



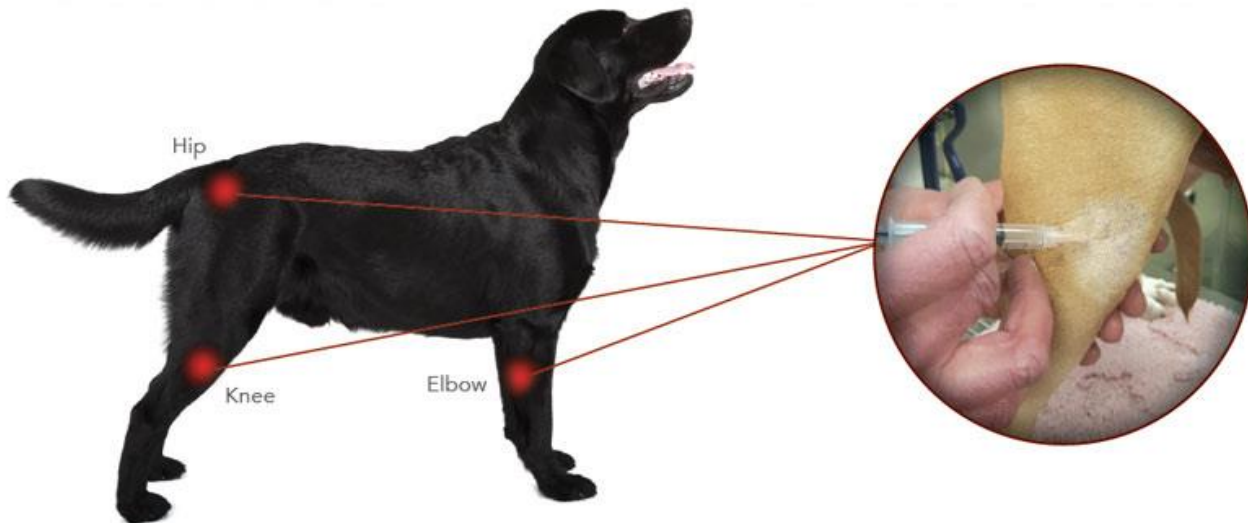
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Promoting Healing with Prolotherapy

By Carvel G. Tiekert, DVM

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Prolotherapy is not a new method for treating pain. The concept of irritating tissue to promote healing dates back to the ancient Greeks and our old friend Hippocrates. He treated Olympic javelin throwers with unstable shoulders by touching what he described as a “slender hot iron” to the ligaments holding the shoulder joints together. The heat would irritate the ligament capsules, causing them to tighten up. Prolotherapy is sometimes known as regenerative injection therapy, nonsurgical ligament reconstruction, and more inaccurately as sclerotherapy.

A LONG HISTORY

The prolotherapy techniques we use today were developed in the 1930s by G.S. Hackett, MD, a surgeon from Ohio, along with other MDs and DOs.¹ These techniques have been used for decades to successfully treat pain resulting from ligament laxity. Hackett coined the term “prolotherapy” because his initial work demonstrated that the tissue laid down during the healing process was new healthy tissue, not scar tissue. (This distinguishes prolotherapy from a related treatment known as sclerotherapy.) “Prolo” stands for proliferative, implying that new cells and collagen fibers are proliferating and growing. The term “regenerative injection therapy”, used by some practitioners, is fairly new and an attempt to portray more accurately what is actually taking place physiologically.

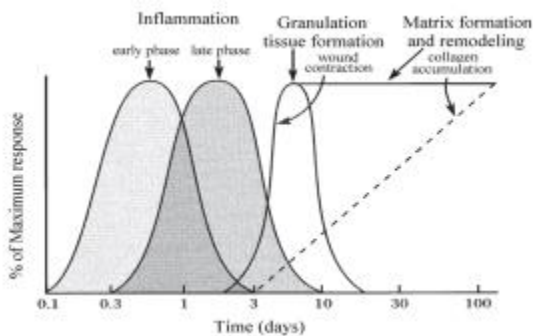
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SCIENTIFIC EVIDENCE

Hackett showed that by creating controlled inflammation, permanent increases in ligament size (35% to 40%) resulted. He reported an 82% patient-reported cure rate for backache in a series of 1,600 patients treated with prolotherapy. His final examinations were performed from two to 12 years following the conclusion of injection therapy, thus indicating the permanency of the treatment.

More recent studies have confirmed Hackett's initial studies. In 1983, Liu (et al) injected a proliferative solution (sodium morrhuate) into rabbit MCLs (medial collateral ligaments of the knee). The ligaments showed a significant increase in ligament mass, thickness, ligament-bone junction strength, and weight-to-length ratio compared to controls.² This effect was confirmed by Maynard (et al) in 1985 in his study on Achilles tendons in rabbits.³ Reeves and Hassenein showed long term benefits for anterior cruciate ligament laxity using dextrose prolotherapy.⁴ Prolotherapy is widely used in the human field, and studies have been published in the Journal of Prolotherapy as well as other medical journals.



PHYSIOLOGY OF PROLOTHERAPY

In a sense, prolotherapy creates an injury. Figure 1 shows schematically what happens during healing. Cellular debris and humoral factors at the injury site attract an initial influx of granulocytes. The granulocytes proceed to secrete a number of factors, among them proteolytic enzymes, which debride the wound area and attract other cells. Ultimately, fibroblasts are recruited and stimulated to produce new intracellular matrix, including new collagen. As the collagen is produced, it creates tissue remodeling, strengthens the area, and causes the wound contraction seen in Figure 1. This contraction, resulting from the production of new collagen/ ligaments, creates a tightening of the wound, a reduction in joint laxity and therefore a reduction in pain. The whole process is called the wound healing cascade, and in the very basic model briefly described above, is characteristic of all healing wounds.

Prolotherapy in Horses

For years, pinfiring and blistering (oddly enough called counter-irritants) were commonly used techniques in horses. They were essentially a type of prolotherapy. They have since fallen into disrepute, and have been replaced by prolotherapy injections for equine lameness.

TECHNIQUE AND APPLICATIONS

Prolotherapy is one of the simplest therapies you can use, but to be successful, it is critical that you know anatomy. It will not be effective unless the solution gets into the ligament, and the boney interface of the ligament.



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In our practice, we use 15% dextrose as our predominant injection solution into the ligaments, and 25% into the joint. Some practices add ozone (prolozone), as it is a highly reactive molecule that helps stimulate the production of new collagen.

When injecting, it is important that you put many small blebs into the ligament rather than one or two large amounts. We usually use a 27 gauge 1¼" needle for most peripheral joints and the spine. I will use an even smaller needle, usually 30 gauge, on very small dogs, and sometimes a 25 gauge needle in larger dogs.

I use prolotherapy extensively for cruciate problems in small dogs, and in what I perceive to be partial cruciate tears in larger dogs. I inject many small blebs of the solution into the retinaculum, and into the lateral collateral ligament, paying particular attention to where it attaches to the bone. When dealing with cruciate problems, I also inject directly into the joint. In this case we use 25% dextrose solution.

It is my personal opinion that this is not an appropriate therapy for dogs over 30 to 40 pounds that have a severe cranial drawer, particularly if there is a meniscal click. I take those dogs to surgery. Since cranial cruciate rupture in the dog is a symptom of chronic disease, in most cases it stands to reason that the rest of the ligaments are not likely to be in the best of shape. Therefore, I do prolotherapy on the contralateral stifle at the same time we do surgery on the affected stifle.

I use prolotherapy for problems along the spine, predominantly for lumbosacral issues. Anesthesia has not been needed in any patients injected from the thoracolumbar to the lumbosacral areas.

I have used prolotherapy at multiple other places in the body where there has been ligament damage. I have also used it for arthritic joint issues, based on the supposition that part of the reason the joints became arthritic was because of weak ligaments and secondary joint instability. Our clinical experience of improved function and well-being in these patients has been rewarding.

We do not need to use anesthesia in most large dogs, but many small dogs and cats require sedation or anesthesia for prolotherapy.

Our success rate with partial cruciate tears and spinal problems from the thoracolumbar area to the lumbosacral has been very high.

I normally repeat the treatment two to four times, at about four week intervals, although I have had many cases show a dramatic response after a single treatment. It is usually suggested, however, that at least four to six weeks are needed to allow the healing process to follow itself through. Rarely, some dogs will have some level of pain after the procedure. It is critical that if you are going to medically treat the pain, you do not use nonsteroidal anti-inflammatories since they will defeat the purpose of the therapy. We recommend acetaminophen instead.

Case Report

Boris belonged to one of the clinic's technicians. He'd had bilateral cruciate damage for several years, and while he could walk without too much difficulty, he didn't want to do very much. After his first prolotherapy treatment, he went up and down the steps without any apparent discomfort. After his second treatment, his owner reported that after a snowstorm, he flew off the deck to play with the other dogs, something he hadn't

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done for several years. Because Boris responded so dramatically to prolotherapy, we did only those two treatments.

CONCLUSION

Prolotherapy is an easy procedure that can significantly improve the mobility of any species. Rather than merely masking the pain, it actually results in long term improvements and performance enhancement. While sedation or anesthesia may be needed in some patients, this therapy can be considered for the healthy maintenance of performance animals and geriatrics, as well as for pain relief in all species.

¹ Hackett, George D; Hemwall, Gustav A; Montgomery, Gerald A. *Ligament and Tendon Relaxation Treated by Prolotherapy* (fifth edition).

² Liu, U.K; Charles, M; Tipton, Ronald D; Matthes, Toby G; Bedford, Jerry A; Maynard; Harold C. Walmer. "An In Situ Study of the Influence of a Sclerosing Solution in Rabbit Medial Collateral Ligaments and its Junction Strength". *Connective Tissue Research*, 1983, Vol. II, p. 95-102, Gordon & Breach, Science Publishers, Inc.

³ Maynard, J.A; Pedrini, V.A; Pedrini-Mille, A; Romanus, B; Ohlerking, F. "Morphological and Biochemical Effects of Sodium Morrhuate on Tendons". *Journal of Orthopaedic Research*, 3:236-248, Raven Press, New York, 1985.

⁴ Reeves, K; Dean M.D; Khatab M. Hassenein, PhD. "Long Term Effects of Dextrose Prolotherapy for Anterior Cruciate Ligament Laxity". *Alternative Therapies*, May/June 2003.