VALLEY SPORTS PHYSICIANS & Orthopedic Medicine

Regenerative Injection Therapy (Prolotherapy)

An Innovative Injection Procedure for Treating Chronic Ligament and Tendon Injuries

Sports Medicine
Non-Surgical Orthopedics
Osteopathic Manipulation
Sports Rehabilitation
Physical Therapy

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Regenerative Injection Therapy (RIT), also known as Prolotherapy, is a minimally invasive injection procedure that stimulates the body's natural healing mechanisms to repair chronically damaged ligaments and tendons. In Prolotherapy, the damaged ligament or tendon is injected with a substance that either directly or indirectly causes a small amount of local tissue irritation or inflammation. The resulting inflammation triggers the body's natural repair processes to strengthen the existing tissue and to enhance the growth of new tissue.

Before learning more about RIT, it is important first to first learn about damage to ligaments and tendons and the role of the body's inflammatory and healing process.[1,2,3,4]

LIGAMENT LAXITY AND TENDINOSIS

Ligaments and tendons are cable-like structures that allow you to walk and move without falling apart. Ligaments connect bone to bone and tendons connect muscles to bone.[5,6] These structures are flexible, but they do not stretch very far. Injuries, such as when you sprain a ligament, twist a knee, take a bad fall, suffer whiplash, lift an object which is too heavy, or perform repetitive movements (whether as part of your job or as a sports activity), can tear or fray these cable-like structures. The injury typically causes some local inflammation, and the repair process is initiated. You know this process is happening when you feel the pain, heat, swelling, and have difficulty moving the injured joint.

If the healing process is completely successful, the ligaments or tendons will be restored to their normal strength and length, and you can return to your normal activities. If this healing process does not completely work, the ligaments or tendons may remain in a stretched or weakened state. This "stretched out" condition may cause pain and discomfort with movement or result in joint instability. Chronic ligament or tendon damage also can cause the surrounding muscles to tighten up and cause additional pain.

Ligaments and tendons are made up of many fibers arranged in parallel bundles, like a rope or cable (see Fig.1, photo A). The fibers are made of long-chain molecules called "collagen." (Glucosamine and chondroitin are some of the molecules that make up collagen.) The collagen fibers are held together by smaller chains or links. Sulfur is an important element in these cross-linkages.

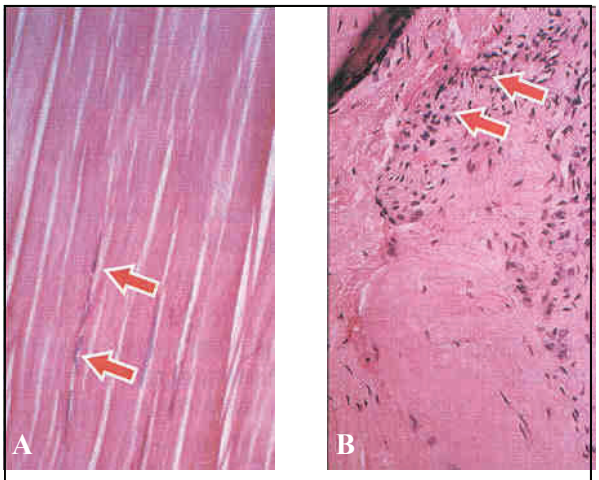


Figure 1. Photo A shows the normal parallel bundles of muscle fibers in a healthy forearm muscle. Photo B shows the degeneration and disorganization in the same muscle in chronic tennis elbow. (The arrow are pointing to different cell types.)

In chronic damage, there is a disruption of the normal parallel arrangement of the collagen fibers.[5,6] Persistently injured ligaments and tendons may have 30-40% fewer collagen fibers, and the fibers are in disarray or unorganized (Fig. 1, Photo B).

When a tendon is freshly injured, it is called "tendinitis." The "-itis" implies inflammation. But if the injury doesn't heal properly, the resulting condition is known as "tendinosis" or "tendinopathy."

Electron microscopic studies have clearly demonstrated that degenerative ligaments and tendons do not contain cells of inflammation. Studies have shown that sometime between 4-10 weeks after a tendon or ligament injury, there is no longer inflammation present. The resulting ligament or tendon is degenerated, weakened, and overstretched. Pain is still experienced, not because of inflammation, but because of the degenerative process.

HOW ARE THESE INJURIES DIAGNOSED?

In most cases, chronic ligament and tendon injuries are difficult or impossible to detect on MRI's, x-rays, CT scans, etc. (X-rays do not show ligaments or tendons at all—only bones.) That is because the imaging techniques currently available are not sensitive enough to detect the amount and type of damage present. (There are a few exceptions, which your doctor can review with you.)

Most often, the diagnosis is made on the basis of the history and the physical exam.

SYMPTOMS OF LIGAMENT LAXITY AND TENDINOSIS

Loose ligaments and degenerative tendons may produce one or more of the following symptoms:

- Significant tenderness when pressure is applied.
- An inability to maintain one position for prolonged periods of time, or repeated movement often relieves the pain. The initial movements are painful. This is in contrast to pain of nerve or muscular origin in which the pain is reduced with rest and worsened with movement. Degenerative tendons are more painful on initial movements after a period of rest, but the discomfort usually improves with use.
- Numbness or pins and needles sensation in a specific pattern that may closely mimic patterns of neurologic origin. Stroking the affected area is comfortable in contrast to true numbness of neurological origin in which stroking produces hyperesthesia (abnormally sensitive response) or dysesthesia (painful response).
- A sense of looseness or instability in the affected joint(s).
- Local and referred pain. Referred pain is pain from a structure that is felt at some distance away from the injured site. This may mimic so closely pain referred from neurological origin that only a careful history will tell the difference.

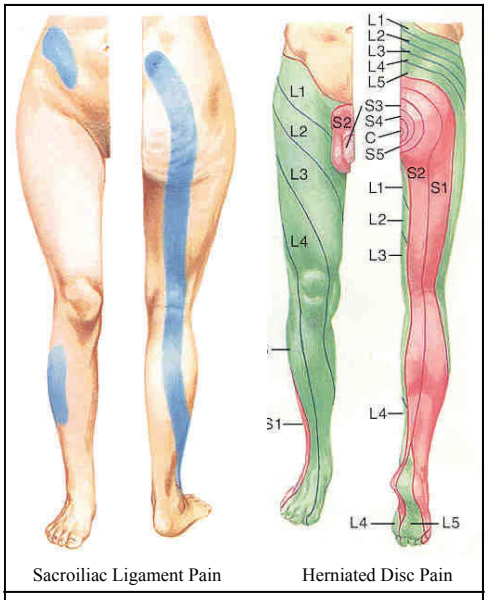


Figure 2. *The referred pain from a damaged low back ligament can look just like the pain from a herniated disc (sciatica).*

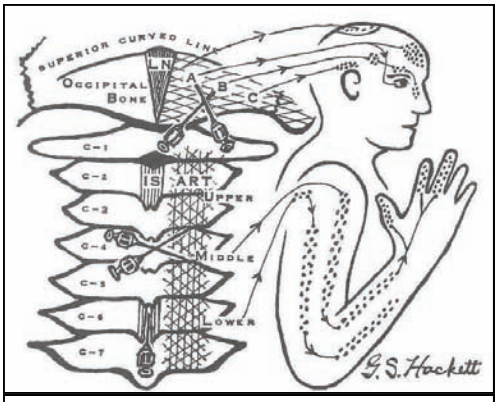


Figure 3. *Referred pain to the arm and head from various ligament structures in the back of the neck..*

- Muscle tightness and spasms are very common. The abnormal joint movement also creates many protective actions by adjacent tissues. Muscles will contract in an attempt to pull the joint back to the correct location or stabilize it to protect it from further damage. There is a tendency for physicians to treat the muscle spasms as the primary cause of the problem. Many medical treatments may be directed toward the muscular spasms, and not the primary cause - the ligament injury. If the joint is slightly out of place because of the ligament laxity, it may respond to treatment by manipulation, such as Osteopathic treatment or chiropractic. Such manipulative techniques may often give good relief and sometimes permanent relief.
- Trigger points that keep recurring in the same locations or that fail to respond to other treatment. Recurring trigger points may indicate that there is a problem elsewhere in the body that is causing the affected muscle(s) to keep forming trigger points.

If loose ligaments and chronically damaged tendons can lead to muscle spasm, loss of movement, and many painful sensations and feelings, what can be done? RIT is the only non-surgical treatment for chronically damaged ligaments and degenerative tendons. In order to understand RIT, one must understand how the body normally heals ligament damage.

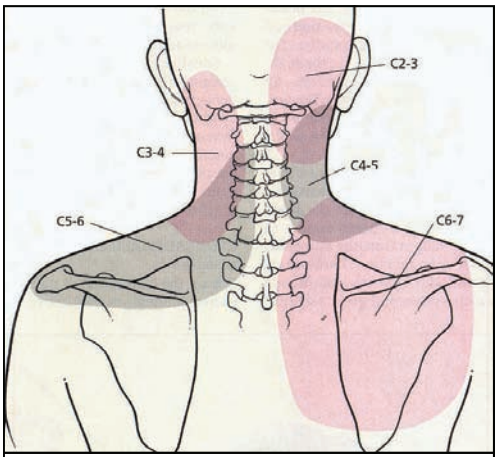


Figure 4. *Referred pain patterns from the facet joints in the neck*

INFLAMMATION:
The Body's Natural Healing Process

Inflammation has 3 distinct phases: the acute inflammation phase, the granulation phase, and the remodeling phase (see Figure 1).[7] This "Healing Cascade" is basic to all injuries regardless of the location, size or tissue involved. These three phases each have their own cellular and chemical processes. Each phase is dependent upon the previous phase for initiation of the next step.

Understanding inflammation is key to gaining an insight into how RIT works.

Phase I:
Acute Inflammation - Early and Late

The first phase is called acute inflammation and is about one hundred hours long. This step begins at the time of the injury, when the ligament and the adjacent cells are broken open and their contents spill at the wound site. The ligamentous and cellular debris attracts an influx of white blood cells called leukocytes. Their job is to clean out the area and prevent infection at the injury site. Many of the chemicals released during this phase will be broken down into messengers or chemical signals that tell other cells to become active or inactive during this phase. Some of these chemicals are called prostaglandins, which help to cause the pain at the injury site.

Phase II:
Granulation Phase - Tissue Repair

The leukocytes also secrete hormones that attract an important cell called the "*macrophage*." The arrival of the macrophages at the injury site signals the beginning of the next phase in the healing process, the granulation phase. Macrophages begin to "clean up" the area through a combination of digesting broken-down cell parts and secreting new enzymes, many of which break down many of the damaged ligament molecules. The macrophages also release a number of hormones which will bring more cells to the injury site.

The macrophages further release chemicals (growth factors) which stimulate

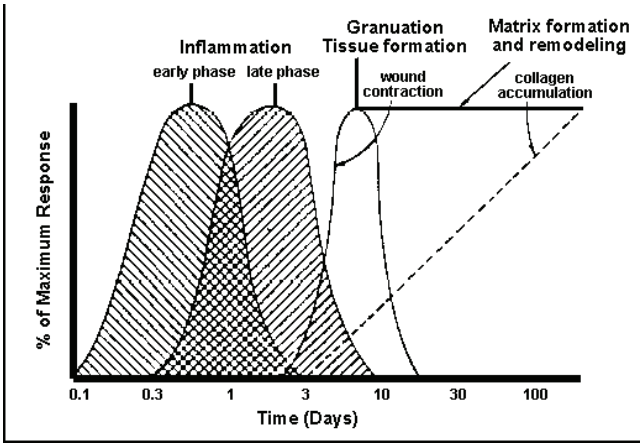


Figure 5. The Phases of Inflammation

the growth of new blood vessels, intercellular matrix, and the cells that will make new ligaments. These specialized cells that make ligaments are called *fibroblasts*. The fibroblasts are responsible for the actual repairing of the damaged ligament or tendon. They begin to make new collagen fibers—the basic building blocks of ligaments and tendons.

The combination of all these cells and the new blood vessels being formed causes the increased thickness and fullness that can sometimes be felt at the injury site. The granulation phase will be present for about ten days to two weeks.

Phase III:
Ligament Remodeling

The third phase of healing is called "wound contraction". During this phase, the new collagen deposited at the injury site will start to organize into a new strong and tighter ligament or tendon. The fibroblasts make single long molecule chains which begin to wrap around each other (like a braid), forming a collagen fiber.

As the collagen fibers wind around each other they begin to contract, and the chains therefore become shorter and tighter. Water is squeezed out (like squeezing a sponge), which also causes shrinkage. As the millions of collagen fibers lose water and shrink, the ends of the fibers will be slowly pulled together and the loose tendon or ligament begins to tighten.

It is important to move the injured joint during this phase. Gentle movement or activity will insure that the collagen fibers are organized correctly—along the lines of force—thereby providing the best strength. This third phase of inflammation lasts for a number of weeks, and the "new" tissue will not reach its maximum strength for several months. Therefore, your doctor should give you specific instructions regarding activity, such as exercise and work.

PROLOTHERAPY (REGENERATIVE INJECTION THERAPY)

Now that we understand what degenerative ligaments and tendons are and how the body's inflammatory process works, we can learn how injection therapy stimulates the body's own inflammatory process in a more controlled and less violent way than that which occurs during trauma or injury.

The technique of creating this inflammation and the subsequent creation of new collagen is done by injecting solutions known as proliferants.

Proliferants are nothing more than irritants that act directly or indirectly to stimulate inflammation or tissue production. These irritants break open the surface of the cell walls and allow the cell contents to spill out into the immediate and adjacent tissue spaces. This stimulates the healing cascade. A number of different solutions may be used, and they fall into one of 4 categories: osmotic shock agents, chemical irritants, chemotactic activators, and mechanical irritants.

Osmotic shock agents remove the water from the cells around the injection site. This irritates the tissue (similar to what happens when get salt or lemon juice in a open cut). In modern Orthopedic Medicine practice, the most commonly used osmotic shock agents are dextrose (a sugar) and glycerin. They are diluted with varying amounts of Novocain, typically resulting in concentrations of 12% dextrose or glycerine.

Chemical irritants directly irritate the tissue when injected. The most commonly used chemical irritant is phenol, as distant relative to alcohol. Phenol is rarely used by itself, however. It is most commonly mixed with dextrose and glycerine in a solution called "P2G."

Chemotactic activators directly "turn on" or stimulate the cells than cause inflammation. Sodium morrhuate, which is derived from cod liver oil, is the only chemotactic activator currently used by most physicians who do prolotherapy. It may be used by itself (when diluted with procaine), but more commonly it is mixed with other solutions. If you are allergic to shellfish or seafood, be sure to let your physician know, because you may also be allergic to sodium morrhuate.

Finally, rarely pumice (a powder of finely ground stone) may be used as a **mechanical irritant**. The grittiness of the powder irritates the tissue. (Don't worry, the body will eventually clear the powder out of the tissue.)

As noted above, all of these solutions are mixed with an anesthetic, usually procaine (Novocain®). The anesthetic helps take some of the sting or pain out of the injection and helps numb the injected area for a few hours. Also, any of these solutions may be mixed with each other, or the concentrations can be altered, depending on the clinical judgment of the physician.

In addition, often the skin and underlying tissue where the injection(s) will be given will be numbed up with either a small injection of lidocaine or a freezing spray, in order to minimize any discomfort from the prolotherapy injections.

Most often these solutions are injected at the fibro-osseous junction, that is, the site where the ligament or tendon attaches to bone. In rare instances, such as Achilles Tendinosis, the solution may be injected directly into the tendon.

The discomfort of RIT, because it is an "artificial" injury, is an important signal that healing is underway. The pain, swelling, heat and redness caused by the injections will vary from person to person and are all signs that the underlying cellular and chemical processes are safely underway. The body's pain signals can be listened to, and as the pain decreases, the joint movement can increase.

WHY DIDN'T MY BODY HEAL PROPERLY THE FIRST TIME?

Physicians and scientists do not understand all the reasons for poor healing. The injured area may not have been protected properly or long enough after injury. The nutrition of the patient during healing may have been inadequate. Smoking and diseases such as diabetes can affect healing. Or the healing process was itself hindered by the use of medications such as ibuprofen or prednisone.

Aspirin and other non-steroidal anti-inflammatories (NSAIDs), such as ibuprofen, Advil, Motrin, Aleve, Naprosyn, Celebrex, etc., can suppress the natural healing response by interfering with key metabolic

pathways. These drugs are frequently prescribed because they reduce pain and are thought to be a safe conservative treatment modality. At the very least these medications can have serious side effects such bleeding problems or increased risk of gastrointestinal ulcers.

More importantly for healing, though, an increasing amount of research is demonstrating that injured ligaments and tendons treated with NSAIDs are weaker and more prone to failure than those not treated with NSAIDs. In one recent study, five surgically repaired rotator cuff tendons that had been subsequently treated with NSAIDs completely failed to heal, and the other NSAID-treated tendons failed under much lower loads than non-treated tendons.

In 2002, a study in the American Journal of Sports Medicine, showed that NSAIDS further weakened injured ligaments by 30% after just 10 days of use.[8] Some doctors believe that continued regular use of NSAIDS may actually lead directly to tendinopathy and ligament laxity.

PROLOTHERAPY BOOKS:

Ligament and Tendon Relaxation Treated by Prolotherapy. George S. Hackett, MD, Gustav A Hemwall, MD, and Gerald Montgomery, MD.

Diagnosis and Injection Techniques Using Orthopedic Medicine. Thomas Dorman MD

Pain Pain Go Away and Instant Pain Relief. William J. Faber, DO, and Morton Walker, DPM.

Prolo Your Pain Away! Curing Chronic Pain with Prolotherapy. Ross Hauser MD

HISTORY OF RIT

RIT is not a new technique.. The concept of irritating tissue to promote healing dates as far back as the ancient Greeks. Hippocrates treated Olympic javelin throwers with unstable shoulders by touching what he described as a "slender hot iron" to the ligaments holding the shoulder joint together. The heat would irritate the ligament capsule, causing it to tighten up. (Interestingly, modern-day orthopedic surgeons use heat probes and lasers to do the same thing surgically!)

Prolotherapy was used in France to treat hernias before modern surgical techniques became available.

The techniques we use today were developed in the 1930's by G.S. Hackett, MD, a surgeon from Ohio, along with other MD's and DO's. The same techniques subsequently have been used successfully for pain relief from ligament laxity for nearly sixty years.

Hackett coined the term "prolotherapy" because his initial work demonstrated that the new 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" is fairly new and is an attempt to portray more accurately what is actually taking place physiologically.

BASIC SCIENCE EVIDENCE

George Hackett was the first to demonstrate clinically and scientifically a method of strengthening ligaments.[9,10,11] He showed that by creating controlled inflammation permanent increases in ligaments size (35-40 %) resulted.[9,10]

More recent studies have confirmed his initial studies. In 1983, Liu et al. injected a proliferative solution (Sodium Morrhuate) into rabbit MCL's (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.[12] This effect was confirmed by Maynard et al. in 1985 in his study on Achilles tendons in rabbits.[13]

In a human study in 1989, Klein et al. documented cellular evidence of new collagen growth when comparing pre- and post-injection sacroiliac ligament biopsies.[14] In a clinical study in 1988, Ongley used an established and reliable computerized instrument to demonstrate decreased ligament laxity and improved patient function after injecting P2G into ACL, PCL, MCL, LCL ligaments of the knee.[15]

CLINICAL EVIDENCE

RIT is gaining wider acceptance for the treatment of painful musculoskeletal conditions due to it's effectiveness and long lasting results.

In one study reported in 1987 in *Lancet*, the prestigious British medical journal, Ongley et al. gave 40 low back pain patients six RIT injection treatments using P2G.[16] At six months, 88% (35/40) of the treatment group (as compared with 39% (16 /41) controls) reported at least a 50% improvement in disability scores and reduction in pain. Furthermore, 15 patients in the experimental group were disability-free, compared to 4 in the control group.

In 1991, Schwartz and Sagedy reported a retrospective study of a series of patients treated with just a 3 injection series with P2G.[17] Overall, 91% (39/43) of patients reported at least 50% improvement. 47% (20/43) reported 95% improvement, 26% (11/43) reported 75% improvement, 9% (4/43) reported 66% improvement, 9% (4/43) reported 50% improvement, 1 reported 33% improvement, and 3 reported no improvement.

In 1993, Klein et al. in a randomized double-blind clinical trial using P2G found 87% (27/31) of patients reported at least a 50% or greater diminuation in pain and disability scores at 6 months post injections compared to 54% (19/35) in the control group.[18]

The effects of RIT appear to be long lasting. Hackett reported an 82% patient reported cure rate of backache in a series of 1,600 patients treated with RIT.[9,10] His final examinations were performed from 2-12 years following the conclusion of injection therapy thus indicating the permanency of the treatment.

THE RISKS OF PROLOTHERAPY

Treatment with RIT is not without risk, but serious complications are extremely rare, and the risks are very dependent on the site being injected.[2,3,4]

General Risks:

The intent of the technique is to create inflammation. Therefore pain, swelling, and redness may result and is in fact anticipated. The injections can also be somewhat painful because the fibro-osseous junction—the typical site of needle placement—is a tender area in many cases.

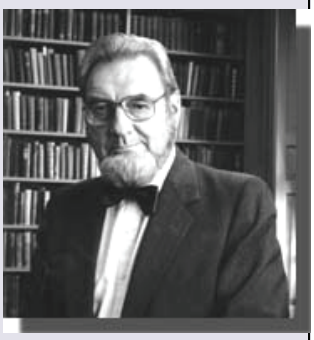
Anytime a person gets an injection, for whatever reason (including vaccination or getting blood drawn) there is a risk of infection, bleeding or nerve damage. Fortunately infection and nerve damage is very rare. Bruising at the injection site may occur.

A NEW "OLD" THERAPY FOR BACK AND JOINT PAIN

Former U.S. Surgeon General Dr. C. Everett Koop described his back and leg pain as 'incapacitating". "My pain was so severe when I lay down" said Koop, "that many nights I would go to sleep propped up with pillows leaning against a window sill".

Dr. Koop's Story

When Dr. Koop was in his forties, he was diagnosed with intractable back and leg pain. One evening at a banquet in Chicago, he complained about his pain to the person next to him. The individual pointed to a man seated at the end of the banquet table and told him there was a the doctor who could help him. Later that evening, Koop introduced himself to Gustav Hemwall, M.D. Koop told him about his condition and the pain he experienced. "I can help you" Dr. Hemwall said.



C. Everett Koop M.D.

After listening to Hemwall's explanation about prolotherapy, Koop underwent the treatment and has no longer been troubled with pain.

Based on his personal experience, Dr. Koop became an advocate of prolotherapy. He relates that as a practicing pediatric surgeon, he would sometimes observe the back and joint pain of the parents of his young patients. One day in particular he recalls noticing a young mother having difficulty putting on her coat. He asked about her problem and she responded she had bursitis in her shoulder. He asked is she would allow him to examine her. After doing so, he told her she did not have bursitis; rather the pain was from the nerves in her neck and shoulder. He told her about prolotherapy which eventually resolved the pain in her shoulder. Koop treated scores of parents in his pediatric practice with prolotherapy, never charging them.

(Reprinted from www. Originally appeared in *THE HEALTH RESOURCE NEWSLETTER*)

Allergic reactions have been reported only 24 times over the years. Based on the over half a million patients injected with RIT in the literature, the risk of allergic reaction appears to be 1 per 22,000 patients injected.

Site-Specific Risks:

Serious complications are very rare. Two deaths have been reported from RIT, but none in the last 25 years, due to the use of newer safer solutions.

In the spine, there is theoretical risk of injection into the spinal canal. And in the cervical spine there is a theoretical risk of damaging the vertebral artery. However, careful selection of needle sizes and proper injection technique markedly reduce these risks.

Even if phenol, a component of P2G, is injected into the canal inadvertently, it is unlikely to cause permanent nerve damage, since much higher concentrations of phenol are intentionally injected into the spinal canal to treat intractable pain syndromes. Klein's study[18] did report two cases of headaches resulting from inadvertent lumbar puncture, but both cases resolved completely without neurologic symptoms or permanent headache. One review reported 1 case of aseptic meningitis in 530,000 patient injections.

The most common potentially serious complication can occur when injecting around the ribs. The ribs protect the lungs. If the needle misses the rib and passes too deeply, it can cause a tiny pinhole in the lining of the lung. This can allow a small amount of air to leak out of the lung and become trapped between the lining of the lung and chest wall. This is known as a *pneumothorax*. It is not painful, but the symptoms are shortness of breath or a decreased ability to take a full deep breath. 28 cases of pneumothorax have been reported, with 2 requiring treatment with a chest tube in the literature (1 in 19,000).

When injecting in the arms and legs, temporary nerve injury may be a rare complication at injection sites where motor nerves are close to the ligament or tendon. These can be discussed with your physician.

At Valley Sports Physicians we have had only one complication from performing prolotherapy. In 1996 a patient sustained a pneumothorax following prolotherapy to a rib. He completely recovered without further complication. There have been no other serious or permanent complications in our practice, despite thousands of injections having been given since 1995.

Risk Summary:

RIT has been proven a safe therapeutic technique in well-trained hands. Changes in injection techniques and a move to safer solutions has eliminated virtually all serious side-effects. The physician performing prolotherapy must be properly trained. Courses, workshops, and prolotherapy training medical missions trips are available. RIT done by trained hands is an effective and safe treatment method for the pain and dysfunction of ligament laxity and tendinopathy, even in pediatric patients.

TREATMENT PROTOCOL

How Often Are Treatments Given?

While response to treatment varies, most people will require between 2 and 6 sets of injections. Each set of treatments is spaced between 2-6 weeks apart. We never give treatments more frequently then every 2 weeks.

In our office we typically plan on doing 3 sets of treatments initially. If there is no indication that the treatments are helping after 3 treatments, we usually stop treatment as it is unlikely they will help. If improvement starts to be noted, then treatments continue.

The point at which treatments are stopped is 1) the patient is markedly better (at least 80-90% improved); 2) There is no further improvement noted (you have reached a "plateau;" or 3) The patient is satisfied with their level of improvement and simply wishes to stop treatment.

How Many Treatments Are Needed?

There is no limit to the number of treatments you can have, and the risks and side effects do not change with increasing numbers of treatments. We have had patients

Finding Physicians Who Perform Prolotherapy

American Association of Orthopedic Medicine
90 S. Cascade Ave., Suite 1190
Colorado Springs, CO 80909
(800) 992-2063
www.aaomed.org

American College of Osteopathic Pain Management and Sclerotherapy (ACOPMS)
107 Maple Ave., Silverside Heights
Wilmington, DE 19809
(302) 792-9280

George S. Hackett Foundation
715 Lakes Street., Suite 605
Oak Park, IL 60301
(708) 848-7773

New Hope For Osteoarthritis?

Osteoarthritis (OA) is the most common form of arthritis. It is a "wear and tear" type of arthritis. When the layer of cartilage that protects the bony joint surfaces begins to wear down, more stress is placed on the bones. The thinning cartilage allows the joint space to narrow down or collapse, the once-tight ligaments that stabilized the joint now are loose, and the joint become increasingly unstable. This, in turn, allows more grinding of the bones against each other, and a vicious cycle begins.

A direct injury to a joint, such as a sports injury, can damage the cartilage directly and start the process in motion. Alternatively, the ligaments that support and stabilize the joint can be injured, resulting in joint instability, which then starts the same process. The bones grinding against each other causes bone spurs to form (similar to what happens to a wooden stake when you pound the top of it with a hammer).

Conventional medical treatment advocates the use of NSAIDs and cortisone injections to treat the symptoms of OA. But none of these help stabilize the joint—they only treat the symptoms. No studies to date have ever demonstrated that these treatments actually slow down or prevent arthritis changes. They only lesson the pain to various degrees.

In 2000, two randomized prospective double-blind placebo-controlled studies of dextrose prolotherapy were carried out specifically in osteoarthritic joints. In the first study, the focus was on osteoarthritis of the thumb and finger joints. Improvement in pain with movement of fingers improved significantly more in the group treated with dextrose prolotherapy compared to placebo.[19] Side effects were noted to be minimal.

In a second study focusing on knee osteoarthritis, after six dextrose injections of the knee, significant improvements were noted in pain (44 percent decrease), swelling complaints (63 percent decrease), knee buckling frequency (85 percent decrease), and flexion range (14 degree increase).[20] Interestingly, those knees that had loose ACL's (the anterior cruciate ligament—one of the main supporting ligaments inside the knee) showed a significantn tightening of the ligaments in the prolotherapy group. In fact, eight out of 13 dextrose treated knees with ACL laxity were no longer loose at the end of one year.

Even more impressive, independent analysis of x-rays showed that the x-rays of the untreated group all worsened over the 12 months of the study, while the x-rays of the prolotherapy group not only did not worsen over time but actually showed some cartilage regrowth!

need only one treatment, and we have had a few who needed 15 or more treatments spread over a 2-year period.

Each treatment session may consist of 1-15+ injections, depending on the specific diagnosis and injury.

We usually start with a milder irritant solution. We may increase the strength of the solution based on the patient's response.

If you are taking anti-inflammatory medications such as ibuprofen, Advil, Motrin, Aleve, Celebrex, or prednisone, these need to be stopped before starting RIT Your doctor will advise you. (Tylenol is allowed since it is not an anti-inflammatory.) .In addition, smoking is known to limit normal healing responses and you have a better chance of success if you stop smoking.

Other systemic chronic diseases, such as diabetes, poorly controlled thyroid disease, and certain hormone abnormalities may also hinder the healing response.

Age does not seem to have any significant effect. Also the length of time you have had your injury matters little (although other compensatory problems may arise the longer the injury goes untreated). More importantly, the degree of injury, which is difficult to know prior to starting the injections, is a more significant in terms how much improvement one can expect from treatment.

Prolotherapy Web Sites

Www.jockdoctors.com
www.aaomed.org
Http://fapm.med.new.net
www.prolotherapy.com
www.prolotherapy-rit.com
www.ongleyonline.com
www.caringmedical.com
www.dormanpub.com
www.getprolo.com
www.wheatons.com/prolotherapy.html
www.spine-health.com
www.correctivecare.com
www.thewellnessclinic.com
www.sonic.net
Members.aol.com/prolopain
www.prolo-therapy.com

When Will I See Pain Relief?

In most cases, patients will not see any pain relief after their first or second treatment. This does not mean that the treatment is not working. Rather it is an indication that the ligaments and tendons are not yet strong enough to stabilize the joints.

The amount of collagen growth required for stabilization of the joint is different for each person. A patient who experiences pain relief at rest but not during activity requires further treatment to strengthen the area. If RIT treatments are continued when there appears to be a positive response, there is an excellent chance of achieving total pain relief with the resumption of all previous activities. If no improvement is seen after the 3rd injection series, RIT is not continued.

The number one reason for partial pain relief with RIT is not completing the full course of RIT sessions. It is important that the patient does not become disappointed or discouraged if there is not yet any pain improvement after one or two sessions, especially in a person who has been in pain for many years.

Are There Special Instructions After I Get The Injections?

As noted above, you need to restrict the use of anti-inflammatory medications (NSAIDs) during the course of treatment. At a minimum, NSAIDs should not be used 3 days prior to injection and for the first 10 days after injection.[4] The use of NSAIDS does not preclude treatment however, since clinical benefit occurs in patients who are on regular prednisone treatment for other medical conditions.

For the discomfort following each treatment session, most patients only need some extra-strength Tylenol. Rarely patients may need stronger prescription-strength pain medication for 1-2 days. Ice or heat are allowed without limits.

Aggressive physical activities, especially ones that stress the injured area, are discouraged. You wan to allow the new "baby" fibers to grow stronger. Gentle or light rhythmic activity, such as walking, swimming, using an elliptical trainer, etc. may be allowed. Your doctor will give you details on recommended activities.

Overcoming Fear

As is often the case, the fear of having a new procedure done is typically worse than actually having it done! The vast majority of patients tolerate the procedure very well and would gladly do it all over again, given the improvement they get in their pain.

DOES INSURANCE PAY FOR RIT?

Although prolotherapy has been used successfully and safely for decades, most insurance companies still consider it "experimental" and do not pay for it. At Valley Sports Physicians, patients are responsible for the costs of treatment. Depending on the location and number of injections, each treatment costs between $75 and $400.

IF RIT IS SO GREAT, WHY DON'T MORE DOCTORS USE IT?

Medicine, by nature, is a very conservative field. Just look at how long it has taken modern medicine to begin to recognize the potential benefits of alternative medicine. In fact, even there is overwhelming evidence of effectiveness, new ideas are very slow to take hold.

For example, in the 1800's, British surgeon Joseph Lister pioneered the "germ theory" of wound infections, which challenged to prevailing idea that "bad air" was the cause of infections. He was able to show that cleaning surgical wounds with carbolic acid virtually eliminated post-surgical infections. Yet his ideas were initially met with indifference and even hostility by other doctors.

Likewise, even before Lister's germ theory, Hungarian physician Ignaz Semmelweis (1818-1865) was able to demonstrate that hand washing virtually eliminated fatal infections on his hospital ward. However, the reception by the medical community was cold, if not hostile. His observations went against the current scientific opinion of the time, which blamed diseases on an imbalance of the basical "humours" in the body.

In addition, because the solutions that are used in prolotherapy injections are easily and cheaply available generics, there are no pharmaceutical companies that stand to benefit financially from promoting RIT. (Most of the major medical research is sponsored by drug companies.)

Prolotherapy, like most other alternative medicine treatments, is not currently taught in medical schools. And only a very small handful of special residency programs expose their physicians to it.

Nonetheless, an increasing number of physicians are becoming aware of it (we have many physicians, including orthopedic surgeons, in the greater Hartford area who refer patients to us for RIT), and more and more physicians are starting to get training in it. As more physicians perform prolotherapy, and as more good quality research studies get published showing that RIT works, prolotherapy will become more widely accepted, and insurance companies will gradually be more likely to pay for it.

SUMMARY

In summary, accidents which cause ligament or tendon injuries are normally healed by a natural process involving inflammation. Inflammation is a multi-phased process, but the end result is the production of collagen which will form the threads of a new ligament or tendon. If the process is interrupted or incomplete, the ligament or tendon does not heal completely, resulting in pain, joint instability, numbness, and/or muscle spasms.

Regenerative Injection Therapy (RIT) is a safe technique for treating those ligament and tendon injuries that have failed appropriate conservative treatment. The literature reports an 80-90% response rate, which is consistent with the results we see in our practice. Permanent repair appears to occur in at least 75% of the cases. The technique is somewhat painful but is tolerated well by the vast majority of patients, and it is effective in decreasing the pain of abnormal joint movement, ligament laxity, and tendinosis.

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