

Prolotherapy

A shot against chronic pain

by Gordon Ko, MD

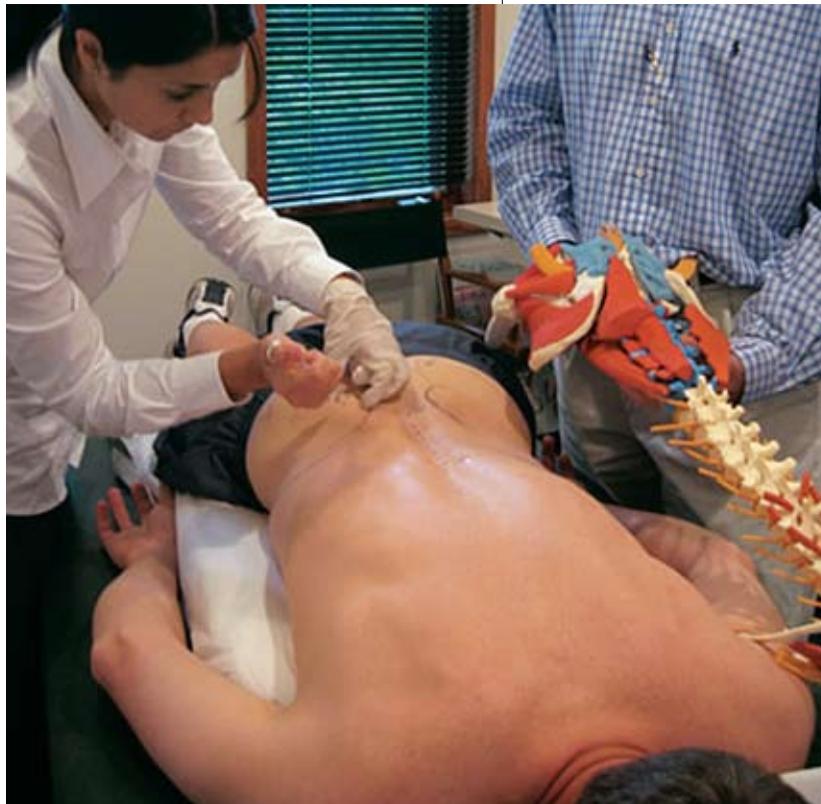
IRRITATE TO STIMULATE — that’s the principle behind prolotherapy, a medical procedure that involves the injection of agents designed to promote healing. The approach has been used since the 1930s for the treatment of chronic musculoskeletal pain such as lower back pain — particularly sacroiliac joint dysfunction — and chronic tendonitis/tendonosis of the shoulder, elbow, knee, ankle or temporomandibular joint. The injections raise the levels and/or effectiveness of growth factors and thus trigger the repair of soft tissue, e.g. ligaments and tendons. Because the therapy stimulates the body to heal itself, it’s a long-term solution rather than a palliative or suppressive measure.

What’s injected?

The term prolo stems from the Latin word “proles,” meaning “to stimulate growth.” Indeed, prolotherapy involves the injection of proliferant agents that promote healing in one of three ways:

- by osmotic rupture of local cells, e.g. hypertonic dextrose (12.5-25%)
- by local cellular irritation, e.g. a mixture of phenol, glycerin and glucose (P2G)
- through chemotactic attraction of inflammatory mediators, e.g. sodium morrhuate (cod liver oil extract)

Other, more aggressive formulations such as zinc sulfate and pumice are no longer commonly used. Newer approaches include centrifuging the patient’s own blood and re-injecting the “platelet enriched plasma” back into partially torn tendons or ligaments under ultrasound guidance.



Revival of an old remedy

In a sense, the principle of prolotherapy goes back thousands of years. Hippocrates, the father of modern medicine, was recorded to treat dislocated shoulders of soldiers with red-hot needle cauterization to stabilize the joint. The first modern day physician to report on prolotherapy was George Hackett, a general surgeon who made a chance discovery during hernia surgery: he noted that injections done “at the junction of ligament and bone (usually in error) resulted in profuse proliferation of new tissue at this union.” He then spent the

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FIGURE 1



Rabbit tendons showing a 40% increase in diameter and a doubling of strength for those that had been injected with a proliferant (right) compared to the non-injected control sides (left).

Used with permission from: Hauser R. Prolo Your Pain Away, 2nd Ed. Beulah Land Press, Oak Park, IL, 2004.

Prolotherapy tricks the body into initiating a new healing cascade with migration and activation of fibroblasts

rest of his career developing and refining the injection techniques, which ultimately led him to publish “Ligament and tendon relaxation treated by prolotherapy” in 1958. He treated 543 patients with chronic low back pain — they were between 15 and 88 years of age, with pain duration from 4 to 56 years — and reported an 82% success rate. His patients considered themselves cured over periods ranging up to 12 years at follow-up. But thanks to Mixer and Barr’s widely respected work on disc herniation and subsequent development of CT and MRI technology, the focus shifted away from such injection techniques and on to surgical procedures. We now know that disc herniation isn’t as common a cause of back pain as previously thought, and that as many as 27% of individuals without symptoms show a lumbar disc protrusion on MRI. Yet, the revival of prolotherapy is still in its infancy. Even in medical schools today, there’s no teaching on this approach and few if any physicians have heard of it.

From inflammation to innovation

Prolotherapy has been called many names; for instance, it’s sometimes referred to as regenerative injection therapy or non-surgical tendon, ligament and joint reconstruction; another variant is growth factor stimulation injection. An older term was sclerotherapy, which suggested that scar formation was the treatment mechanism — as in the Hippocratic cautery. But biopsy studies haven’t found scar tissue; rather, they observed the formation of new, normal, thicker and stronger connective tissue.

One of the best-studied mechanisms stimulating this growth is that of a temporary, low-grade inflammatory response to the injection. This reaction is instigated at the site of ligament or tendon weakness, i.e. at the fibro-osseous junction. It tricks the body into initiating a new healing cascade with migration and activation of

fibroblasts, formation of new collagen — in areas where this process had been prematurely aborted or never started — and subsequent reinforcement of the previously weakened connective tissues.

Does it work?

Since Hackett’s studies on rabbit tendons (see Figure 1), several animal and human laboratory studies have demonstrated the strengthening of ligaments and tendons with prolotherapy injections. There have also been clinical reports and studies, including double-blind randomized placebo-controlled trials (RCT) for low back pain. Interestingly, the 2-year Yelland study found positive effects for both the dextrose- and saline-injected groups. This suggests that even the needle itself may have a proliferative effect on ligaments. Other well-designed RCTs have been published for knee pain and finger osteoarthritis — all showing significant beneficial effects with prolotherapy. Favourable case series have also been documented for groin injuries in elite soccer players, neck pain related to motor vehicle collisions and fibromyalgia.

Our nearly 20-years’ worth of clinical experience in using an integrative approach for chronic pain finds that prolotherapy works best in safely treating mechanical back pain due to sacroiliac joint ligamentous laxity. My first year physiatry resident (and chiropractor MD) is currently working on a retrospective analysis of patients from the last 5 years whom we’ve treated for this condition with the preferred sodium morrhuate proliferant.

Who’s eligible for prolotherapy?

When you consider referring a patient for this treatment, it’s important to rule out more serious diseases that might be causing the symptoms, such as cancer, cauda equina syndrome, aneurysm or infection.

Continued on page 70

CASE PRESENTATION

Mrs. P., a 45-year-old married computer worker, was referred by her family physician for treatment of her severe chronic low back pain. Clinical exam revealed old polio, i.e. an atrophic small flail right arm and shorter, thinner left leg (Figure 2), as well as marked tenderness in the left sacroiliac (SI) region. The shear test for SI instability revealed 2+ laxity. Nerve root tension tests were negative and electromyography showed only chronic neurogenic changes. Blood work and bone scan were negative for active sacroiliitis. After trials of physiotherapy, chiropractic and orthotics (leg-length correction), she received monthly prolotherapy injections — with phenol-glycerin-glucose (P2G) and lidocaine — to the SI ligaments for 6 months.



Polio patient with chronic low back pain

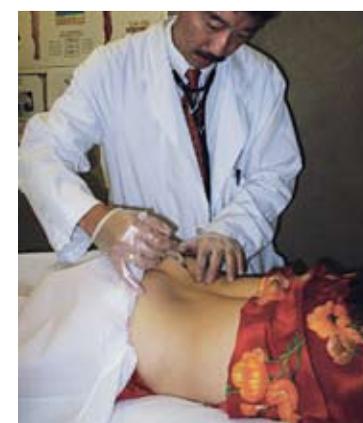
OUTCOME:

She improved to the point where she could work full-time in a prolonged sitting position. Also, she was able to exercise more effectively than before, i.e. without back pain flare-ups, and joined a gym to

train regularly with a personal trainer.

Mary returned 2 years later for a tennis elbow complaint and was pleased to report continued relief from her back pain. Prolotherapy was also effective in resolving her elbow pain.

	pre R	post R
Visual analogue scale for pain (VAS)	8/10	4/10
Short-form McGill pain questionnaire	24/45	19/45
Pain disability index	44/70	24/70
Oswestry low back pain score	37/50	15/50



Treatment for left sacroiliac joint pain



Treatment for tennis elbow

CHRONIC LOW BACK PAIN...

- is the leading cause of disability in people under age 45
- is the third most common disability in adults over 45

ACUTE LOW BACK PAIN...

- goes on to cause chronic disabling pain in 5% of people
- causes recurrent episodes of lumbar pain in 60% of cases

(Ferguson SA et al. *Spine* 2000; 25:1950-6)

Just a click away

■ The Canadian Centre for Integrative Medicine: www.MusclePainRelief.ca

■ Dr. Ko's physician education website: www.NeuropathicPain.ca

■ American Association of Orthopaedic Medicine, with a link to training workshops for prolotherapy: www.aaomed.org

■ The Canadian Association of Orthopaedic Medicine: www.caom.ca

Continued from page 68

It's also useful to have the patient go through a course of manual therapy with an experienced chiropractor or physiotherapist first — someone with a FCAMT and/or osteopathy specialization would be best. The following criteria may then be used to select those who are most likely to respond to prolotherapy.

There are symptoms and signs of ligamentous laxity. This includes the “theatre/cocktail party syndrome,” where the back pain is more pronounced when the person is staying in a prolonged sitting or standing position. Other clues of joint-ligamentous dysfunction include clicking, cracking, popping and/or grinding sensations, and recurrent subluxations or dislocations. Sacroiliac joint laxity often occurs after trauma, such as a slip and fall on the buttock, a car accident with the foot on the brake at the time of impact, or a difficult pregnancy and delivery. It can also be the result of wear and tear in runners and may happen after a spinal fusion, as the areas above and below the fusion take on greater stress.

Manipulation therapy provides temporary relief. Ideally, seek feedback from the physical therapist — statements such as “the joint feels unstable” are important clues. In some with sacroiliac instability, bracing with the Serola belt will provide improvement.

The person is in good nutritional status. Collagen formation requires key co-enzymes including vitamin C, zinc and iron. You should order blood work including serum B₁₂ (optimal would be > 540 pmol/L), 25-hydroxy-vitamin D (optimal 100-160 nmol/L) and serum ferritin (make sure there's no iron deficiency). The omega-3 profile can also be done (ideal AA:EPA ratio < 3). Smokers, the obese and those with severe immune compromise will take longer to respond or may not respond at all.

The patient agrees to stop non-steroidal

anti-inflammatory drugs while undergoing prolotherapy, as these will interfere with ligament healing and regeneration. Take special care with patients on blood-thinners; good tissue compression is important in these cases.

The individual is motivated to undergo treatment. Patient response may be limited by psychiatric instability, needle phobia, litigation and disability claims. Prolotherapy is a procedure that isn't covered by provincial health plans but may be paid for by extended health insurance plans. The average person will require four monthly injections with a maximum of six injections total.

Assisted healing

Effects are best when prolotherapy is combined with FCAMT physiotherapy and focused exercise. It's also a good idea to avoid excess joint manipulation. Post-injection soreness and stiffness is common for the first 3-5 days — such discomfort may be managed with acetaminophen, tramadol or opioids. Regular exercise is encouraged but patients should stay away from excessive high-impact activities. Ligament healing may further be promoted with a good diet, including adequate protein, good fats such as omega-3 fatty acids, and avoidance of refined carbohydrates.

For those who have severe neuropathic pain and central sensitization, pre-prolotherapy treatment with meds such as pregabalin and cannabinoids (nabilone, cannabidiol) is helpful. If the joint has stabilized but there's still ongoing pain, fluoroscopic-guided joint denervation may help. Correction of abnormal muscle biomechanics and posture with electromyography-guided and ultrasound-assisted injections of botulinum toxin type-A is also a very useful adjunct to prolotherapy. **PE**

See page 105 for references

PROLOTHERAPY

Continued from page 70

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