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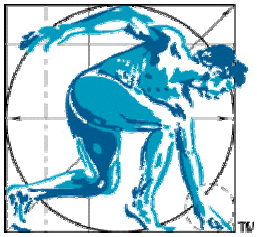

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REGENERATIVE INJECTION THERAPY

PROLOTHERAPY OR REGENERATIVE INJECTION THERAPY (RIT)

The Injection Treatment for Ligamentous Laxity & Tendinopathy (Tendinosis)

Regenerative Injection Therapy (RIT), also known as Prolotherapy, involves the injection at the enthesis (attachment site) of a damaged ligament or tendon with a substance that either directly or indirectly stimulates the body's own inflammatory process, or a substance that directly or indirectly acts as a growth factor with the goal of producing the repair of the ligament or tendon with new healthy collagen tissue, the strength fibers of these structures.

Before we learn about RIT, we must 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 (as a job or within a sport), can tear or fray these cable-like structures. These injuries start a healing process called inflammation to repair the injured ligament or tendon. 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, then the ligaments or tendons will be returned 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 lead to a situation in which it can cause pain and discomfort with movement.

The torn or strained ligament is really a disruption of the normal arrangement of collagen molecules.[5,6] Persistently injured ligaments and tendons are found to have 30-40% less collagen fibers, and the fibers that are present are found in disarray (unorganized).

A degenerative ligament is diagnosed by your doctor as Ligament Laxity or Instability (It is usually a micro-instability, since often surgery is not indicated). A degenerative tendon is diagnosed by your doctor as a tendinosis or tendinopathy. This is differentiated from a tendinitis (an acutely inflamed tendon). Electron microscopic studies have clearly demonstrated that degenerative ligaments and tendons do not contain cells of inflammation. It has been found 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.

SYMPTOMS OF LIGAMENT LAXITY AND TENDINOSIS

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

1) Significant tenderness when pressure is applied.

2) 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 pain on initial movements after a period of rest, but the discomfort usually improves the more they are used.

3) Numbness or pins and needles sensation along a specific distribution 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)

4) Local and referred pain. Referred pain is pain from a liga-

A NEW "OLD" THERAPY FOR BACK AND JOINT PAIN

Former 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*)

PROLOTHERAPY WEB SITES

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
Www2.prolo-therapy.com

ment or joint 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.

5) 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 ligamentous injury. If the joint is slightly out of place because of the ligamentous laxity, it may respond to manipulative care. Such manipulative techniques will often give good relief and sometimes permanent relief.

If lax ligaments can lead to muscle spasm, loss of movement, and all sorts of 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. This healing process is called inflammation.

INFLAMMATION:

The Body's Natural Healing Process

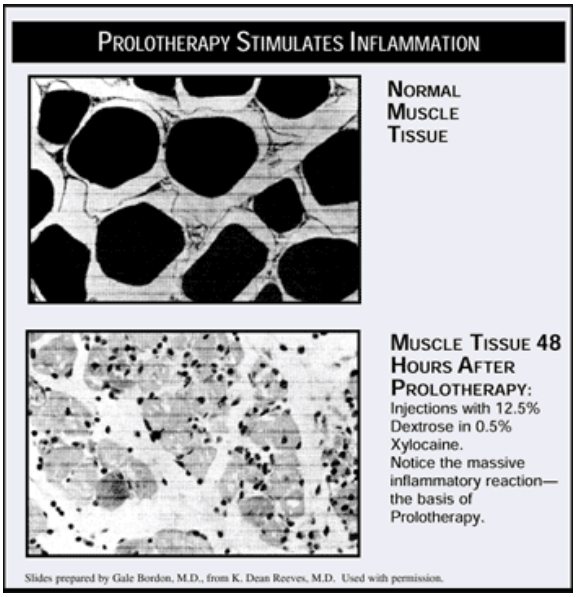
Inflammation has 3 distinct phases: the acute inflammation phase, the granulation phase, and the remodeling phase (See Figure 1 on next page).[7] This "Healing Cascade" is basic to all injuries regardless of the location, size or tissue involved. These three phases each have their own cellular and chemical 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.

Ligament injection therapy simply stimulates this healing process in a more controlled and less violent way than occurs during trauma in an automobile accident, slip or fall, twist or athletic injury



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 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. The combination of all of 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. The fibroblasts will be stimulated, or "turned on" to make new collagen fibers - the basic building blocks of ligaments and tendons.

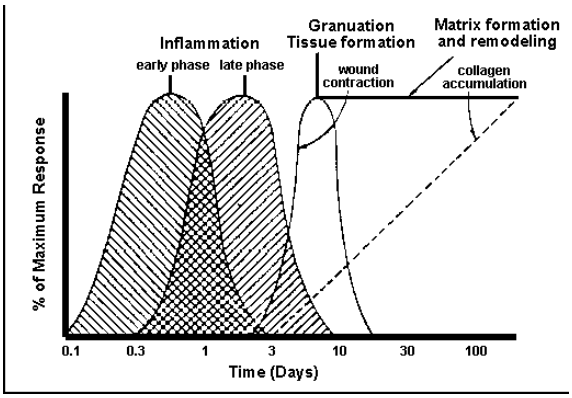


Figure 1. Phases of inflammation.

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 be organized into a new strong and tighter ligament and tendon. The fibroblasts make single long molecules which, when outside of the cell, will begin to entwine around each other, forming what we call a collagen fiber, which is a "triple helix" (like a braid) of these molecules. The individual molecules are held together by strong chemical bonds. As the collagen fibers wind around each other they begin to contract and the molecules 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 ligament will be slowly pulled together and the laxity will decrease.

It is important to move the injured joint during this phase because the joint forces 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.

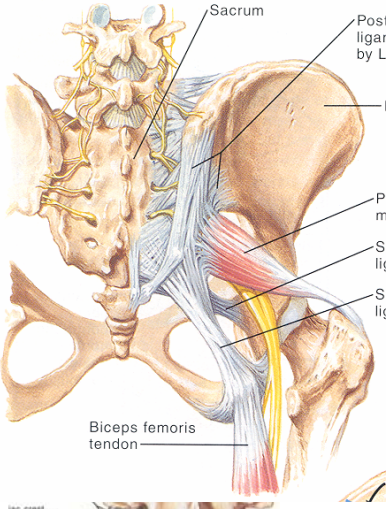
REGENERATIVE INJECTION THERAPY (RIT)

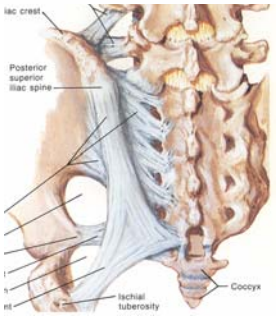
Now that we understand what degenerative ligaments and tendons are and how the body's inflammatory process works, we can learn how ligament injection therapy stimulates the body's own inflammatory process in a more controlled and less violent way than that which occurs during trauma or injury.

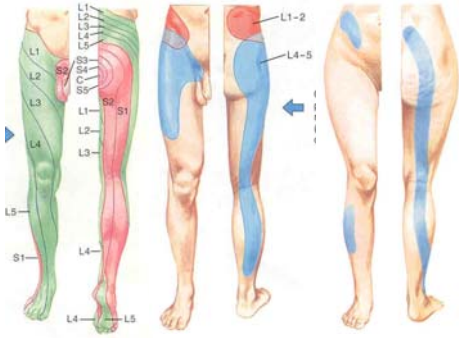
The technique of creating this inflammation and the subsequent creation of new collagen is done by injecting solutions known as proliferants.

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 proliferants may be used which are capable of causing this process.

The most frequently used in our office are osmotic shock agents (See the table to the right). These drugs are dehydration agents that act to remove the fluids from the cells around the injection site. In the







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. Farber, DO, and Morton Walker, DPM.

Prolo Your Pain Away! Curing Chronic Pain with Prolotherapy. Ross A. Hauser M.D.

PROLOTHERAPY SOLUTIONS

Standard Solution:

"P2G"

(12.5% Dextrose, 12.5% Glycerin, 1% Phenol — mixed in 1% preservative-free procaine (Novocain))

Alternatives:

12.5% Dextrose alone
(in 1% procaine)

1% Sodium Morrhuate
(in 1% procaine)

Any Combination of Above

Position Statement

Regenerative Injection Therapy (RIT): Effectiveness and Appropriate Usage

by

The Florida Academy of Pain Management

June 30th, 2001

To determine the validity of RIT/prolotherapy, a position paper committee of interventional pain physicians was formed and undertook a comprehensive review of the medical literature. The committee reviewed 78 specific articles and nine textbooks as well as 51 relevant articles and chapters from other textbooks.

Allopathic and Osteopathic physicians have been practicing the methodology known as regenerative injection therapy (RIT) for decades. Pilot, retrospective, open face prospective, and double-blind placebo-controlled studies have clearly indicated RIT's effectiveness in the treatment of chronic musculoskeletal pain arising from post-traumatic and degenerative changes in connective tissue such as ligaments, tendons, fascia, and intervertebral discs.

Clinical and experimental electron microscopic studies have proven that structurally the newly formed connective tissue has biomechanical properties similar to those of normal ligaments and tendons.

From 1937 through 2000, more than 40 authors reported case studies, retrospective, prospective and animal experiment studies evaluating the results of treatment with RIT. The calculated number of patients reported in those studies exceeded 530,000. Improvement in terms of return to work and previous functional/occupational activities was reported in 40-82 % of patients. The resolution of pain symptomatology was evaluated differently in various studies and ranged from 0 -100 %. Complications included 28 pneumothoraces, 2 requiring a chest tubes, 24 allergic reactions, 1 grand mal seizure, and 1 aseptic meningitis.

The Florida Academy of Pain Medicine endorses RIT when utilized appropriately for the treatment of specific chronic pain problems.

(Full position statement with an extensive list of references is available at www.aaomed.org and http://fapm.med.new.net and was printed in *The Pain Clinic*, June 2002, volume 4, number 3)

modern Orthopedic Medicine practice, the most commonly used osmotic shock agent is a dilute solution of glucose, glycerin, and a very small amount of phenol. It is called "P2G".

Sodium morrhuate is another frequently used proliferant. This drug is the same long fat molecule that makes up a portion of the cell wall. When injected in dilute amounts it directly stimulates the production of the prostaglandins or the chemical messengers of inflammation. Sodium morrhuate is extracted from cod liver oil, and has the same chemical formula as arachadonic acid. If you are allergic to shell fish or seafood, be sure to let your physician know, because you may also be allergic to sodium morrhuate.

All of these proliferants are injected at the fibro-osseous junction (the site where the ligament or tendon attaches to bone) with a large amount of local anesthetic, usually procaine. 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 NATURE HEAL ME THE FIRST TIME

Why is this secondary treatment needed? If this process goes on naturally, why did it not do the job correctly the first time? Orthopedic medicine physicians do not understand all the reasons. There may have been continued joint movement following the injury, and the ligament healed in the "longest possible length" position. The nutrition of the patient during healing was inadequate. The genetic tendencies to heal are not complete. Or the healing process was itself suppressed by such medications as aspirin or ibuprofen.

Aspirin and other non-steroidal anti-inflammatories (NSAID's), - such as Ibuprofen, Motrin, Aleve, Naprosyn, Vioxx, etc - can knock out or suppress the healing response by interfering with the prostaglandin-growth factor pathways. These drugs are frequently prescribed because they reduce pain and are thought to be a safe conservative treatment modality. Research, however, has shown that aspirin is not without significant side effects. In addition to well documented adverse effects upon the stomach, NSAIDs may directly inhibit the healing of injured ligaments.

In 2002, in the American Journal of Sports Medicine, NSAIDS were shown to further weaken the 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.

HISTORY OF RIT

RIT is not a new technique. RIT was first used by Hippocrates on Olympic javelin throwers who occasionally dislocated their shoulders. It was used to treat hernias before modern day surgical techniques became available. The techniques we use were developed in the 1930's by G.S. Hackett, MD along with other MD's and DO's. The same techniques and drugs 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. Prolo- stands for proliferative.

BASIC SCIENCE EVIDENCE

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

More recent studies have confirmed his initial studies demonstrating proliferative histiologic (microscopic) changes. In an animal study in 1983, Liu et al. injected a proliferative solution (Sodium Morrhuate) into rabbit MCL's

A list of physicians who utilize Prolotherapy can be obtained from:

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

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

George S. Hackett Foundation
c/o Gustav A. Hemwall, M.D.
715 Lakes Street., Suite 605
Oak Park, IL 60301
(708) 848-7773

(medial collateral ligaments of the knee) that resulted in an increase in ligament mass, thickness, enthesis strength and weight/length ratio compared to controls.[12] This affect 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 histiologic evidence of new collagen proliferation when comparing pre- and post-injection sacroiliac ligament biopsies.[14] In a clinical study in 1988, Ongley used a computerized instrument previously established as a reproducible, objective measure of human knee ligament function to demonstrate decreased ligamentous laxity and improved patient function after injecting P2G into ACL, PCL, MCL, LCL ligaments of the knee.[15]

CLINICAL EVIDENCE

RIT is now gaining wider acceptance for painful musculoskeletal conditions due to demonstration of 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]

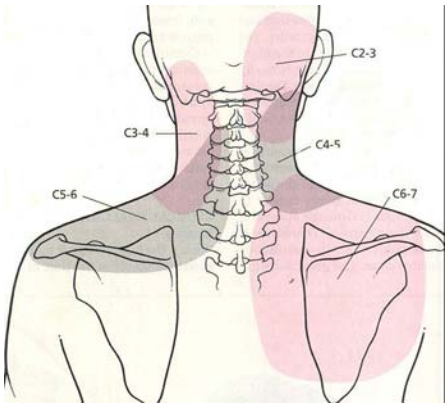
The affects of RIT appear to be long lasting. Hackett reported in a series of 1,600 patients treated with RIT an 82% patient reported cure rate of backache during follow-up examinations.[9,10] His final examinations were performed from 2-12 years following the conclusion of reconstructive therapy thus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

THE RISKS OF RIT

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

General Risks:

Since the intent of the technique is to create inflammation, pain, swelling, and redness may result and is in fact anticipated. The injections are also painful because the placement of the needle at the fibro-osseous junction is also a tender site in many cases. Since the skin is broken with a needle, infection is a possibility, but sterile technique is used and very few infections have been reported. Bruising at the injection may occur. Allergic reactions



have been reported 24 times. Based on the 530,000 patients injected with RIT in the literature, the risk of allergic reaction appears to be 1 per 22,000 patients injected.

Site-Specific Risks:

Optimal Treatment for Osteoarthritis: Regenerative Injection Treatment (RIT) ?

The leading or most common cause of osteoarthritis is mechanical instability. The most common causes of mechanical instability are injury and wear and tear. Ligaments are the primary stabilizers of joints. With injury, such as whiplash injury, the ligaments are often pushed beyond their normal range of motion resulting in tearing or overstretching of the ligaments. When the ligaments are torn or overstretched, they are not able to stabilize the joint. This results in instability of the affected joint. This instability may be gross as observed with a complete ACL tear of the knee or the instability may be micro-instability such as when ligaments are only partially torn to different degrees. In an attempt to stabilize the joint, the body responds by creating more bone which is recognized on x-rays as bony irregularities, called osteophytes.

Bony degenerative changes of the joint are a hallmark of osteoarthritis. Conventional medical theory believes the friction and inflammation present in these injured joints results in the osteoarthritis and that by preventing the inflammation, the osteoarthritis can be prevented. No studies to date have ever demonstrated that anti-inflammatory medications or cortisone injections, both specifically targeting and decreasing inflammation, actually slow down or preventing arthritis changes. They only lesson the pain to various degrees.

Inflammation is actually the body's own healing response and if you look at how the new bony changes appear around the joint they always appear along lines of stress and in an attempt to stabilize the joint. Therefore when treating arthritis one should really view these degenerative changes as a result of mechanical instability not as the cause of pain. Inflammation should be viewed not as the cause of the arthritis, but as a response to the underlying joint instability. If one focuses treatment on the instability, often pain can be reduced significantly. Therefore the inflammatory process should be ***stimulated*** rather than blocked to bring about the fullest healing.

In 2000, two randomized prospective double-blind placebo-controlled studies of dextrose prolotherapy were carried out specifically in osteoarthritic joints. In the first, osteoarthritis of the thumb and finger joints was the focus of study. Improvement in pain with movement of fingers improved significantly more in the dextrose group compared to placebo.[19] Side effects were also noted to all be minimal. In a second study focusing on knee osteoarthritis with and without ACL laxity, at 12 months after three dextrose injections of the knee, improvement in pain (44 percent decrease), swelling complaints (63 percent decrease), knee buckling frequency (85 percent decrease), and flexion range (14 degree increase).[20] Even more impressive, analysis of blinded radiographic readings at zero and twelve-month films revealed stability of all radiographic variables except for two which actually improved with statistical significance. Further, knees with ACL laxity at 12 months revealed a statistically significant improvement in joint laxity. In fact, eight out of 13 dextrose treated knees with ACL laxity were no longer lax at the conclusion of one year. These results are impressive due to the use of only a 10 percent dextrose. This minimal concentration of glucose is actually thought not to be pro- inflammatory, but actually a direct induction of growth factors.

Serious complications are very rare. Two deaths have been reported from RIT, but not in the last 25 years, due to the use of newer proliferants.

In the spine, specific needle lengths and angles of injection are used to eliminate the possibility of injection into the spinal canal. Even if phenol, a component of P2G, is injected into the canal inadvertently, it is unlikely to cause permanent neurologic symptoms, since much higher concentrations of phenol in glycerin are intentionally injected into the canal in treating intractable pain syndromes. Klein's study[18] did report two cases of reported lumbar puncture headaches, both without neurologic symptoms or permanent headache. One review reported 1 case of aseptic meningitis in 530,000 patient injections.

The most common serious complication can occur when injecting rib joints. There is a small possibility of causing a pneumothorax, a collapsed lung. Specific injection techniques are used to minimize this complication. 28 pneumothoraces have been reported with 2 requiring a chest tube in the literature (1 in 19,000 injections based on 530,000 people injected).

When injecting in the extremities, 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.

Risk Summary:

RIT has been proven a safe therapeutic technique in well trained hands. Changes in injection techniques and a move to dextrose-based solutions has eliminated virtually all serious side-effects. The prolotherapist must have training in the form of workshops, apprenticeships, and be a true student of functional anatomy. 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 as demonstrated by Dr. C. Edward Koop.

TREATMENT COURSE

Treatment responses vary. Most people will require between 2 and 6 injection series, each spaced 2-4 weeks apart. Each session may consist of 1-15+ injections, depending on your specific diagnosis and injury. Smoking is known to limit normal healing responses. Other systemic chronic diseases may also slow your response. Age does not seem to have any significant effect. The degree of injury, which is difficult to know prior to starting the injections, is probably most important.

In some cases, patients will experience no pain relief after their first or second RIT treatments. This does not mean that therapy 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 if the pain is not relieved after one or two sessions, especially a patient who has been in pain for decades. We have also had severe pain cases require only one treatment session and relatively simple cases require 6-10 sessions for complete pain relief.

Post injection instructions include the restriction 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 on regular prednisone.

Aggressive full range of motion activities are initially restricted, but regular motion is encouraged.

Overcoming phobias and fears is difficult, but worthwhile and often produces the most happiness. Typically the fear and anxiety of having the treatment is worse than the treatment itself.

SUMMARY

In summary, accidents which cause ligament or tendon injuries are normally healed by a process called inflammation. Inflammation is a multi-phased process, but the end product is the production of collagen which will form the threads of a new ligament. As the collagen loses water, it shrinks, becomes shorter and tends to pull the two ends of the ligament together. If the process is incomplete, the joint may remain in the abnormal position and this causes pain, numbness, and muscle spasms.

Regenerative Injection Therapy (RIT) is an injection technique whereby drugs are injected at the fibro-osseous junction, which causes inflammation and the subsequent stimulation of fibroblasts to make new collagen fibers. Dextrose based proliferants may also work as direct tissue growth factors to stimulate the new collagen fibers.[2,3,4,19,20] The literature reports an 80-90% response rate consistent with our results. Permanent repair appears to occur in at least 75% of the cases. The technique is painful but safe, and it is effective in decreasing the pain of abnormal joint movement, ligament laxity, and tendinosis.

REFERENCES:

1. This handout was adapted from the Prolotherapy information given out by The American Association of Orthopeadic Medicine. www.aaomed.org. 90 S. Cascade Ave., Suite 1190,Colorado Springs, CO 80909. (800) 992-2063.

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