

Regenerative Injection Therapy: Prolotherapy

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ABSTRACT

Background: Temporomandibular joint disorder (TMD), a collective term used to describe a group of medical disorders causing temporomandibular joint (TMJ) pain and dysfunction, is the most prevalent orofacial pain. The treatment modalities for the chronic TMJ cases are quite diverse and changes according to the etiology of TMD disorders. Nowadays, people look for other possibility other than surgery and one of the options is 'prolotherapy,' - the regenerative injection therapy. This paper is an outline of this new alternative therapy.

Keywords: Prolotherapy, Proliferants, TMD, TMJ pain.

INTRODUCTION

Temporomandibular joint disorder (TMD) a collective term used to describe a group of medical disorders causing temporomandibular joint (TMJ) pain and dysfunction is a frequent cause of orofacial pain.¹ The TMJ is susceptible to degenerative changes and pathologies noticed in other synovial joints, as a result of the frequent and monotonous stresses that the TMJ undergoes. The prime treatment modality in TMJ pain typically includes:

- resting the jaw
- relaxing the jaw muscles
- doing jaw exercises as recommended by a physical therapist.

If the above mentioned fails then generally anti-inflammatory (NSAIDs) drug is recommended. On the other hand, overuse of NSAIDs may delay healing and its use is debatable in treating musculoskeletal injuries.¹ Thereby, 'prolotherapy' is a possible substitute in the management of TMD. Since age augmentation of tendon, ligament, and joint healing is achieved by proliferative injection therapy (prolotherapy), also known as regenerative

injection therapy (RIT).^{2,3} The prime implementation of prolotherapy requires injections at tendon and ligament insertions along with a drug to initiate proliferation of fibrous tissue to heal and strengthen the fibro-osseous junction (foj).^{4,5} Researches prescribe prolotherapy to manage temporomandibular dysfunction (TMD).⁶⁻⁸

History of prolotherapy

Hackett⁹ started practising joint injections in 1939. Studies done by David Shuman, Earl Gedney, D.D.S, M.D¹⁰ proved TMJ prolotherapy injections with beneficial results. Furthermore, joint injection incorporated in a comprehensive textbook on injection therapy,¹¹ and prolotherapy has been the upcoming topic of several lectures and presentations.^{12,13}

Mechanism of action

An overview of the wound healing activity is important to understand the mechanism of prolotherapy. Stages of wound healing:

- inflammatory

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- proliferative
- remodeling stages.

Inflammation commences the biological process of wound healing¹⁴.

injury



granulocytes migrate into the injured tissue



monocytes and macrophages gets attracted



growth factor is released



activates the fibroblasts



new collagen fibrils is formed

Inflammation plays a prime role in soft tissue healing and the efficacy of NSAIDS to hinder the healing response has been reported in experimental situations and has been noticed clinically¹⁵. On the other hand, prolotherapy encourages the inflammatory process and initiates the healing process. histological studies have showed fibroblast proliferation originating in the periosteum following injection of the prolotherapy solution¹⁶.

Prolotherapy Technique

It includes a single injection or a series of injections, and is mixed with a local anesthetic. In each session, this solution is injected to treat the painful and tender ligament and tendon insertions and in the adjacent joint spaces¹⁷. Patient posture and head position to lower down the risk of syncope the most favorable patient position is supine or reclined posture so that the head is stabilized. the head is positioned away from the injection site.¹⁸ Pre-injection procedure and selection of injection tools prior the procedure the area is cleaned properly with antiseptic solution . then with the help of a 3cc syringe with 30 gauge needle and 1 inch length is chosen to perform the

procedure¹⁸. 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.¹⁸ The schedule is at an interval of 2, 4 and 6 weeks over a total of 12 weeks.

Various proliferant solution and their mechanism of action:¹

- irritants phenol :p2g (phenol, glycerin, and dextrose) it directly alkylate the proteins on the surfaces of cells.
- particulates: pumice attract the macrophages
- osmotic shock agents: hypertonic dextrose (12.5 to 25%) act by dehydrating cells at the injection site
- chemotactic agents: sodium morrhuate cod liver. it oil attract inflammatory cells
- growth factors: rbc-rich plasma. it stimulates proliferation

Proliferant solution in prolotherapy^{19,20}

The four important constituents are :

Osmotic Agent : agent used is dextrose(12.5%). it is prepared by diluting the following agents :

- 1 part of 50% dextrose
- 2 parts of 1% lidocaine
- 1 part of bacteriostatic water

This helps in prevention of iatrogenic infection. patients who are allergic to corn should not be given dextrose as it is derived from corn.

Mechanism of action:

dextrose

produces a hypertonic extracellular environment



lysis of adjacent cell walls



release of cellular proteins, inflammatory breakdown products of cell wall and debris

↓
attracts macrophages and granulocytes to the area

↓
inflammation and fibrous healing

Inflammatory mimetic:

Agent is "sodium morhuate". extracted from fatty acids in the fish oil. it replicates the action of intracellular inflammatory agents which draws the attention of macrophages, granulocytes to the injection site.

Chemical and Physical irritant:

Physical irritant: phenol

Chemical irritant: pumice flour.

They draws the attention of macrophages and granulocytes by either foreign body reaction or by cell wall damage/alteration.

Follow up and Prognosis ²¹

Healing process of prolotherapy is inspected after a period of 12 weeks. Under unusual circumstances , if development is not seen, then it should be kept in mind that sometimes fibrous tissue proliferation may be retarded by about 18 months

Indications for prolotherapy²²

- objective evidence of a tendinous or ligamentous injury or disorder; pain in the joints under load during function.(pathological point of view)
- patient's compliance to undergo the injection therapy
- 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)

Contraindications of prolotherapy^{23,24}

- immunocompromised patients, smokers, poor nutritional status.
- needle phobia.
- allergy to a proliferant solution.
- acute infections such as cellulitis, local abscess or septic arthritis
- relative contraindications include current and long term use of high doses of systemic corticosteroids or nsaid, as these are counterproductive to the inflammatory process.

Future prospective

Researchers are working on the fact to lessen the discomfort caused by inflammatory response. furthermore, with the help of genetic engineering, chemotactic and polypeptide growth factors are researched to be used as a substitute. in the near future, it is expected that prolotherapy could be used causing less discomfort and inconvenience to patients²⁵

CONCLUSION

This regenerative injection therapy could ease joint pain, strengthen joint stability and range of motion. The encapsulation of the TMJs and the minor role of innocuous drugs introduced into the TMJs during prolotherapy amplify the safe usage of TMJ injections. Studies included in this paper document to the efficiency of prolotherapy as a better and reliable modality for the treatment of TMD.

"The Groundwork Of All Happiness Is Good Health....."

Leigh Hunt.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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