

A Multimodal Approach to the Conservative Management of Meniscus Tear

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Introduction:

Conservative management of meniscus tears is currently the preferred method of intervention over surgery due to the observation of negative long-term clinical results associated with meniscectomy, the removal of part or all of this important structure.^{1,2,3,4}

The menisci are two crescent-shaped fibrocartilage structures believed at one point to be unimportant vestigial remnants of a muscle in the knee, unable to heal if torn, especially the avascular central portion. As early as 1966 Seedhom began presenting data to show that the menisci are extremely important structures with myriad physiologic functions including shock absorption, as well as joint stabilizing and weight distribution via increasing surface area.⁵ In more recent years others have further qualified and quantified these claims.^{6,7} The menisci may also be involved in joint lubrication,⁸ proprioception,⁹ and providing nutrients to the articular cartilage.¹⁰

Meniscus tears, the most common injury of the knee joint, occur 500,000¹¹ to 3,000,000¹² times per year with a male:female ratio of 2.5 - 4:1 and result in meniscectomy 61 per 100,000.¹³ The average cost of meniscus arthroscopic surgery is between \$7500 - \$9500 per procedure,¹⁴ but may go as high as \$30,000 depending on complexity of the procedure and geographic location.¹⁵

A large number of quality literature reviews draw conclusions from research studies dating back to 1923. Mark Lueck, DC, PT, DPT in his 2014 two-part article in *Dynamic Chiropractic* describes in detail the current state of understanding of different types of meniscus tears, current methodologies for diagnosis, and he presents a comprehensive list of relevant physical therapy exercises available for Chiropractors to consider including in a typical meniscus tear rehabilitation program.^{16,17}

Since Dr. Lueck's exhaustive article was published, several new conclusions have been drawn from systematic reviews of the literature that are of value to mention. Arthroscopic debridement is no longer considered to be of any benefit in the treatment of degenerative type meniscus tears. A conservative non-operative approach is now considered the standard of care.¹⁸ And, the Thessaly test is no longer considered to be valuable either alone or in conjunction with McMurray test in the diagnosis of meniscus tears;^{19,20,21} however, it may remain as a useful functional motion assessment for some.

Various surgical methodologies are currently under study to determine the efficacy at preserving the meniscus to decrease the progressive OA observed following partial or total meniscectomy including repair via reattachment, tissue augmentation, and transplant. It is important to note that tears of the meniscal root, which include avulsion of meniscal roots from the tibial plateau as well as radial tears within 1 cm from the attachment to the bone,^{22,23} are associated with similar degrees of joint degeneration over time as complete meniscectomies as this injury causes an

increase of peak pressure to the tibial plateau of 25%, which is the same amount determined following medial meniscectomy;²⁴ therefore, various methods of suturing the meniscus back to the tibial plateau are being attempted. This procedure is capable of restoring proper peak contact pressures;^{25,26,27} although, outcomes measured over time show mixed results based on the location of the tear. Surgical repair of Lateral Meniscal Posterior Root Tears (LMPRTs) do not appear to be of clinical benefit; whereas, Medial Meniscal Poster Root Tears (MMPRTs) show results better than partial meniscectomy. However, post operative MRI and second look arthroscopy shows that most of these do not heal.²⁸

Case Report:

A 35-year-old male in excellent health experienced a traumatic knee injury while practicing Capoeira, he heard a ‘pop’ sound, the knee swelled considerably, and it became locked in 20 degrees of flexion. He enjoyed an active lifestyle with his wife and two young children prior to his debilitating, acute knee injury.

This patient has a history of many physical traumas including a fractured right ulna at age 3, severe ankle sprain at age 13, a snowboarding fall left him numb from the waist down for several hours, and a near-death MVA causing severe internal organ hemorrhaging and several broken toes and fingers.

Following his injury he was examined by MRI, which revealed a multidirectional tear of the medial meniscus body and posterior horn. He consulted an orthopedist who recommended partial meniscectomy and warned of eventual knee replacement. He also tried the services of an acupuncturist, a chiropractor and a Rolfer with no relief.

The patient walked with a limp and a moderately swollen right knee. He complained of instability, quadriceps muscle weakness, moderate swelling, constant, moderate dull achy right knee pain, inability to fully flex or to fully extend his knee, soreness in the right calf muscles and increased pain when he tried to laterally rotate his right leg.

Exam Details:

The patient showed a positive Thessaly test at 20 degrees, a positive McMurray, and joint line tenderness upon palpation. There was a mildly positive anterior drawer test and a mildly positive Slocum’s test. MCL and LCL tested negative. He showed decreased right knee flexion and extension by 20 degrees as well as many subtle joint motion and palpable soft tissue asymmetries comparing right and left sides of the body. He also showed positive findings specific to chiropractic techniques used and explained later.

A multimodal approach to care was recommended for 12 weeks. Upon re-evaluation the patient showed continued improvement, and another 12 weeks of care was recommended after which time the patient regained near full function and was released from care.

Intervention/Methods

The patient's knee was treated using the Hendrickson Method which involved isometric and post isometric muscle energy techniques (METs) to the patient's quadriceps and hamstrings, and a figure-8 mobilization applied to the knee joint to restore near full knee flexion and most of extension. Deeper cross fiber strokes were used on painful areas around the knee joint, which stimulate fascial micro-tears as a means to support healing. And for rehabilitative purposes the patient was also instructed in the progressive practice of knee circles (Tai Chi warm up).²⁹

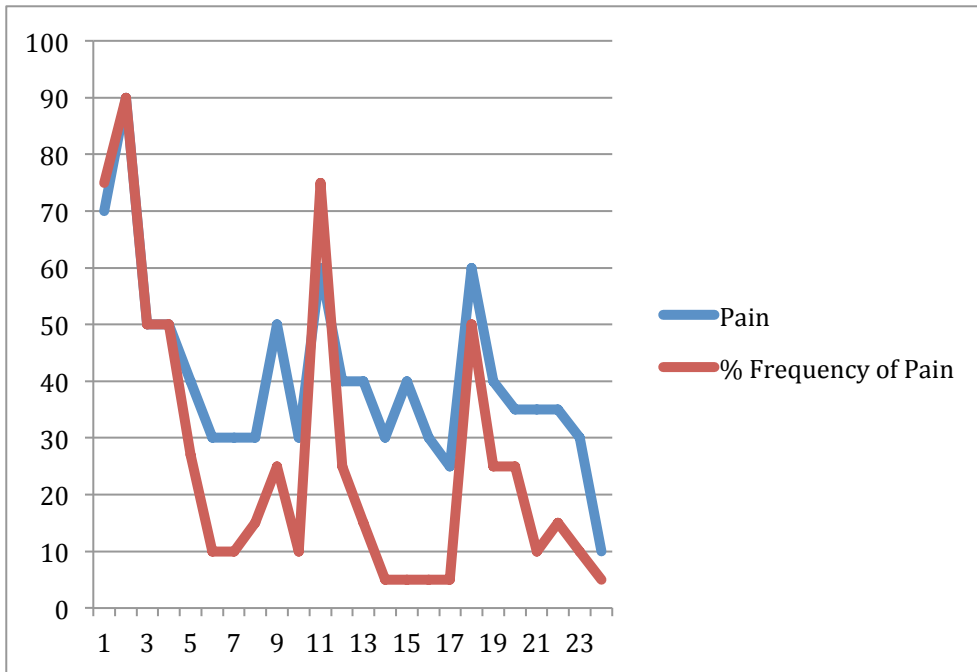
Activator Methods (AM) adjusting as well as motion palpation assessment of the patient showed a hypertonic right psoas and decreased right hip flexion. Hip adduction tested weak with patient supine, knees bent, feet together and flat on table, knees slightly apart. Using AM isolation testing to identify and adjust the right psoas and a right superior pubic bone all of these findings improved. Hypertonic left lumbar musculature and decreased right hip extension with patient prone improved with isolation testing and adjustment of a right later sacrum, which is typically consistent with a right hypertonic psoas. A right posterior and right lateral occiput AM adjustment normalized cervical spine translation with patient prone and is typically found as a biomechanically coupled partner to the right lateral sacrum.^{32,33} Following these adjustments all joint ranges of motion in the body were fairly uniform except for some subtle aspects of right knee/hip flexion and extension.

Sacro-Occipital Technique (SOT) assessment noted a right short leg persisted in the supine position along with medial knee pain on the short leg side, lateral knee pain to palpation on the long leg side, a positive upper right fossa test and cranial involvement. SOT blocks were placed under the patient's hips according to category 2 technique (spine blocking to balance pelvic torsion and reduce sacroiliac joint hypermobility), and cranial basic 2 was used to normalize motion at the spheno-basilar junction. Following application of this technique the leg length became equal and the hip and knee range of motion had improved. Later office visits included a few additional category 2 treatments however the remainder of office visits included intermittent blocking of category 1 (prone blocking to balance pelvic torsion), release of atlas dural tension and correction of SB+ (to release a sacral nutation restriction).⁴⁴

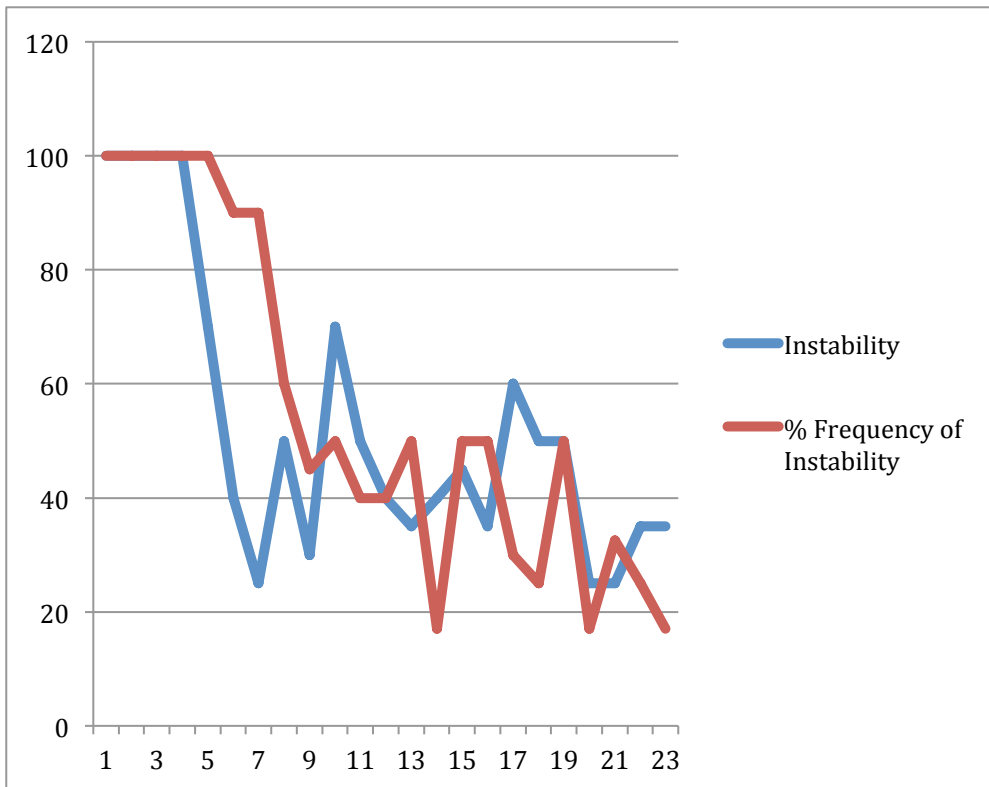
A multiradiance MR4 cold laser was used following current protocol for addressing the stages of inflammation and healing. The preset sweep settings were used to treat the most apparent presenting symptom of acute pain, chronic pain, swelling. The tissue healing setting was used near the end of care once pain and swelling were decreased.⁴⁵

Results:

Numbers from a 0 – 10 scale were recorded for pain and frequency of pain during each of the 24 office visits (x-axis). Pain numbers were multiplied times 10 in the chart below in order to show them next to the % frequency. An average improvement was noticed throughout the entirety of his 24 weekly office visit. Exacerbations were directly associated with over exertions during times of decreased pain.



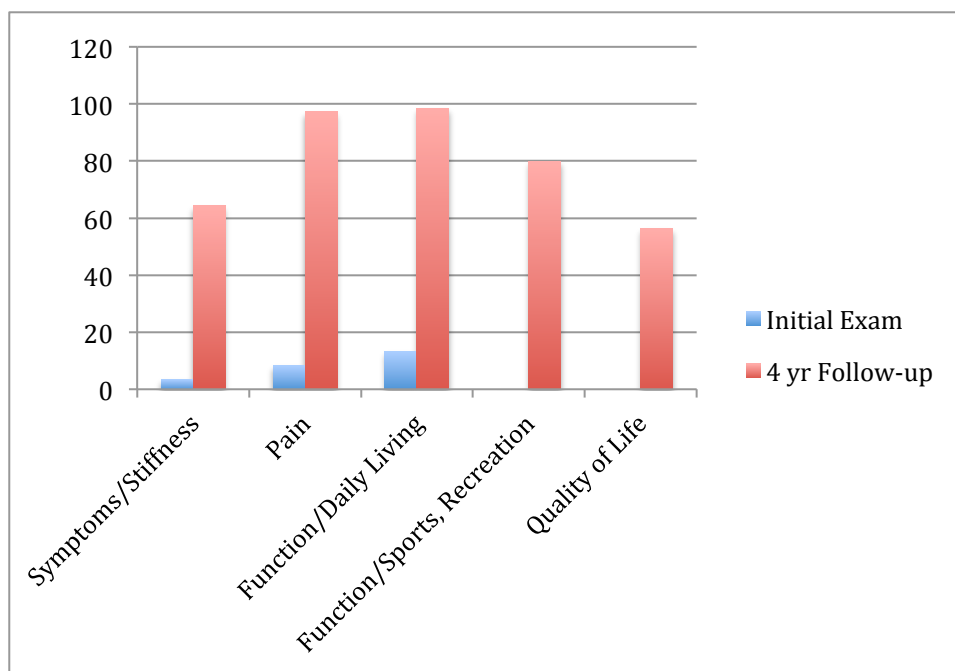
In the below chart numbers from the 0 – 10 scale for instability were multiplied times 10 and charted next to the percent of time the patient noticed the symptom during the week.



At a 4-year follow up exam reported pain was recorded as a 1 out of 10 with occurrences of instability 2 times per month mostly during strenuous activities like running on a beach. The patient reported returning successfully to hiking, biking, running while coaching his daughter's soccer team. He avoids dancing and Capoeira.

The Knee injury and Osteoarthritis Outcome Score (KOOS) is a standardized questionnaire used to assess the patients' opinion about the severity of their knee injury. 0% represents extreme pain or the total absence of knee function; whereas, 100% indicates full knee function and/or no knee pain.³⁴ Patient KOOS results are depicted in the table below.

At his 4-year follow-up for symptoms he showed a 1701% improvement, where his only reported symptoms were occasional, audible clicking in his knee, a 1067% improvement in reported pain where his only reported symptom was very infrequent, mild pain while pivoting especially if he fell behind on his stabilizing exercises. Function and daily living increased 644%. Function associated with sports and recreational activities improved 8000%. And, his quality of life improved 5625%.



Discussion:

A review of the literature revealed no randomized controlled trials investigating chiropractic adjusting with or without exercise for the treatment of meniscus tear; although, Chiropractic care has been studied for care of lower extremity kinematic chain imbalance.^{35, 36} Polkinghorn presented the first case of successful chiropractic management case of meniscus tear via multimodal approach in 1994, which made use of mechanically assisted instrument adjusting.³⁷ Jarosz and Ames presented a similar success in 2010 with a multimodal approach also

incorporating mechanically assisted instrument adjusting.³⁰ And, Brantingham published a case series in 2008 treating 4 cases of meniscus tear with diversified adjusting and exercise.³⁸

Various integrative methods were utilized in the assessment and treatment of this patient. The Hendrickson Method is an assessment and treatment system for soft tissue injuries consisting of cross fiber massage strokes, joint mobilizations and muscle energy techniques (METs) developed by Tom Hendrickson, D.C.²⁹ Hendrickson teaches that the fascia of the hamstrings is continuous with the fibers of the meniscus; therefore, deficits in unilateral hip flexion predispose the knee to injury as the hamstring on the affected side is shorter and tighter. Adding knee flexion and a twist during sports activity would add even more stress on the affected meniscus and may be akin to pulling a ripe fruit from a tree. Therefore, he suggests that normalizing hip flexion and joint end feel bilaterally is important to removing a major obstacle to knee joint healing.

Activator methods chiropractic adjusting provides a system of identifying specific joints in the body that when adjusted provide immediate and profound improvements in joint ranges of motion as well as immediate improvements in muscles strength. There are two other published cases of the Activator tool use proving to be useful for the treatment of an MRI confirmed meniscus tears where treatment resolved the patient's symptoms.^{30,31,37}

Sacro-Occipital Technique methods involves assessment of the whole body kinematic chain noting relationships between the cranium, cervical spine, spine, pelvis, hip, knee, and pedal dynamics. With this patient kinematic relationship was found clinically between the knee and pelvis as well as the pelvis and upper cervical and cranial regions. [I can get you references for this...]

A multiradiance MR4 cold laser was also used to reduce inflammation and to promote healing. Fitz-Ritson details many of the known mechanisms of action of low level laser therapy as well as the relevant therapeutic applications for the chiropractic patient.³⁹ Extensive treatment protocols are available online.⁴⁰

Further studies making use of gait analysis through wearable accelerometers and goniometers may help to quantify the important aspects of this approach. Accelerometry, a non-invasive tool for studying biomechanics, can be used to study the qualitative aspects of shock absorption in the knee and the improvements that likely occur through a multimodal approach to treating meniscal tears as well as other knee injuries.⁶ Tognetti et al describe a wearable system for knee joint angle measurement while walking, and they review similar advancements in technology which may prove useful for further research in this area.⁴¹ Comparisons may also be made between meniscus tears outcomes while studying normal vs. osteoarthritic knees as it is known that their contact areas and pressure distributions vary greatly.⁴²

Conclusion

While this study represents a single case conclusions cannot be assumed to be as effective for other patients. This case does however represent the fourth report of a chiropractic / multimodal approach being successful for the treatment of MRI confirmed meniscus tear. Further studies are

needed to guide patients and practitioners to the best practice for meniscus tear treatment. A blinded controlled study of a multimodal manual therapy approach with and without exercise employing these technological advancements in addition to the standard outcome based questionnaires seems in order. Combining chiropractic techniques, massage techniques and ancillary treatments such as cold laser can be a therapeutically and cost effective conservative approach to treating meniscus tears. Normalizing biomechanics as much as is possible in the body creates an environment conducive to joint healing.

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