

An introduction to prolotherapy therapy in musculoskeletal pain and hypermobility: encouraging the body to heal itself.

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Definition of prolotherapy:

Prolotherapy which is a contraction of the word ‘proliferative therapy’ otherwise and also known as regenerative therapy, is defined as injection of growth factors or growth factor stimulants to help production of normal cells or tissue. An example of the former involves, for example, the injection of blood concentrates (which have growth factors in them). The second involves the injection of irritant/stimulant solutions (e.g. Dextrose, Phenol, Sodium Morrhuate) that initiate production of growth factors by the body and thereby encourages new tissue growth and repair.

Types of prolotherapy are used for many conditions:

Prolotherapy/ regenerative therapy is a well recognised technique and also includes a very large area of exciting research with examples of developing therapies, including injecting stimulants of new tissue growth for treatment of life threatening blood disorders, restoring failing heart muscle, reversing renal failure, promoting recovery of the brain after strokes and to treat diabetic neuropathy. Many animal models have shown that it is indeed possible to encourage the body to start repairing tissues and organs itself by the use of prolotherapy.

Prolotherapy in musculoskeletal disorders including hypermobility:

It is not surprising, therefore, to find similar reports of tissue repair and healing with prolotherapy injections into musculoskeletal tissue. For example, prolotherapy has been shown to increase collagen fibre diameter, mass and strength by 40%-55% even by one week in one animal model of ligament damage after an irritant injection compared to control. Even in normal animals such injections seem to increase ligament/tendon strength by 10%-15%. Remarkably, in a further animal study full thickness cartilage growth was seen in injured joints¹.

Prolotherapy has been applied in many musculoskeletal conditions, including the following:

- Head and neck and shoulder pain syndromes, including whiplash injury
- Spinal pain syndromes, including thoracic lumbar, ilio-lumbar, Sacroiliac joint instability
- Ligament laxity with hypermobility and pain, Ehler’s-Danlos syndrome
- Iliac crest syndromes, iliocostalis friction syndrome
- Patellofemoral syndromes
- Inoperable painful hip shoulder, finger, ankle and knee joints.
- Scapular dysfunction
- Tendinopathies, including around elbow, shoulder and Achilles, Planter fasciitis
- Pubic symphysis dysfunction

It is clear that for it to work the injections have to be precise anatomically, with enough solution, often repeated and must be combined with physical therapyⁱⁱ.

Evidence for prolotherapy in clinical practice:

Prolotherapy and low back pain

In low back pain the first trial evaluated prolotherapy or saline injection in back pain in conjunction with manipulation. Prolotherapy doubled the number of patients showing more than 50% improvement in pain and disability, 39% to 85% at 6 monthsⁱⁱⁱ.

In another similar study (but using local anaesthetic in the control group injections) it showed that 77% of patients who had prolotherapy showed an improvement compared to 50% in the control group at six months.

A third trial showed a negative result but was criticised because the volumes of prolotherapy solutions were too small.

A fourth study was done in chronic non-specific low back pain patients who all had physical therapy and both saline or prolotherapy and both groups showed similar levels of improvement. Not a surprising result if one applies the therapy only to non-specific low back pain, where does one inject the solution?

A review in 2004^{iv} concluded because of technical and clinical heterogeneity, present literature offers moderate evidence of prolotherapy effectiveness in select patients utilizing appropriate technique and co-interventions. In 2008 a further review in Spine Journal concluded prolotherapy has a prolonged history of use, a reasonable (but not proven) theoretical basis, a low complication rate; it mentions the positive results seem to be in those trials with repeated injections with mixed irritant solutions and involving exercises, is worth considering for patients with persistent chronic low back pain where nothing else has worked^v.

Prolotherapy improves symptoms in arthritis of joints

A double blind placebo-controlled study on 10% glucose prolotherapy in chronic knee osteoarthritis showed a 35% reduction of pain, 45% improvement in swelling and better range of movement, compared to the control group^{vi}. Similarly a double-blind placebo-controlled study was conducted on patients with greater than 5 year history of finger osteoarthritis, showed a 42% improvement in pain and improved flexibility of joints^{vii}

Prolotherapy causes measurable ligament and tendon healing and clinically significant improvements in function

Using a specific apparatus to measure knee ligament laxity, prolotherapy was shown to reduce laxity from 9.4 mm to 6.2 mm at a 3-year follow-up study. Repeated bi-monthly injection were given over 1 year and then as required^{viii}. A double-blind randomized controlled trial of prolotherapy in patients with at least 6 months of refractory lateral epicondylitis of the elbow ('tennis elbow'), showed improved pain and function at 16 weeks which was maintained at 1 year^{ix}. Using verifiable imaging the complete repair of an

Achilles tendon rupture in an athlete achieved with prolotherapy^x, showed that prolotherapy may induce significant and clinically measurable ligament and tendon repair, this been reported in other patients^{xi}. In elite athletes with 6 months or more of chronic unresponsive groin pain showed improvement after a course of 3 injections with 22 out of 24 getting back to full-time sport and 20 out of the same 24 reporting no pain^{xii}.

So then why, if prolotherapy is so good, haven't we heard more about it?

The solutions used in standard prolotherapy are cheap, reasonably widely available and not patentable. Therefore, drug companies are not interested in promoting the technique. The results of musculoskeletal prolotherapy are highly dependent on the doctor and the skill with which the injections are done. Five cases of paralysis were described with prolotherapy in the 1960's were due to lack of x-ray control and use of the technique by inexperienced operatorsⁱⁱ.

Careful choice of volume and type solution depending on site of administration and use of x-ray particularly with injections around the spine means that complication rates are usually in the order of 1, 20,000 for example for accidental self resolving pneumothorax (though only 1/250000 required any treatment) and indeed allergic reaction is also in the order of 1 in 20,000ⁱⁱ. Major complications such as paralysis are thought to be in the order of 1 in 500,000 or so.

My own practise is to use Prolotherapy as part of overall management, including analgesics, physical therapies, Botulinum toxin for muscle spasm and also other injections, including radiofrequency denervation which can be very useful in removing pain from arthritic spines as the latest evidence suggests^{xiii}, for example, sacroiliac joints pain, and I combine radiofrequency denervation of the joint with prolotherapy to the sacroiliac joint ligament. This may be all that is required; in contrast I find that a course of 3-5 prolotherapy injections over the course of 6-12 months is required for tennis elbow, knee and shoulder joints. Under x-ray I use more aggressive solutions for sacroiliac joints and usually only 1-3 injections are required, particularly if combined with radiofrequency techniques.

I cannot emphasise enough that to avoid complications, careful selection of the doctor performing the procedure is important. They should have considerable experience of the technique, skill with needles and access to x-ray and resuscitation facilities for the possible very rare complications.

What can prolotherapy do for hypermobile patients?

Having presented the data and the cautions above there is no doubt the use of prolotherapy can be life changing experience for a significant number of patients who undergo the technique. If one does searches in the published medical database there is however very little specific research on hypermobility. That said, the incidence of 'Benign Hypermobility Syndrome' is about 5% in the population and it is likely such people present as patients and form part of the studies mentioned above. However, a frequent objection to the use of prolotherapy is that new or regenerated collagen is still the same as before but my own experience of treating literally hundreds of such patients is that even in hypermobile patients, the quality of the regenerated tissue is better and certainly less painful than the original.

In normal people the collagen strength has been shown to increase with prolotherapy, so it is surely not surprising it improves in hypermobile subjects but there is the issue that the published data is lacking, however, I have plenty of hypermobile patients who can testify that their sacro-iliac joints or pubic symphysis have stopped dislocating after years of suffering. Or, for example, their necks, back, shoulders and knees no longer give them pain at night and they can move, walk and exercise again.

So there we have it, how to present an emerging technique whose mechanism of action is only now being understood, knowing it may possibly help a large number of people without giving false hope to some desperate people who may not benefit.

It is imperative, therefore, that your case is discussed with an experienced doctor who performs the technique well. You should discuss the pros and cons, the risks and likelihood of success, and concurrent therapies you will need to do such as exercise, physiotherapy, diet and medications. Prolotherapy can be life changing but not for everyone and may work in some but not other parts of the body in the same individual.

In my experience it can help 50% or so of those who try the technique alone. The success rate rises with concurrent therapies such as spinal injections, as mentioned above, and those who repeat treatment in those who respond, i.e. if one responds to the first one or two injections and carry on with further treatment, this more selected group tend to do really well and success rates are above 70%-80% with improvements which may last for years.

Dr Munglani would be please to provide further information on prolotherapy, including all the references mentioned below.

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