

---

MANUAL OSTEOPATHIC MANAGEMENT  
OF KNEE PAIN SECONDARY TO  
MUSCULOSKELETAL AND JOINT  
DISORDERS

FERGUS O' CONNOR

---

---

NAO RESEARCH THESIS AUGUST 2015

---

## **Introduction**

The knee joint is the largest synovial joint in the body. The knee is also one of the most commonly injured joints in the body (Swenson et al, 2003). There is a high prevalence of injury of the knee joint amongst amateur athletes and sports enthusiasts (Nicholl, Coleman & Williams, 1995). The knee is a vital joint in movement and in combination with the hip and ankle it supports the body when standing, walking and sitting. Therefore injuries to the knee often result in substantial disability to the injured person as it can often prevent walking and cause much pain and discomfort with activities of daily living.

Not properly addressing knee issues or injuries when they occur can lead to a lot of complications and further disability many years after recovery from the injury. Arthritis and Osteoarthritis of the knee can cause a lot of functional disability in later life. Thirty-three percent of people 63 to 94 years of age are affected by osteoarthritis of the knee, which often limits the ability to rise from a chair, stand comfortably, walk, and use stairs (Felson, 1990). As knee injuries are particularly prevalent among younger athletes, it is vitally important that a correct and efficient treatment plan is adhered to prevent further knee issues later in life from these old injuries. A 10 year study on the epidemiology of athletic knee injuries found almost 50% of the patients presenting with knee injuries in the US were between the ages of 20–29 at the time of injury. There is not a great rate of proper rehab of injuries amongst this age group as most are keen to get back to play as soon as possible and due to the eagerness to return to activity, do not adequately recover and rehabilitate the joint and surrounding soft tissues or worry about the long term consequences of such an injury.

The lack of proper rehabilitation of injuries of the knee joint often leads to more advanced issues in later life. At 10 to 20 years after the diagnosis, on average, 50% of those with a diagnosed anterior cruciate ligament or meniscus tear have osteoarthritis with associated pain and functional impairment: the young patient with an old knee. (Lohmander, Englund & Dahl, 2007) Also traumatic knee injuries often cause concomitant damage to multiple structures (ligaments, menisci, cartilage, etc.) and frequently lead to the later development of Osteoarthritis (Roos & Lohmander, 2003).

Osteoarthritis is a debilitating disease that often causes a major loss of normal function and limits the ability to participate in normal daily activities. The high prevalence of osteoarthritis amongst those with previous knee injuries is worrying and highlights the importance of having an effective treatment plan when the joint has been injured. The importance of a relevant and efficient treatment plan has been shown as being a predictor of the severity of problems that may develop later on in life for those who have suffered knee injury (Paans et al, 2009).

Manual Osteopathic Treatment can be an effective option in offering a structured and effective treatment plan for knee injuries and healing to help prevent longer term joint problems. This research will look at the ways manual osteopathic treatment can be applied to a knee injury to help prevent long term problems such as Osteoarthritis from developing.

## Types of knee injuries

There are many ways in which the knee joint can become injured. This research paper will focus on three of the most common types of knee injury acknowledging that there are many more varieties and types of injury which can occur within the knee joint. The focus for this paper are the three common injuries which are *injuries of the ligament, injuries of the cartilage, and injuries of the muscles* which support the knee joint.

**Ligament injuries** are common in sports participants and are often caused by twisting or overextending the knee during physical activity. There are 4 ligaments in the knee which are prone to injury: The Anterior Cruciate Ligament (ACL), the posterior cruciate ligament (PCL), the lateral collateral ligament (LCL) and the medial collateral ligament (MCL). The anterior cruciate ligament (ACL) is a very common injury amongst sports participants due to its role as a stabilizer and a preventer of forward movement of the tibia. In their epidemiology of athletic knee injuries, Majewski, Susanne & Klaus (2006) documented the prevalence of knee injuries over a 10 year period among athletic participants. They found that amongst those with a knee injury from sports participation the following percentage presented with: ACL lesion (20.3%), medial meniscus lesion (10.8%), and lateral meniscus lesion (3.7%), MCL lesion (7.9%), LCL lesion (1.1%), and PCL lesion (0.65%). A lot of research has focused on recovery from ACL injuries and the long term effects due to the higher prevalence of this injury. However, similar injuries to the other ligaments can also lead to potential joint issues in later life.

**Knee Cartilage/Meniscus injuries:** Injuries involving the meniscus of the knee are second only to ACL injuries as the most common type of injury suffered in the knee joint. The medial meniscus is injured more frequently than the lateral meniscus. Either can be damaged or torn during activities that put pressure on or rotate the knee joint. It has been shown that meniscus injuries are also prone to later development of joint problems if not treated effectively. Englund et al (2009) concluded that in knees without surgery, meniscal damage is a potent risk factor for the development of osteoarthritis.

**Knee Muscle/Tissue Injuries:** More serious ruptures of the ligaments or meniscus of the knee can often be accompanied with damage or injury of the muscles which support the knee. Injuries of each of the muscles can also occur in isolation such as strains and sprains or in more rare cases complete tears or ruptures of the tissue.

**Severity of tissue injuries:** Muscle tissue injuries are often graded depending on the severity. Determining the severity or the grade of tissue injury will be important in determining the appropriate treatment. As defined by Kellet (1986) the tissue severities are:

**Grade 1 (first-degree).** Mild pain at the time of injury or within the first 24 hours. Mild swelling, local tenderness, and pain occur when the tissue is stressed.

**Grade 2 (second-degree).** Moderate pain that requires stopping the activity. Stress and palpation of the tissue greatly increase the pain. When the injury is to ligaments, some of the fibers are torn, resulting in some increased joint mobility.

**Grade 3 (third-degree).** Near-complete or complete tear or avulsion of the tissue (tendon or ligament) with severe pain. Stress to the tissue is usually painless; palpation may reveal the defect. A torn ligament results in instability of the joint.

The most commonly injured muscles in relation to the knee joint are: The hamstring muscles which affect hip and knee movement (Biceps femoris, Semimembranosus and the Semitendinosus) and also the quadriceps group of muscles that performs the majority of the work to extend the knee (Rectus femoris, the Vastus medialis, the Vastus intermedius and the Vastus lateralis). Proper assessment and treatment of muscle injuries is also important to prevent further problems with the knee joint from arising.

### **Manual osteopathy as a treatment for knee injuries**

Manual Osteopathy has many useful functions in the treatment of common knee injuries. The initial role is to perform a full assessment of the presenting injury. The manual osteopath should do an assessment of the injury and conclude which muscles, joints and movements are affected by the injury. The importance of a thorough evaluation of the injury is paramount and cannot be overstated. For each diagnosis or problem, goals must be set that are applicable to each patient. Hence two patients with the same diagnosis may not be treated in the same manner. Factors such as personality, interests, and overall health can be determining factors. (Hammer 2007) Following an osteopathic principle, one should not just assess the injured joint but consider how the dysfunction may be affected by or be affecting other areas of the body. E.g. is there a reduction in hip flexion due to the knee injury. Once muscle imbalances and other somatic dysfunctions have been identified the manual osteopathic practitioner can provide stretching and strengthening exercise to help increase ROM in the joints and to assist in improving flexibility of the corresponding joints. With their extensive knowledge of muscle testing and biomechanics manual osteopathic therapists can test for knee injuries in the following ways:

***Muscle strength:*** The clinician tests the knee flexors/extensors and the ankle dorsiflexors/plantarflexors and any other relevant muscle groups. (Kisner & Colby, 1993) The strength of individual muscles surrounding the major joints (Hip, ankle, etc.) should also be considered as these often show weakness following injury. (Janda 1987) It is important to consider testing would be hip and ankle impairments or length/strength imbalances which may be affecting the knee.

***Range Of Motion:*** Active and passive joint movement or range of motion should be measured and the quality, range and resistance through the movement should be observed. Numerous differentiation tests (Maitland 1986) can be performed; the choice depends on the patient's signs and symptoms.

***Function:*** Observe the patients gait and how does the injury prevent function of the joint in normal everyday activities.

Along with taking a detailed history any assessment of the knee should also consider previous injuries/diseases which may not appear related. A good history taking of the patient can help in identifying any potential causes or contributing factors to the injury. While specific assessment of the major joints and muscles should be conducted along with the assessment of the knee it is also important to also observe posture of the patients to see if there is any abnormalities which

may be caused due to guarding of the injured joint, or may have been there pre injury and contributed to the potential for injury.

### **Treating knee injuries: An osteopathic approach**

Osteopathic treatment acts on neuro-musculo-skeletal system, on the basis of the relationship between structure and function, in order to stimulate the body's inherent self-regulatory process (Papa et al, 2012). The manual osteopath can play an important role in treatment of musculoskeletal injuries of the knee. Correct treatment following injury with osteopathic principles can help ensure that a full recovery can occur and help lower the chances of complications from the injury. Following such a treatment plan has also been shown to reduce the risk of osteoarthritis in later years (Paans et al, 2009). As discussed, due to the high prevalence of osteoarthritis amongst those who suffer a knee injury, using osteopathy to treat the injury is a valuable and effective approach for the patient.

The initial standard advice for many knee injuries follows the general principles of musculoskeletal soft tissue injuries. That is following the PRICER acronym which involves protecting the injury, resting the affected limb, Icing for 20 -30 minutes at a time every 3 or 4 hours to help reduce swelling, compression or using an elastic bandage to help control the swelling and elevation, or keeping the affected joint elevated to help increase blood flow to the area. Taking an anti-inflammatory painkiller will also help with pain and reducing swelling.

The protocol following initial rest and reduction of swelling will be dependent on the type and severity of knee injury. A good assessment will have identified the severity of the injury and assessed how the injury is affecting related muscles and joints. However there are some general principles which apply across injuries and where Osteopathy techniques can be applied to effectively assist in the healing and recovery process. There are many manual treatment methods available to the osteopathic practitioner to assist with knee injuries. These include different types of stretching, joint mobilization, PNF (Proprioceptive Neuromuscular Facilitation), trigger point techniques, soft tissue mobilization and friction massage. For the purpose of this research we will focus on joint mobilizations and soft tissue mobilizations.

***Joint Mobilizations:*** If ROM (Range of motion) is restricted then joint mobilizations may be an effective strategy for the manual osteopathic therapist to apply. Joint mobilization refers to manual therapy techniques that are used to modulate pain and treat joint dysfunctions that limit range of motion (ROM) by specifically addressing the altered mechanics of the joint. (Kisner & Colby, 1996). Joint mobilizations will assist in restoring joint motion by decreasing pain and stiffness. The mobilizations can be performed at various grades (ranging from Grade I (small amplitude beginning ROM) to Grade V (manipulation, small amplitude beyond). A mobilization of the knee joint would assist in increasing flexion (keep the femur stationary and glide the tibia posteriorly) or also increasing extension (stationary femur while gliding the tibia anteriorly). Mobilization techniques are one part of a total treatment program when there is decreased function.

***Soft Tissue Mobilization:*** Soft tissue manipulation can help the muscle, tendon, or ligament to stretch and loosen. The surrounding areas can also then be strengthened to add some support to the injured area which will assist in giving it a chance to heal correctly. Again, the specific treatment plan will be dependent on the injury. For example for a patient presenting with an ACL sprain, hip, knee and ankle PNF pattern stretches would be appropriate with a focus on strengthening the hamstrings. A patient presenting with a meniscus tear would follow a similar protocol of hip, knee and ankle PNF pattern stretching. However, this patient may also benefit from progressive resistive exercise which would involve strengthening the muscles around the knee through isotonic exercise. Any approach should include the supporting joints and tissues and include these in a plan of strengthening and stretching. Depending on where the patient is in the recovery phase, more strengthening exercises can be added to increase soft tissue mobilization and further therapeutic exercises can be added to the treatment plan. Exercises should be performed in open-chain and closed-chain positions to improve strength and endurance in isolated muscle groups and to prepare the patient for functional activities (Kisner & Colby, 1996). The individual patient should be the most important factor in determining the appropriate treatment.

### **Conclusion:**

The knee is the most commonly injured joint in the body among sports and fitness enthusiasts. This research paper focused mainly on knee ligament and soft tissue injuries. There is a worrying high correlation between knee injuries and later development of more debilitating diseases such as Osteoarthritis. The importance of an appropriate and effective treatment plan with presenting knee injuries is important to help prevent any longer term disability from occurring. It has been shown that proper treatment of a knee injury can lead to more positive long term outcomes and reduce the risk of developing osteoarthritis. Manual Osteopathic Practitioners can play an important role in ensuring the correct treatment and effective rehabilitation of these knee injuries. Joint mobilizations and soft tissue mobilizations are two of many techniques which a manual osteopath can apply to a knee injury. This can assist in rehabilitation and ensure a full and complete recovery from an injury which can prevent further problems from developing.

---

## REFERENCES:

---

- Englund, M., Guermazi, A., Roemer, F. W., Aliabadi, P., Yang, M., Lewis, C. E., Felson, D. T. (2009). Meniscal Tear in Knees without Surgery and the Development of Radiographic Osteoarthritis among Middle-Aged and Elderly Persons: The Multicenter Osteoarthritis Study. *Arthritis and Rheumatism*, 60(3), 831–839.
- Hammer W (2007) Functional soft tissue examination & treatment by manual methods. 3rd ed. Sudbury (Mass): Jones & Bartlett;
- Janda V. (1987) Muscles and motor control in low back pain: Assessment and management. In Twomey LT (Ed.) *Physical therapy of the low back*. Churchill Livingstone: New York.
- Kellet, J. (1986). Acute soft tissue injuries: A review of the literature. *Medicine and Science in Sports and Exercise*, 18,489± 500.
- Kisner C, Colby LA. (1996) Therapeutic exercise: foundations and techniques. 3rd ed. Philadelphia (PA): FA Davis,
- Lohmander LS, Englund PM, Dahl LL, Roos EM (2007) The long-term consequence of anterior cruciate ligament and meniscus injuries: osteoarthritis. *Am J Sports Med* 35:1756– 1769
- Maitland, G. (1987) The Maitland concept: Assessment, examination and treatment by passive movement. In: Physical Therapy of the low back. Twomey, L. and Taylor, J. (Eds) New York: Churchill-Livingston
- Majewski M, Susanne H, Klaus S. (2006) Epidemiology of athletic knee injuries: A 10-year study. *Knee* 2006; 13:184-188.
- Nicholl, J. P., Coleman, P., & Williams, B. T. (1995). The epidemiology of sports and exercise related injury in the United Kingdom. *British Journal of Sports Medicine*, 29(4), 232–238.
- Paans, N., van den Akker-Scheek, I., van der Meer, K., Bulstra, S. K., & Stevens, M. (2009). The effects of exercise and weight loss in overweight patients with hip osteoarthritis: design of a prospective cohort study. *BMC Musculoskeletal Disorders*, 10, 24.
- Papa, L., Mandara, A., Bottali, M., Gulisano, V., & Orfei, S. (2012). A randomized control trial on the effectiveness of osteopathic manipulative treatment in reducing pain and improving the quality of life in elderly patients affected by osteoporosis. *Clinical Cases in Mineral and Bone Metabolism*, 9(3), 179–183.
- Roos, E. M., & Lohmander, L. S. (2003). The Knee injury and Osteoarthritis Outcome Score (KOOS): from joint injury to osteoarthritis. *Health and Quality of Life Outcomes*, 1, 64.

Swenson, D. M., Collins, C. L., Best, T. M., Flanigan, D. C., Fields, S. K., & Comstock, R. D. (2013). EPIDEMIOLOGY OF KNEE INJURIES AMONG US HIGH SCHOOL ATHLETES, 2005/06–2010/11. *Medicine and Science in Sports and Exercise*, 45(3), 462–469.