

# Prolotherapy For Knee Pain

A reasonable and conservative approach to knee tendonitis/tendonosis, sprain-strains, instability, diagnosis of meniscal tear, patellofemoral pain syndrome including chondromalacia patellae, degenerative joint disease, and osteoarthritis pain

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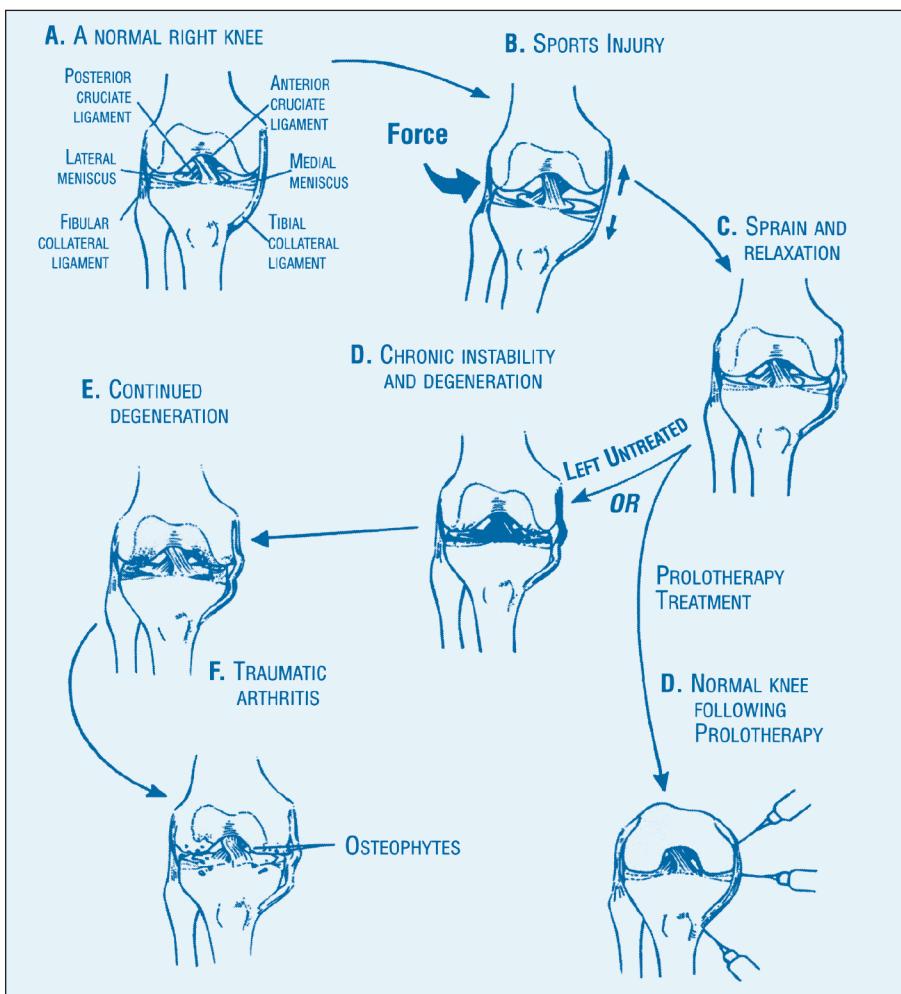


Prolotherapy is a method of injection treatment designed to stimulate healing.<sup>1</sup> Many musculoskeletal injuries and pain syndromes lend themselves to prolotherapy treatment including low back and neck pain, chronic sprains and/or strains, whiplash injuries,

tennis and golfer's elbow, knee, ankle, shoulder or other joint pain, chronic tendonitis/ tendonosis, and musculoskeletal pain related to osteoarthritis. Prolotherapy works by raising growth factor levels or effectiveness to promote tissue repair or growth.<sup>2</sup> It can be used years after the ini-

tial pain or problem began, as long as the patient is healthy.

This month's article focuses on the use of prolotherapy for knee pain and injuries, including ligament and meniscal injuries, tendonitis and tendonosis, patellofemoral syndrome, and osteoarthritis pain including degenerative joint disease.



**FIGURE 1.** How soft tissue injury leads to degenerative arthritis. From Hauser, "Prolotherapy: An Alternative to Knee Surgery," Beulah Land Press, Oak Park, IL, 2004. Used with permission.

## Prolotherapy Mechanism of Action Review

Prolotherapy works by causing a temporary, low grade inflammation at the site of ligament or tendon weakness (fibro-osseous junction), "tricking" the body into initiating a new healing cascade. Inflammation activates fibroblasts to the area, which synthesize precursors to mature collagen, reinforcing connective tissue.<sup>2</sup> This inflammatory stimulus raises the level of growth factors to resume or initiate a new connective tissue repair sequence to complete one which had prematurely aborted or never started.<sup>2</sup> Prolotherapy is also known as "regenerative injection therapy (RIT)," "non-surgical tendon, ligament, and joint reconstruction" or "growth factor stimulation injection therapy."

## Ligament Injuries Lead to Degenerative Arthritis

Osteoarthritis almost always begins as ligament weakness.<sup>3</sup> Unresolved ligament sprains (overstretching) results in ligament relaxation and weakness. Relaxation of the ligament results in joint instability and a change in joint biomechanics which eventually results in osteoarthritis of that joint as bones glide over each other unevenly. The observation that bones remodel and grow in response to their mechanical environment is best explained in Wolff's Law which states:

“Bones respond to stress by making new bone.”<sup>4</sup> Tendon injuries, if unresolved, over a long period of time also have an influence on joint biomechanics and can contribute to the development of osteoarthritis.

This has been well demonstrated in the medical literature. One study of female soccer players who had sustained knee ligament injuries showed a very high percentage with knee osteoarthritis 12 years later.<sup>5</sup> Another study, published in *Sports Medicine*, observed the increased incidence of osteoarthritis with individuals who engaged in certain sports. These included wrestlers, boxers, baseball pitchers, football players, ballet dancers, soccer players, weightlifters, cricket players, and gymnasts.<sup>6</sup> Postgraduate Medicine reports in its investigation of the causes of human arthritis:

“There is no question that trauma and mechanical stress on the joint lead to the development of osteoarthritis.”<sup>7</sup>

Even in veterinary medicine, it is well-established that ligament sprains favor the development of osteoarthritis in animals.<sup>8</sup>

If ligament and tendon injuries are stimulated to heal, biomechanics can be restored and the downward progression of degenerative changes can be prevented or stopped. Prolotherapy can, therefore, be seen as a method to prevent or stop the arthritic process because it strengthens the joint and thus ends the need for the knee or other treated joint, to grow bone or form bone spurs<sup>9</sup> (see Figure 1).

### Prolotherapy for Patients with Degenerative Arthritis

Prolotherapy has been used successfully even after the diagnosis of osteoarthritis and degenerative joint disease. This may be because of its ability to strengthen the existing intact, but weakened, ligamentous and tendinous structures. There is also some clinical evidence that prolotherapy may help to regenerate cartilage. Reeves and Hassanein in Kansas City investigated prolotherapy in degenerative osteoarthritis with and without ACL laxity. In their double blind, placebo-controlled study, enrolled patients had either grade 2, or more, joint narrowing or grade 2, or more, osteophytic change. In addition to subjective indexes such as visual analogue scale for pain, swelling, and frequency of leg buckling, objective goniometric flexion measurements as well as radiographic measures of joint narrowing

and osteophytosis were taken before and after prolotherapy. Arthrometric measurements of ACL laxity were also done. The study concluded that prolotherapy treatment resulted in clinically and statistically significant improvements in knee osteoarthritis. Preliminary blinded radiographic readings (1-year) demonstrated improvement in several measures of osteoarthritic severity. ACL laxity, when present, also improved.<sup>10</sup>

### Cartilage Regeneration

Clinical evidence exists that prolotherapy can help to stimulate cartilage regeneration, although no specific controlled studies have yet been done to confirm this. Laboratory studies have demonstrated that cartilage cells respond to injury (inflammation) by changing into chondroblasts, cells capable of cell proliferation, growth, and healing.<sup>11</sup> Therefore, it would be logical that in vivo use might stimulate a similar phenomenon. One case report by Dr. Ross Hauser in Oak Park, Illinois, showed clinical evidence of such a change. X-rays were taken of a patient with severe knee osteoarthritis one year apart, before and after prolotherapy treatments (see Figure 2). The patient was a 62 year old female who, when first seen, was unable to ambulate without a cane. After 12 prolotherapy sessions this patient was pain free with full mobility. Clearly, more clinical trials need to be done, and this would be a good future area of investigation.

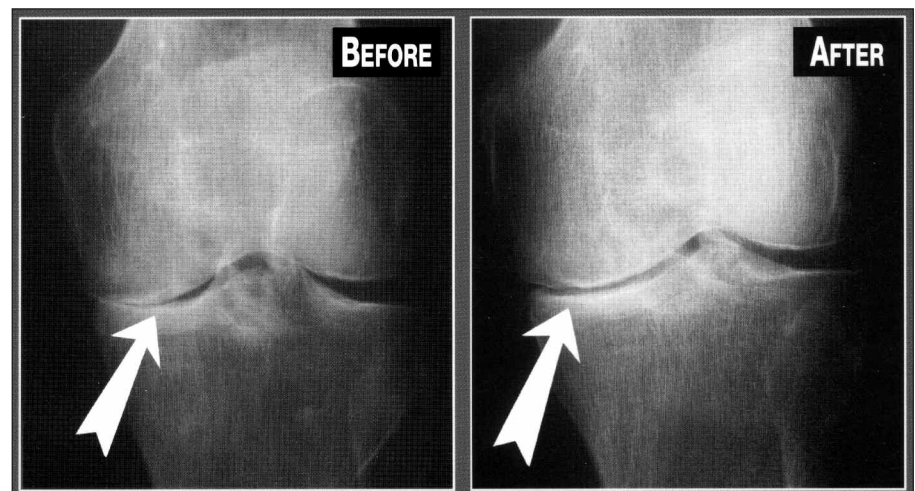
### MRIs Can Be Misleading

When deciding what patients are candidates for prolotherapy, do not be misled

by the MRI or use the MRI for diagnosis alone. MRI's may show abnormalities not related to the patient's current pain complaint and so should always be correlated to the individual patient. Many studies have documented the fact that abnormal MRI findings exist in large groups of pain-free individuals.<sup>12-18</sup> The finding of asymptomatic changes in knee joints during surgery is also not uncommon.<sup>19,20</sup> One study looked at the value of MRI's in the treatment of knee injuries and concluded “Overall, magnetic resonance imaging diagnoses added little guidance to patient management and at times provided spurious [false] information.” So do not use an MRI alone to determine a treatment course. The MRI should be used in combination with a history of the complaint, precipitating factors or trauma, and a physical exam.

### Meniscal Injury

The meniscus is a C-shaped region of fibrocartilage between the femur and the tibia which provides shock absorption. There is a medial and a lateral meniscus, with the medial being the more commonly injured (see Figure 3). Meniscal tears are a common diagnosis, in part because MRI's clearly show these tears. However, as noted above, MRIs can be misleading, and this is especially true with the meniscus. A knee MRI study addressed this issue. The authors looked for meniscal abnormalities in asymptomatic, pain-free individuals aged in their 20s to 80s and found Grade 1, 2 and 3 changes present in essentially all decades, with an increase in prevalence with increasing age. 62% of individuals as



**FIGURE 2.** Xray before and after Prolotherapy. From Hauser, *Prolotherapy: An Alternative to Knee Surgery*, Beulah Land Press, Oak Park, IL, 2004. Used with permission.

## Case Reports

### Case #1

51 year-old cameraman complaining of left knee pain for 6 months which began after a two foot fall from an unstable riser at work. Two weeks after this injury, the patient was running, as was his routine, and began to notice discomfort in his left knee. Discontinuing running helped but, while at his daughter's soccer game, he ran after a ball and a week later began to have the same pain recur in his knee and has persisted. He feels the pain in the medial aspect of his knee when going up and down stairs, worse going up, and also when walking. NSAIDs have not helped. He has been told he has a torn meniscus and arthritis causing his pain.

**Medical History:** No major surgeries or medical issues.

**Review of Systems:** No complaints other than seasonal allergies.

**Medications:** Claritin

**Physical Exam:** Left knee slightly swollen as compared to left, but without erythema or deformity. Flexion to 110 degrees, with restricted extension secondary to apparent Bakers cyst. Mild crepitus present. +1/2 drawer sign with lateral to medial motion present. Negative McMurray's. Tenderness present at the medial collateral ligament and pes anserius tendons.

**MRI:** 1. Mild tricompartmental osteoarthritis with cartilage loss most severe in the lateral facet and trochlea; 2. Complex grade III signal in the posterior horn of the medial meniscus and body compatible with tearing; 3. Mild anterior cruciate ligament sprain as well as a grade I medial collateral ligament sprain. Meniscocapsular separation cannot be excluded as the edema is most intense adjacent to the meniscus; 4. Small joint effusion and small lobulated popliteal cyst.

**Prolotherapy Treatment:** After 5 prolotherapy treatments one month apart, the patient reported 90% improvement. At the patient's followup visit and treatment 3 months later, he reported continued improvement, now 95%, and reports no pain with return to regular exercise. At one year follow up, the patient reports continued stability and activity.

### Case #2

63 year-old male, public relations executive, with 20 year history of left knee pain on and off, status post 2 knee arthroscopic surgeries which gave him only short-term relief. Over the past few years, he states the pain has worsened and recently exacerbated with a lifting injury. He has taken NSAIDs such as Bextra which temporarily help, and followed the RICE protocol (rest, ice, compression, elevation), but the pain has continued. He has stiffness and difficulty getting up from seated to standing position, and trouble going down stairs. He has been told he has cartilage degeneration and needs a knee replacement.

**Medical History and Review of Symptoms:** Tonsils out as a child and measles at age 30. No health issues except elevated blood pressure, on medication.

**Medications:** Aspirin, Cozaar, Effexor, Bextra prn.

**Examination:** Valgus deformity, left greater than right.

Flexion is restricted at 90 degrees of flexion with restricted extension of 10 degrees from flat. There is mild swelling but no erythema. Tenderness to palpation at the medial collateral ligament and pes anserius tendon. +1/2 drawer sign and negative McMurray.

**Prolotherapy Treatment:** After 10 prolotherapy treatments one month apart, the patient felt he was 85% improved and was no longer considering a knee replacement. He reported far less pain under load and resting, better flexibility, walking down stairs easily, and no stiffness when getting up from sitting or after driving. At 2-1/2 year follow-up, he had continued stability with range of motion only mildly restricted in extension and with full range of motion in flexion.

### Case #3

14 year-old male with anterior knee pain for one year after being active in several sports for many years, including basketball, football, soccer and baseball. No prior known trauma. He states he was diagnosed with Osgood-Schlatter disease and was told there was nothing he could do about it. The patient wakes up in the morning with the pain and it lasts throughout the day and has prevented him from participating in his usual sports. Subsequently, he dropped out of all his athletic activities and is not currently active in any sport yet still experiences daily pain.

**Medical History and Review of Systems:** Negative

**Medications:** None

**Examination:** Enlargement of the tibial tuberosity with tenderness to palpation at the patellar tendon insertion on the tuberosity bilaterally. Rest of exam within normal limits.

**Prolotherapy Treatment:** After one treatment to the right knee and three treatments to the left knee at 3 to 4 week intervals, patient states he is 95-100% better in both knees, and back to full sports activity. He reports he can now "do anything." Followup at 1 and 2 years showed stable improvement with continued full return to all sports.

### Case #4

32 year-old female, former Olympic Taekwondo competitor, with history of right knee pain for three years, status post ACL reconstruction (patella technique) with partial medial menisectomy. The patient's pain returned 1 year later and she underwent arthroscopic debridement which confirmed damage to her articular cartilage. This provided only temporary relief. She has done rehab exercise on her own but despite this, over the last year, medial knee pain has returned and is now persistent and fairly constant. The pain is aggravated by walking and activity.

**Medical History and Review of Systems:** Healthy, no health issues or complaints.

**Medications:** None

**Exam:** Right knee: patellar tracking deficit and crepitus. +2 drawer sign. Range of motion within normal limits. Negative McMurray. Tender to palpation at MCL, patellar tendon and pes anserius tendon insertion.

**Prolotherapy Treatment:** The patient was given six treatments on her right knee, approximately every 4 weeks. She felt immediate reduction in her pain starting with the first





