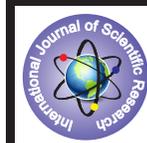


Prolotherapy Revisited: a Therapeutic Adjunct For Tmds



Medical Science

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ABSTRACT

The most commonly reported chronic pain conditions are corresponding with musculoskeletal dysfunction and degeneration. The most important cause of joint instability is the ligament injury, which leads to symptoms like pain. However, standard therapeutic regimens have failed to be effective in chronic conditions as they do not treat the underlying cause. Hence, this is where prolotherapy comes into picture. Prolotherapy is also known as nonsurgical ligament/tendon reconstruction, or sclerotherapy. The ligaments and tendon become weak over a course of time which leads to inflammation. Prolotherapy by using a sugar based solution is injected into the affected area whereby it causes increase in the blood supply and nutrients which stimulate the tissue repair. Through this review we are trying to highlight that prolotherapy can be regarded as an alternative therapeutic modality that can reduce or eliminate pain by stimulating the natural regenerative processes.

INTRODUCTION

The Temporomandibular Joint (TMJ) functions uniquely in that the condyle both rotates within the fossa and translates anteriorly along the articular eminence. Thus the joint is referred to as "ginglimodiartrodial": a combination of the terms ginglymoid (rotation) and arthrodial (translation).¹ The TMJ is an articulation between the mandible and cranium. The mandibular condyle, glenoid fossa and the articular eminence forms the TMJ. In earlier times, disorders of masticatory system were regarded as one condition or syndrome with no differentiation of subtypes of muscle or joint disorders. With the advancement in understanding of the anatomy, it has become possible and which may lead to better prognosis with effective treatment modalities. The term Temporomandibular disorders (TMDs) is a collective term embracing a number of clinical problems involving masticatory muscles, Temporomandibular joints and associated structures, or both.² The signs and symptoms of TMDs are pain, joint noise, deflection or pain, limited range of motion and locking. As there are many etiologic factors associated with TMDs, the diagnosis and treatment becomes a bit complex. Even the largest academy

dedicated exclusively to the diagnosis and treatment of TMD, the American Academy of Craniofacial Pain, has only about 900 members out of the 150,000 currently licensed dentists in the U.S, and only about 15 percent of these members limit their practices to TMDs.³ Hence, Prolotherapy may be regarded as an excellent choice for patients suffering from TMDs not responding to other treatment modalities. On reviewing literature it has been seen that patients after undergoing treatment with Prolotherapy when biopsied showed significant results in increase in collagen fibres and ligament diameter.

HISTORY

The history of Prolotherapy dates back to ancient times, involving the stimulation of inflammatory cells via injection of stimulant solutions. Egyptians used the earliest form of prolotherapy to treat lame animals by "branding" or hot iron cautery in the 18th century. Hippocrates recorded the first use of prolotherapy in humans in 400 BC by using a hot poker in the axilla to repair a dislocated shoulder.

Alfred A.L.M. Velpeau, considered the father of prolotherapy, in the year 1835, injected a patient with an iodine solution to treat hernia. ⁴Rene Leriche injected ligaments with procaine demonstrating pain pattern from ligament laxity and injury.⁵ George

S. Hackett, a trauma surgeon from Ohio in 1940 expanded the concept of tendon, injury and ligament and was the first to coin the term, "prolotherapy". Prolotherapy derived from a latin word 'proli' meaning offspring, "proliferate"- to produce new cells in rapid succession.⁶⁻⁸

PROLOTHERAPY APPROACHES

Prolotherapy has always been attractive for patients as well as physicians as it promotes natural body healing and uses no medication that can cause future side effects. It is a treatment method that requires injection of proliferant solution (dextrose, ethanol) into the tendon and ligament. Proliferative solutions cause increase in the blood supply and increase in the fibroblast activity and collagen growth.⁹

VARIOUS TYPES OF PROLOTHERAPY

Hackett Hamwell (Dextrose) Prolotherapy

It incorporates techniques of George S. Hackett and Gustav A. Hemwall. This technique utilizes an inflammatory concentration of dextrose 12.5 to 25%. The injections are given around the painful areas and the importance is given in treating all tender areas and resolving joint instability by treating ligaments and joint stabilizing structures. It is administered every four to six weeks for growth of new connective tissue.

Subcutaneous Prolotherapy/ Neurofascial/Neural Prolotherapy

Involves the injection of 5% dextrose in subcutaneous tissue to induce healing. The injections are given underneath the skin at the location of sensitized peptidergic nerves. These nerves are sensitized because of trauma, injury or constriction and represent sites of inflammation.¹⁰ Dr. George Hackett in 1950 first termed neurogenic inflammation as "inflammatory neuritis".¹¹

Plasma Rich Prolotherapy (PRP)

PRP gained a lot of acceptance in 1930. It usually involves injecting of concentrated platelets, which release growth factors to stimulate recovery in nonhealing soft tissue injuries.¹² PRP contains platelets, where growth factors like platelet-derived growth factor, transforming growth factors etc. have their effect on fibroblasts and other immune cells that accelerates the regeneration of injured tissues.^{12,13} After autologous blood collection, blood is centrifuged and the plasma rich in growth factors is injected into the area.¹⁴ Prolotherapy is administered every one to two months for a period of one to six visits.

Stem Cell Prolotherapy

Stem cells have the capability of regenerating into any type of body tissue.

The amazing thing about stem cells is that when you inject them into the body, they know what kinds of cells your body needs – for example, meniscus cells or cartilage cells. This therapy involves autologous transfer of pluripotent stem cells from the bone marrow as the proliferating solution. Stem cells have the ability to repair injured and inflamed cells. It is indicated in extreme cases where dextrose solutions have failed to produce any effect. The stem cells can be found in all tissues of the body in various quantities but with major reserves in the adipose tissue and the bone marrow.¹⁵

Prolozone

It is a type of prolotherapy technique in which ozone gas is used along with therapeutic substances to stimulate healing. The concentration of ozone gas used is 3-4%. Numerous studies published so far have documented the analgesic effect of ozone in arthritis.^{16, 17} Being an oxidising agent, it has found to anti-inflammatory effect. Prolozone therapy is administered weekly for three to twelve times and can also be used alongside dextrose prolotherapy.

MODE OF ACTION

“Prolo” means “to proliferate.” It is also known as “Regenerative therapy” and involves the injection of the proliferating solutions which causes local aseptic inflammation, increases the stem cells concentration and which causes acceleration of the fibroblast transformation. As a result new collagen synthesis markedly increases. Thus, the process of localised inflammation and fibrous healing begins.

RATIONALE FOR TREATMENT

Concentrated dextrose/lidocaine injections into the ligament
Inflammation
Deposition of collagen
Decreased pain and stability

Procedure of Prolotherapy

Patient Posture:

Supine or reclined for stability. The head is turned as far as possible, opposite the injection site.

Preinjection preparation:

The skin is cleansed and prepared with an alcohol wipe and a 30 gauge needle is used. A 12.5% dextrose solution is used most often as it causes less post injection soreness.

Injection approach

The patient is asked to close the anterior teeth on a small bite block. The needle then penetrates the skin midway between the tragus of the ear is directed superiorly and anteriorly toward the apex of the fossa, into the superior joint space, where contact is made with the periosteum. The injection site is observed for any signs of bleeding after withdrawing the needle.

The standard regimen is to repeat the injections three times, at two weeks, four weeks, six weeks.

Proliferants used in Prolotherapy are:

Chemical irritants:

Mild chemical irritants: phenol or tannic acid, initiate the healing process by attaching themselves to the walls of the cells wherever they are injected. Thereby, causing inflammation which stimulates the body to produce collagen and start the healing process.

Chemotactic agents are proliferants that attract macrophages

directly to the injected area (e.g., Morrhuate Sodium, a fatty acid derived from cod liver oil). These macrophages (cells in the body) “clean up” debris associated with inflammation.

Osmotic agents work by causing cells to lose water, leading to inflammation and consequently stimulation of the healing response. Dextrose and glycerin are two of the main ingredients in prolotherapy solutions.

Particulates such as pumice flour are microscopic particles, attract macrophages. The macrophages secrete growth factors which results in collagen production.

INDICATIONS OF PROLOTHERAPY

- Degenerative joint diseases
- Ligament injury
- Myofacial pain syndrome
- Tendinopathy
- Complex regional pain syndrome¹⁸
- Fibromyalgia
- Muscle origin pain and tears
- Recurrent subluxation or dislocation of the joint.

CONTRAINDICATIONS

- Allergic to prolotherapy solution
- A healing disorder
- A malignant disorder
- Bleeding disorders

SIDE EFFECTS OF PROLOTHERAPY

Prolotherapy being an invasive technique carries certain risks like:

- Trauma From Needle
- Temporary change in occlusion
- Pain Stiffness
- Bleeding
- Bruising
- Swelling
- Allergic and Anaphylactic Reactions may occur due to the solutions injected.

ADVANCEMENT TO KNOWLEDGE

Many new developments have occurred in the regenerative orthopaedic medicine of which Neural prolotherapy is one. In Conventional prolotherapy the main concentration was on ligament tendon healing. But, with neural prolotherapy the concentration has been shifted to subcutaneous nerves as the source of pathology. The introduction of low dose dextrose solution in the subcutaneous nerves can prove to be a new breakthrough in the treatment of pain by taking the healing profession to another level.¹⁹

CONCLUSION

In the end, I would like to conclude by highlighting the fact that prolotherapy by no means may be regarded as the ultimate remedy from all musculo-skeletal disorders. But being a novel method in alternative pain treatment can be very effective when combined with integrative pain management programmes. Thus, prolotherapy may be regarded as a coherent, simple yet effective method in relieving temporomandibular joint disorders.

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