

PATIENT EDUCATION AND SELF-ADVOCACY: QUESTIONS AND RESPONSES ON PAIN MANAGEMENT

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Prolotherapy

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ABSTRACT

Questions from patients about analgesic pharmacotherapy and responses from the authors are presented to help educate patients and make them more effective self-advocates. The topic addressed in this issue is prolotherapy and a discussion and its history, types, indications, side effects and treatments.

KEYWORDS proliferative therapy, prolotherapy, regenerative injection therapy, tendonopathy

QUESTION FROM A PATIENT

I'm an active 45-year-old woman with on-and-off low back pain for the past 2 years. The pain has been getting much worse. I have tried all the usual remedies without success. My friend mentioned a treatment call prolotherapy. How does it work and would it be effective for my back pain?

ANSWER

Prolotherapy as defined in Webster's *Third New International Dictionary* is "the rehabilitation of an incompetent structure, such as a ligament or tendon, by the induced proliferation of new cells."¹ Prolotherapy involves the injection of solutions at the point at which tendons and ligaments attach to the bone, to cause an inflammatory reaction. Inflammation starts the regeneration and repair of the injured tissue in and around the joint to promote tissue repair or growth. It can be used years after the initial pain or problem began, as long as the patient is relatively healthy.

Many different types of musculoskeletal injuries and pain (e.g., low back and neck pain,

chronic sprains/strains, whiplash injuries, tennis and golfer's elbow, osteoarthritis, and chronic tendonitis/tendinosis) potentially can be treated with prolotherapy.²

History

The concept of creating irritation or injury to simulate healing was described as early as the fifth century BC. During this time, Hippocrates (460–370 BC) treated unstable joints by poking the ligaments with a hot metal rod.³ Although the procedure was rudimentary and experimental, Hippocrates hypothesized that causing inflammation of injured ligaments would lead to self-repair. This was one of the first steps towards using the body's own healing mechanism to repair connective tissues.

In the 1940s, a trauma surgeon in Ohio, George S. Hacket, MD, expanded the concept of tendon (connects muscle to bone) injury and ligament (connects bones to other bones) looseness to chronic musculoskeletal pain. He was the first to coin the term "prolotherapy." The name prolotherapy comes from the word "proli-" (Latin) meaning offspring; "proliferate"—to produce new cells in rapid succession.^{4–6}

Epidemiology

The incidence of musculoskeletal pain is rising in epidemic proportional across the globe. In the United

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States, 9–20% of adults suffer from chronic musculoskeletal pain at any one time.⁷ There are currently 15 million individuals who are limited from one daily activity by musculoskeletal pain, and that number is estimated to reach 67 million people by 2030.⁷ Nearly all people with chronic pain have a substantially reduced health-related quality of life, with 42% unable to work due to pain and 63% unable to engage in routine activities of daily living.⁷

Mechanism of Action

There are many different types of prolotherapy. They range from the use of hypertonic dextrose or sugar (12.5–25%) solution, subcutaneous (under the skin injections) prolotherapy, platelet-rich plasma (concentrated platelet cells taken from the patient's own blood) prolotherapy, and stem cell (precursor cells for all the other cell types of the body) prolotherapy using either bone marrow or adipose (fat) tissue.⁸

Prolotherapy strengthens ligaments and tendons by the stimulation of growth factors via the inflammatory healing cascade. An increase of glucose concentration causes an increase in cell protein synthesis, DNA synthesis, cell volume, and proliferation. This, in turn, stimulates ligament size and mass, tendon hypertrophy, extracellular matrix, ligament-bone junction strength, and repair of articular cartilage defects. The increase of glucose concentration from prolotherapy injections causes cells to produce different types of growth factors. These growth factors are pertinent to the repair, health, and growth of tendons, ligaments, and other soft tissues.⁹

Indications

The goals of prolotherapy are to improve support, improve function, and reduce pain. After a careful history and physical examination, those patients who have undergone conventional medical management may benefit from this type of treatment. Conventional treatments for back pain are rest, ice/heat, physical therapy or home exercise program, behavioral modifications, and nonopioid pain medications.

The indications for prolotherapy are nonspecific mechanical pain resulting from ligament or tendon injury from trauma, repetitive sprain injury, or collagen deficiency. The diagnosis is made on a clinical basis: pain from pressing on superficial ligament and joints or from patient history. The indication for prolotherapy may be pain that has failed to respond to other, more conservative treatments.

The contraindications to prolotherapy are non-musculoskeletal pain, metastatic cancer, septic joints

or cellulitis, systemic inflammation, spinal anatomical defects, morbid obesity, bleeding disorders, chemical dependence, low pain threshold, and whole-body pain.¹⁰

Treatment

The treatments typically involve six to eight weekly injections of 23–30-mL solutions of dextrose and local anesthetic. The injections are done in an office-based setting. The injections are accompanied by manipulation and instructions to perform joint exercises for several weeks. Before the procedure, patients are advised to avoid any type of nonsteroidal anti-inflammatory medications (e.g., ibuprofen, naproxen) 3 days prior to the procedure. This is because the goal of prolotherapy is to cause inflammation to promote healing. Nonsteroidal anti-inflammatory medications stop inflammation.¹⁰

Patients may receive topical anesthetic gels with or without sedation for the procedure. These anesthetic gels help to numb the area where the injections are performed. While palpating the affected area, tender sites are targeted by using a small-gauge needle directed at the injured ligaments or tendons. After the procedure, patients are advised to limit their activity for the first few days. This is to allow them to recover from the procedure. They can use acetaminophen (Tylenol) for pain if needed and are usually sent home with range-of-motion exercises.¹⁰

Complications

The most common side effects related to prolotherapy are a temporary (12–96 hours) increase in pain, stiffness, and bruising at the injection site. Other possible side effects include headache, nausea, diarrhea, and minor allergic reaction to the medication. Rare injuries include lung collapse, disc injury, meningitis, hemorrhage, and nerve damage.¹¹

Review

A systematic review of prolotherapy for all conditions yielded 42 studies published since 1937, which consisted mostly of case reports and case series. The effectiveness of prolotherapy for chronic pain was reported in two national Cochrane Collaborations published in 2004 and 2007. There is inadequate evidence to recommend prolotherapy as a sole treatment for low back pain. However, the overall conclusion showed that, when combined with spinal manipulation, and exercise, prolotherapy may

improve chronic low back pain and disability. The current most promising indication for prolotherapy appears to be in the treatment of tendinopathies. Early studies indicate promising results in the treatment of osteoarthritis, but further clinical trials are needed before recommendations can be made.¹²

Use

There have been many famous people who have gone through prolotherapy for various injuries and pain symptoms. C. Everett Koop, a pediatric surgeon who went on to become the U.S. Surgeon General during the Reagan administration, found relief from neck and arm pain by using prolotherapy. Most recently, prolotherapy has been used to treat many professional athletes such as football players Hines Ward and Troy Polamalu, and golfer Tiger Woods, to name a few.

Conclusion

Prolotherapy is a low-risk injection therapy that uses the body's self-healing mechanisms to improve structure and function via strengthening ligaments and tendon structures. Because prolotherapy is a treatment modality that may provide a solution to a patient's pain symptoms, it may be beneficial prior to long-term opioid therapy or surgical intervention. The use of regenerative injection therapies will continue to expand with further research, advances in treatment strategies, and an increasing demand for modalities such as prolotherapy, platelet-rich plasma (PRP), and stem cell treatments for different types of pain treatment.

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