

“Prolotherapy in Temporomandibular Disorders: an Overview”

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Abstract Prolotherapy reinitiates the inflammatory process thereby augmenting the natural healing process of the body by stimulating fibroblastic activity. It is a promising approach in the management of TMDs, especially in refractory cases where conservative management has failed and in patients where surgical management is not possible. The osmotic agent used is dextrose. It produces a hypertonic extracellular environment causing lysis of adjacent cell walls resulting in migration of the macrophages and granulocytes to the area, thus initiating the process of localized inflammation and fibrous healing.

Keywords TMD, Prolotherapy, Inflammation, Dextrose, Regenerative Injection Therapy

the use of medical resources, decreasing pain intensity and managing associated depression and anxiety[5]. Published studies of pain reduction after treatment in multidisciplinary pain clinics report pain reduction ranging from 14-60%[6,7]with an average pain reduction of between 20-30%[8]. Other treatment outcome criteria include reductions in addictive medication, reductions in the use of health care services, increased activity (including return to work) closure of disability claims. Thus providing effective treatment for chronic pain is challenging and individuals suffering from chronic pain often seek care from many different practitioners and may be willing to submit to treatments that may complicate the problem or be harmful which can result in more suffering and disability[9].

1. Introduction

Pain has been defined by the Task force on Taxonomy of the International Association for the study of pain (IASP) as “An unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage”. Merskey describes chronic pain as persistent pain that is not amenable as a rule, to treatments based on specific remedies or to the routine methods of pain control such as non narcotic analgesics[1]. Chronic pain is now recognized as a complex disorder that persists past the normal time of healing and as pain persists, psychosocial issues including depression, maladaptive beliefs about pain, medication abuse, strained interpersonal relationships and ineffective coping strategies become prominent aspects of the disorder[2].

Chronic Pain management is often seen as a low priority among health care providers; it is perceived as complicated, time intensive and often ineffective[3]. Ineffective medications are often overprescribed, repetitive examinations are conducted in an attempt to find a simple anatomic problem that is causing the pain and comorbidities are ignored[4]. Treatment goals usually focus on managing medication misuse or abuse, increasing function, reducing

2. A Unique Approach in Chronic Joint Pain

Among the multitude of reasons that exist for chronic pain the pathetic persistent pain of joints has been a universal challenge to existing treatment modalities – medical, surgical and alternate therapies. Overcoming this challenge in rescuing the senile joint pain as well as the stress related joint pain experienced by round the clock professionals today is a scientific advance surpassing the existing standard anti inflammatory regimens and the modern surgical methods. The history of this promising therapy for the pathetic joints dates back to 1939 when the pioneers of this therapy – Gustav Hemwall and George S Hackett practiced a therapy which created a favorable environment for inflammation and augmented the natural healing process of the body. This promising approach is referred to as Proliferation injection therapy/ Regenerative injection therapy popularly known as Prolotherapy[10].

The biological process of wound healing is initiated by inflammation. The inflammatory cells – (granulocytes, monocytes, macrophages) migrate to the injured tissue site. Subsequently growth factor is released which activates fibroblasts to produce a matrix with new collagen fibrils. The current therapeutic modality in the form of anti inflammatory

regimens decreases pain and swelling but unfortunately diminish the healing response as they reduce inflammation.

“Prolos” means to stimulate growth. Thus Prolotherapy reinitiates the inflammatory process and thereby augments the natural healing process of the body by stimulating fibroblasts proliferation and thereby strengthening the joints, tendons and ligaments[11].

3. Prolotherapy and Temperomandibular Disorder

The term Temperomandibular disorder(TMD) is a collective term embracing a number of clinical problems that involve the masticatory musculature, the Temperomandibular joint(TMJ) and associated structures or both[12]. These disorders are characterized by a) facial pain in the region of TMJ and or the muscles of mastication b) limitation or deviation in the mandibular range of motion c) TMJ sounds during jaw movement and function[13].

Although the cause of most TMD remains idiopathic yet certain hypothesis have been proposed such as the relationship of occlusal disharmony and TMD[14]. Also a muscular cause not directly related to occlusion was proposed in 1950's[15-17]. However advances in diagnostic imaging in late 1960's led to intracapsular reasons[18-19]. Ultimately since perfect standardized methods for assessment, classification and treatment do not exist TMD had always remained a challenge and researchers have attempted to explore several management modalities and Prolotherapy is one such evolution[20].

4. Prolotherapy Technique[20]

Patient Posture and Head 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.

Preinjection Procedure and Selection of Injection Tools

Before administering injection – the anatomic landmarks are marked after cleaning the related skin area with appropriate antiseptic. A 3cc syringe with 30 gauge needle and 1 inch length is preferably chosen.

Articular Injection Approach

Patient Position, Needle position and Injection Frequency Protocol

Access to the Superior joint space is attained by asking the patient close the anterior teeth on a small bite block or 2 thickness of dental cotton rolls which enables translation of the mandibular condyles down the glenoid slope of the anterior fossa.

The needle penetrates the skin midway between tragus of ear and posterior aspect of condyle. It is directed superiorly and anteriorly towards the apex of the fossa into the Superior joint space where contact is made with periosteum. As contact is made with periosteum into the joint capsule slight momentary resistance is felt. If excessive resistance is felt then the needle is withdrawn slightly and redirected to ensure that the injection is superficial to but in contact with periosteum.

A common schedule is at an interval of 2, 4 and 6 weeks over a total of 12 weeks.

Post injection Bleeding and Protocol

The injection site is observed for bleeding after withdrawing the needle. Generally the bleeding is minimal and direct pressure stops the bleeding within seconds. A similar procedure is repeated on the opposite side if it is affected. The patient is allowed to rest for a short interval. The pulse is recorded. Patient's comfort is assured and reappointment is scheduled.

4a. Alternate approach in TMD and Secondary injection sites[21,22]

In case of TMD, generally disc displacement is in anterior/anteromedial direction and is associated with elongation of posterior discal ligaments wherein 1cc of solution is injected posterior to the partially translated condyle. The needle is directed anteroposteriorly parallel to the plane of tympanic bone to avoid penetration into the ear. Occasionally if the anterior discal ligaments and superior lateral pterygoids are involved then the incisal bite stop is removed and the patient is asked to bite on the posterior teeth lightly and then following it 1 cc of solution is injected anterior to the palpated condyle. It is directed inferior to the glenoid eminence and zygomatic arch. The needle then is directed anteromedially parallel to the mediolateral contour of the articular slope.

Masseter origins/insertions, Long/short tendons of the temporalis muscle on the coronoid process, stylomandibular region from retromandibular border approximating superior to the gonial angle directing the needle anteriorly close to the medial aspect of the mandibular body towards the stylomandibular ligament attachment. An universal protocol is to inject with the tip of the needle against the periosteum avoiding injecting under the periosteum

4b. Post Injection Problems: Side effects and Adverse effects

Temporary posterior open bite due to distraction of the condyle and mandible inferiorly following the injection of fluid into the articular space. In addition to it, the local anesthetic effect makes the patient susceptible to biting the tongue or buccal mucosa in that region[23].

Temporary anesthesia occasionally extending upto the eye leading to ptosis. Bleeding episodes (extravasation with external bleeding) associated with bruise in the face. Occasionally syncope in anxious patients which can be minimized by supine positioning [24-26].

4c. Post Injection Instructions[27]

Diet and Patient care

- Semisolid diet atleast for 3 days until posterior occlusion is re-established.
- Avoiding rubbing/scratching/irritating the anesthetized zone
- Use of eye drops until ptosis affected eyes become motile.

Avoid anti Inflammatory Agents and Ice

To allow the mechanism of prolotherapy that is based on inflammation. Acetaminophen and opioids can be given if there is a definite necessity

A signed informed consent about post injection problems is always better

5. Follow Up and Prognosis [28]

The prognosis of Prolotherapy is checked after 12 weeks. Occasionally if improvement is not noted, it should be borne in mind that sometimes fibrous tissue proliferation may be delayed by about 18 months

6. Proliferant Solution in Prolotherapy[29, 30]

The proliferant solution comprises of four important constituents. They include Osmotic agent, inflammatory mimetic, chemical irritant and physical irritant.

Osmotic Agent

The osmotic agent used is Dextrose. About 12.5% of Dextrose solution is commonly used. It is prepared by diluting 50% dextrose with 1% methyl paraben (preservative) free lidocaine and with bacteriostatic water. This helps in prevention of iatrogenic infection. 1 part of 50% dextrose; 2 parts of 1% lidocaine; 1 part of bacteriostatic water is the preferred ratio. Since dextrose is a corn product, dextrose should not be used for patients who are allergic to corn.

Mechanism of Action

Dextrose produces a hypertonic extracellular environment and thereby causes lysis of adjacent cell walls. As a result there is release of cellular proteins, inflammatory breakdown products of cell wall and debris which bring macrophages and granulocytes to the area. Thus the process of localised inflammation and fibrous healing begins.

Inflammatory Mimetic

Sodium morhuate serves as the inflammatory mimetic. It is derived from fatty acids in the fish oil. It mimicks the activity of intracellular inflammatory agents which attracts

the macrophages, granulocytes to the injection site.

Chemical and Physical Irritant

Phenol and pumice flour serves as the physical and chemical irritants respectively. They attract macrophages and granulocytes by either foreign body reaction or by cell wall damage/alteration

7. Indications for Prolotherapy[31]

- Objective evidence of a tendinous or ligamentous injury or disorder ; Pain in the joints under load during function.(Pathological point of view)
- Willingness of the patient to undergo the injection therapy irrespective of discomfort(Patient point of view)
- In refractory cases where conservative management – medical, physical, dietary, home care therapy have failed. Failure of Oral appliances and unwillingness to wear them. Patients in whom surgical management is not possible. (Alternate option of treatment)
- To enhance recovery as an adjuant to other treatment procedures such as Oral appliances(Adjuant Treatment)

8. Contraindications for Prolotherapy[32]

- Allergy to the components of Prolotherapy solution.
- An active state of infection.
- A healing disorder.
- A condition associated with excessive bleeding eg. Hemophilia
- A malignant condition.
- Existence of parafunctional habits. Eg. Bruxism in which the parafunctional habit needs treatment before Prolotherapy

9. Conclusion

Prolotherapy follows the principle of biological process of healing by reinitiating the inflammatory process by stimulating fibroblasts proliferation and thereby strengthening the joints, tendons and ligaments. It is this mechanism of prolotherapy that finds its use in management of TMDs as an adjuvant or an alternative treatment modality. Thus Prolotherapy is an efficient, simple and conservative method to treat temporomandibular disorders such as joint sounds, joint pain, hypermobility, locking, hypermobility[33, 34] The success of prolotherapy and the need for additional therapy necessitates a judicious approach with patience.

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