bones are the lateral temporomandibular, sphenomandibular, and stylomandibular. The temporomandibular ligament restrains the movement of the mandible and prevents compression of tissues behind the condyle [12]. The joint capsule attaches to the articular eminence, the articular disc, and the neck of the mandibular condyle. The sphenomandibular and stylomandibular ligaments keep the condyle, disc, and temporal bone firmly opposed and the multiple ligamentous attachments provide disc stability. Laterally, the disc is continuous with ligament tissue attaching it to the neck of the condyle [13]. While the cause of disc displacement is still under debate, an argument could be made, for many it is injury to the joint capsule and TMJ ligament complex. Anteriorly, the TMJ disc depends on the support of the joint capsule and TMJ ligament complex. If, for some reason, these became weakened, stretched, or torn, anterior disc dislocation would result.

3. PROLOTHERAPY

Prolotherapy, as defined by Webster's third new International dictionary, is "the rehabilitation of an incompetent structure, like a ligament or tendon, by the induced proliferation of cells." "Prolo" comes from the world proliferate. Prolotherapy injections proliferate or stimulate the growth of new, normal ligament and tendon tissue [14].

4. HISTORY

Hippocrates treated athlete's shoulder instability by initiating healing through inflammation and strengthening of the capsule of the shoulder, by a red-hot needle 2500 years ago [15]. Prolotherapists have a long history treating TMD since the time of Louis W. Schultz, in the year 1930's. In a paper he described just how common TMJ syndrome was and that the modalities of traditional treatments like appliances were effective. He described an easy method of shortening and strengthening the TMJ capsule by injection (later termed prolotherapy). He tested various solutions in animals until he found one that caused a strengthening of the ligaments that support the TMJ but caused no injury to other structures. Dr. Schultz taught the technique of TMJ prolotherapy to Gustav S. Hemwall, MD. The primary author has worked with Dr. Hemwall and eventually assumed his practice upon his retirement from medicine in 1996. After acquiring Dr. Hemwall's practice, Dr. Schultz's son came to the clinic for a prolotherapy evaluation. He commented that in his father's a few years of practice as a dentist, medical doctor, and surgeon, the procedure that gave him the most amount of satisfaction in treating a TMJ case was prolotherapy. While practitioners of Prolotherapy since the time of Dr. Schultz have commonly used prolotherapy for all sorts of TMD, even in cases not involving subluxation, no other studies have been done since that time [16].

5. INDICATIONS AND CONTRAINDICATIONS FOR PROLOTHERAPY

Prolotherapy being a therapeutic approach, it can be suggested as a treatment of choice in treating most of the TMD's. It's always a fact that every good as its own drawback, same hold well with prolotherapy i.e. it is contraindicated in several systemic disorders (Table 1).

Indications	Contraindications
Injury to tendons and ligaments	Allergy to Prolotherapy solution
Functional pain in joints	Active state of infection like cellulitis
Failure of oral appliances	Patient in anticoagulant medications
Failure of conservative management	Healing disorder, Bone disorder like arthritis
Patients contraindicate for surgeries	Haemophilia
To enhance recovery as an adjuvant to other procedures like oral appliances	Immunocompromised patients

Table 1: Indications and contraindications of prolotherapy [17,18].

Solution used in prolotherapy

Prolotherapeutic solution is a magical solution with multiple types of contents contains an osmotic agent, inflammatory mimetic and irritants which could be either physical or chemical (Table 2).

Agents	Composition
Osmotic agents	Dextrose with 1% lidocaine
Inflammatory mimetic	Sodium morhuate
Chemical irritant/Physical irritant	Phenol and pumice

Table 2: Agents used in the prolotherapeutic solution with its contents [2,16,18].

Types of prolothery techiniques

Since the ancient times many prolotherapeutic techniques have evolved. Stem cell prolotherapy is a recent advancement in this technique [18]. Few types of techniques are:

- Hackett-Hemwall,
- Subcutaneous,
- Platelet rich plasma,
- Prolozone
- Stem cell prolotherapy using either bone marrow or adipose tissue.

TECHNIQUE FOR TMJ PROLOTHERAPY

Prolotherapeutic approach is considered to be successful only if the basic protocols are followed without any compromise. The operator and patient position is very important in any procedure related to dentistry.

Patient position

The preferred patient position is supine or reclined posture to provide stability to head to decrease the risk of syncope. The head is turned to the opposite side away from the injection site.

Materials required

3 cc syringe, 25-gauge needle, 30 gauge needle, prolotherapeutic solution, and antiseptic solution.

Preferred solution

Dextrose is commonly used, because it causes less post injection soreness than fish oil and pumice. Pumice is difficult to inject.

Preparation of solution

A 3 cc syringe is taken, 0.75 mL of 50% dextrose, 0.75 mL of bacteriostatic water, and 1.5 mL of 2% lidocaine is drawn for individual TMJ region. Solution is drawn using 25-gauge needle to draw up the solutions speeds the process, then the needle is changed to 30-gauge and the syringe is shaken and the air expressed. The result is a dextrose concentration of approximately 12.5%.

6. PROCEDURE

First step in prolotherapy is locating the posterior joint space of TMJ. This is done by palpating the lateral pole of the condyle while asking the patient to open and close the mouth. Then the located area is cleansed with antiseptic solution. Area of target to inject solution is the depth of the depression that forms immediately anterior to the tragus of the ear as the condyle translates forward and down. This can be marked with a washable felt-tip pen, if desired (Figure 1). Then, a disposable bite block is placed between the patient's anterior teeth to keep the patient from closing the condyle back into the fossa and onto the needle. The injection needle penetrates the skin at the marked point and is directed medially and slightly anteriorly to avoid penetration into the ear. Slight negative pressure is exerted on the plunger to confirm that the needle tip is not in a vessel, even though no vessels of any size are expected to be encountered within the fossa. 1 mL of prolotherapy solution is deposited here.

The second target is the anterior disc attachment, where the disc connects to the superior portion of the lateral pterygoid muscle. Injecting the prolotherapy solution here can strengthen the tendinous attachment of this muscle to the disc at the same time the anaesthetic component of the solution anesthetizes and elongates the muscle, which can allow the disc to reposition itself over the condyle and often produces an immediate reduction in TMJ clicking. The target area, which is anterior disc attachment, is located and simultaneously location of posterior joint space is palpated (Figure 2). Location of the slight depression just anterior to the condyle when the mouth is closed is noted and this point is marked with washable ink. Marking this point before injecting the posterior aspect of the joint is advisable, as it becomes much more difficult to palpate this depression after the posterior joint recess has been injected. For this injection, the bite block is removed, and the patient is instructed to close gently, moving the condyle back into the fossa. Insert the needle at the marked point, again directing the tip medially and angulated slightly anteriorly to, or nearly to, its full one-inch length. Aspiration is performed and another 1 mL of prolotherapy solution is injected here.

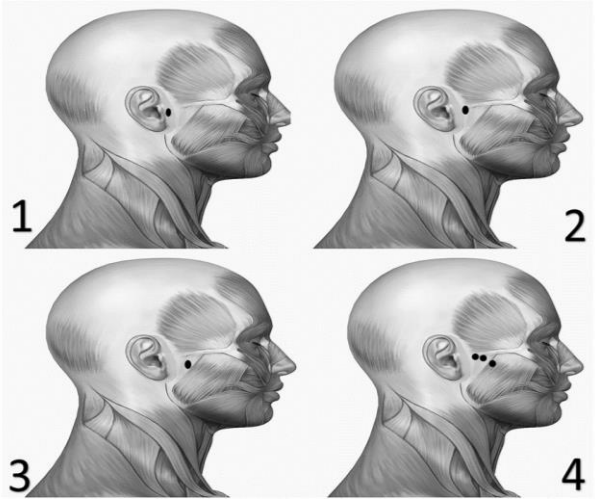

Figure 1 - Figure 4: Different injecting points.

The third target is masseter muscle. First palpate the masseter attachment along the inferior border of the zygomatic arch at the same time palpate and mark the posterior and anterior aspects of the condyle and mark the area of the masseter that is most tender to palpation (Figure3). Asking the patient to clench the teeth makes the masseter stand out, and the area that is most rigid to palpation is usually the most tender as well. The patient is told to relax the jaw, and the final mL is injected directly into this area, again at or near the full one-inch length of the needle. Marking all the injecting points before starting the first step always proved to be beneficial (Figure 4).

The injection sites are wiped with alcohol or antiseptics, which remove the washable ink as well, and a pulse is taken for the medical record and to confirm that the patient has relaxed and is ready for discharge. Usually injections are repeated three times, at two-week, four-week, and six-week intervals. This totals four injection appointments over twelve weeks. Palpate the joints for pain and noise, and palpate the affected muscles for pain, at each appointment. Measure the range of jaw motion intrinsically and record all these findings. Patients typically report some improvement after the first injection appointment but often have some increased discomfort shortly before the second appointment. The following appointments generally produce more benefit, quieter joints, and symptom relief without rebound [2].

7. COMPLICATIONS

Complications by prolotherapeutic procedures are very rare, yet the possible of complications cannot be ruled out. The most common complications reported in literature after the injection is allergy to solution. Dextrose being an extract of corn, can cause allergic reactions in few individuals. Even the allergy to lidocaine can cause allergy. There is possibility of Ptosis, due to diffusion of solution causing paraesthesia of lower eye lid. Since the procedure includes injecting the solution, patients can get anxious. Due to wrong positioning of the patient, syncope can be precipitated so it beneficial to

position the patient in supine position to avoid such complications. Extravasation with external bleeding and/or visible facial bruising can also be a complicated issue [2,19,20].

8. POST INJECTION MANAGEMENT

Precautionary measures mandatory after the injection sessions which include asking the patient to strictly take semisoft diet until the occlusion is regained. It is better to avoid rubbing, scratching, or irritating the anesthetized zone. Anti-inflammatory medications must be strictly avoided. Acetaminophen and opioid analgesics may be prescribed for the post-injection discomfort and to help manage coexistent pain disorders [15].

9. CONCLUSION

Evidences have proven the positive affect of prolotherapy in treating TMD. With the advancement of science, research need to be carried out to reduce the pain and discomfort. Avoiding narcotic drugs post treatment should be thought of and alternative method should be implemented. To conclude “Research can complicate the present yet simplify the future”.

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