

## **Rehabilitation of an isolated MCL injury in a 39 year old female non-competitive runner: A case study**

### **Abstract**

*Objective:* This paper will examine a rehabilitation program for a healthy non competitive 39 year old female who sustained an isolated injury (grade 1) to the right medial collateral ligament (MCL).

*Results:* Following a 3 week treatment plan focusing on active rehabilitation, utilizing concentric closed kinetic chain and proprioceptive exercises, a greater than 80% resolution of the primary complaint of knee pain was reported, with the patient resuming pre injury activity levels, specifically running.

*Discussion:* Conservative care, specifically rehabilitation is a mainstay treatment for knee injuries. For this isolated, grade 1 MCL sprain, closed chain kinetic exercises with a focus on increasing both strength and endurance in the quadriceps and hamstring musculature as well as increasing proprioception, were found to be effective.

*Key words/MeSH terms:* Medial collateral ligament, rehabilitation, unhappy triad, injury, knee

### **Introduction**

The knee is one of the most commonly injured joints in the body, with approximately 1/3 of the population reporting a previous history of either acute or chronic knee injury. Chronic injuries are often associated with impaired biomechanics, poor muscular conditioning, increased body weight and previous history of trauma, whereas acute injuries can occur as a result of a variety of activities, for example pivoting on the affected knee, increased forces produced upon the joint, such as acceleration-deceleration and hyperextension.<sup>1</sup> Post injury rehabilitation programs are therefore designed to increase muscular strength, re-establish joint mobility and neuromuscular control and to enable patients to return to pre injury activity levels.<sup>2</sup> During closed kinetic chain exercises, the amount of tibiofemoral shear force produced by the knee is located more posteriorly during muscle activity and the magnitude of the posterior shear force increases linearly to the amount of knee flexion. During open kinetic chain exercises, the magnitude of the resultant shear forces produced on the knee is maximal. Consequently the type of exercise that are prescribed to patients with knee injuries is of paramount importance when establishing a rehabilitation program for people with knee injuries, depending on degree of injury and stage of rehabilitation.<sup>1</sup> Not surprisingly, closed kinetic chain exercises are believed to help protect the knee from excessive shear forces while concurrently rehabilitating muscle strength and conditioning of the injured knee.<sup>2</sup>

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### **Case Report**

A 39 year old healthy, non competitive female runner presented to the clinic with a primary complaint of acute right knee pain of 1 week duration. She reported that she felt an immediate onset of pain following pivoting on the affected knee with the right foot planted. The patient reported that her pain was localized to the knee, in a horseshoe distribution travelling medially to laterally. The patient indicated that increased pain is felt at different times of the day with increased discomfort felt in the morning. Verbal pain rating was 8/10 at the time of the injury, however, her pain level had improved to approximately 5-6/10 since that time. Aggravating factors included climbing stairs, movement of the knee towards the body (hip flexion) and knee flexion. At this point ice has not offered the patient any tangible relief of her knee pain, however, the patient was instructed to maintain icing protocols to help control pain and inflammation (10 minutes on, 10 minutes off, 10 minutes on). Prior to her injury the patient was running 30-50 km per week in conjunction with some toning exercise as well as kickboxing.

Upon physical examination, it was noted that the patient exhibited an inability to equally bear weight on affected leg during gait assessment. A recommendation that the patient try to avoid limping behaviors as much as possible was made, in order to avoid abnormal motor patterns. Range of motion revealed full extension both actively and passively. Actively flexion was limited to 60 degrees due to pain with increased pain and muscle guarding noted with passive overpressure. Quadriceps and Hamstring muscular resistance was graded 4/5 on the affected side with associated give way weakness due to pain. Palpation and sensation of affected area was positive for medial joint line tenderness, with increased pain elicited with deeper palpation. Palpation directly overlying the MCL recreated the patient's chief complaint with respect to location of pain and was point specific to the MCL. Valgus stress test was positive for the patient's chief complaint at both 0 and 30 degrees of knee flexion, with increased pain elicited with external rotation of ankle and application of valgus stress. Varus stress test, anterior and posterior drawer tests were unremarkable. Of note, the patient was unable to perform a 1 leg squat test or duck waddle due to elevated pain levels.

At that time a diagnosis of an isolated, grade 1 MCL sprain was made and a 2 part treatment plan including an active rehabilitation component to address muscular strengthening and conditioning and proprioception and a passive component to address pain and joint inflammation including ice massage, ice application and acupuncture (SP 9, ST 35, 35, Extra 2, medial joint line, medial collateral ligament, high point of the vastus medialis oblique) was established. The rehabilitation exercises initially prescribed included seated isometric terminal knee extension at 180 degrees and isometric flexion at approximately 90 degrees, 1 legged standing on a flat surface. As the patient improved, more advanced exercises were prescribed accordingly. Additional proprioceptive exercises included 1 legged standing on a labile surface (balance discs) and standing on a wobble board (2 legged and 1 leg) were prescribed once the patient's pain allowed her to perform them with good form. Pelvic bridging (2 legs, 1 leg and on

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an exercise ball), wall sits with and without an exercise ball, hamstring curls on an exercise ball and squats utilizing an exercise ball were prescribed. Core strengthening exercises including front and side planking and arm-leg transfers with an exercise ball in a supine position were also given.

The patient was instructed to perform the strength and conditioning exercises every other day, with as many repetitions as possible with good form and to cease and desist if the chief complaint of right knee pain was reproduced with any exercise. Paperwork including pictorial representations and written instructions of each exercise were provided to the patient at each appointment when new exercises were prescribed. New exercises were reviewed at the subsequent appointment following their initial prescription in order to ensure that they were being done with the proper form.

A re-evaluation was done approximately 3 weeks post injury, with the patient reporting a greater than 80% improvement in her primary complaint of knee pain. As a result she was discharged from an active treatment plan and was advised to maintain the rehabilitation plan in order to maintain the strength and conditioning of the stabilizing musculature of her knee and help avoid a recurrence.

### **Discussion**

Although the MCL can be injured in combination with other structures, specifically the ACL and the medial meniscus, which is collectively known as the 'terrible triad', isolated MCL injuries are not uncommon.<sup>1,3</sup> The MCL component of a combined ACL-MCL injury has a worse prognosis than an isolated MCL injury. Isolated MCL injuries, even those as severe as a grade 3, usually heal spontaneously. Of note, surgical repair has not been found to enhance the healing process for MCL injuries of this severity.<sup>3</sup> It is known that the ability of an injured ligament to heal is dependent on a variety of factors, including anatomical location, presence of associated injuries and selected treatment modality.<sup>3</sup> From a clinical standpoint, grade 1 and 2 MCL injuries have been found to heal within 11 to 20 days post injury, whereas healing of a grade 3 MCL tear may continue for a number of years post injury.<sup>3</sup> A thorough knowledge of the effects of stress and motion on healing ligaments is of importance, as loading conditions that simulate stresses that can cause injury should be avoided from a rehabilitative perspective.<sup>3</sup> As a result closed chain exercises that limit the amount of joint stress can be utilized as part of a safe program to strengthen and condition the injured knee.<sup>2</sup>

### **Conclusion**

Ligament injuries are among the most common types of injuries seen in the knee. Although isolated ligament injuries can occur, as in this case, more often the ligaments in the knee are injured in combination with each other and other structures, specifically the anterior cruciate

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ligament and the meniscus, collectively known as the terrible triad. Given the mechanism of injury that this patient described and the signs and symptoms that the patient presented with, this author is confident in diagnosing this case as an isolated MCL 1<sup>st</sup> degree sprain and prescribing the appropriate rehabilitation, including closed chain kinetic exercises with a focus on proprioception, to effectively treat this injury.

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