Patellofemoral Syndrome: Don’t Overlook the Hip

By Jasper Sidhu, BSc, DC

Patellofemoral syndrome, also known as “runner’s knee,” is a common knee condition that presents to chiropractic offices. Most often, exercise is prescribed for patellofemoral syndrome, along with advice on education, home exercises and avoiding aggravating factors.

Treatments consist of various therapies from taping to patellar mobilization to active stretching and strengthening programs. All too often, treatment focuses primarily on the knee area. However, in order to effectively treat this condition, it is essential to look not only at local areas, but also distal to the site of injury, particularly the hip area.

Relative to patellofemoral syndrome, the literature discusses various causes and findings upon physical examination. These can include such things as muscle weakness in functional testing, gastrocnemius, hamstring, quadriceps or iliotibial band tightness, deficient hamstring or quadriceps strength, an excessive quadriceps (Q) angle, patellar compression or tilting, hypomobile or hypermobile tenderness of the lateral patellar retinaculum, and an abnormal VMO / VL reflex timing.\(^1\)\(^-\)\(^2\) Recently, there has been a general shift toward looking at lumbopelvic and hip muscle and joints.\(^3\)\(^-\)\(^4\)

**Hip Muscle Weakness, Gluteal Activation and Trunk Musculature**

Man running - Copyright â Stock Photo / Register Mark Research has shown that hip muscle weakness, more specifically of the hip abductors and external rotators, contributes to the increase in hip adduction and internal rotation generally seen in women with patellofemoral syndrome.\(^5\)\(^-\)\(^7\) A systematic review of the literature demonstrated a decrease in abduction, external rotation and extension strength of the affected hip compared to healthy controls.\(^8\) Therefore, adding strengthening of hip abductor and lateral rotator muscles provides additional benefits with respect to perceived pain symptoms during functional activities.\(^9\)

One of the most important and overlooked muscles to address is the gluteus maximus. Apart from being a strong hip extensor, it is the most powerful external rotator of the hip.\(^10\) One study looked at gluteal muscle activation during common therapeutic exercises.\(^11\) The single-limb squat and single-limb deadlift exercise led to the greatest activation of the gluteus maximus, while side-lying hip abduction was greatest for the gluteus medius.
These sorts of conclusions may lead to the assumption that hip muscle weakness correction will ultimately lead to restoration of normal kinematics. However, some studies have demonstrated that this may not be the case.\textsuperscript{12-13} Does this mean hip strengthening has no effect on patellofemoral syndrome? Not at all. What we can conclude is that hip strengthening is just one of many areas to address. Apart from hip strengthening, the clinician also needs to look at altered proprioception and neuromuscular control as potential factors contributing to patellofemoral syndrome.\textsuperscript{14-16}

Development of core programs to address the trunk musculature (abdominals, transverse abdominis, obliques, multifidi, erector spinae) is recommended to provide a total rehabilitation program for a multifactorial condition such as patellofemoral syndrome. In addition to rehabilitation exercises, lumbopelvic dysfunctions should be addressed with spinal manipulation. Quadriceps muscle function in patients with patellofemoral syndrome has been shown to improve following lumbopelvic manipulation.\textsuperscript{17}

In addition to assessing muscle weakness around the hip joint, the clinical exam should also focus on muscle tightness. Common muscles that cross the hip joint and can be affected include the piriformis, hamstring and iliotibial muscles. A study by Piva SR, et al., found that patients with patellofemoral syndrome demonstrated significantly less flexibility of the gastrocnemius, soleus, quadriceps and hamstrings compared to healthy control subjects.\textsuperscript{18} With respect to the iliotibial band, a tight iliotibial band has been shown to increase tibial external rotation, increase patellar lateral translation and tilt, thereby suggesting an increase in lateral cartilage pressure.\textsuperscript{19}

Another study found a correlation between a tight iliotibial band and patellofemoral syndrome.\textsuperscript{20} (However, there was uncertainty whether a tight ITB is the cause or effect of patellofemoral syndrome.) Either way, focusing on a rehabilitation program that addresses the entire kinetic chain, including the hip area, is crucial to ensure we take care of the entire spectrum of causes that can be attributed to this condition.

**A Comprehensive Program to Address Patellofemoral Dysfunction**

After examining the hip and associated musculature, you can develop a progressive program to address dysfunctions. Initial treatments should consist of general stretching of the tight muscles, such as the iliotibial band, hamstrings and quadriceps. Addressing lumbopelvic dysfunctions with spinal manipulation is also recommended throughout the length of treatment. In addition, isolated muscle recruitment is recommended. These can include bridging exercises to address the hip extensors.\textsuperscript{21}
For example, an exercise band can be wrapped around the thigh area, with instructions to raise the hip while externally rotating and abducting the hips. Care must be taken to prevent the patient from internally rotating and adducting the thighs as their hips lower. Constant feedback is required to ensure that the exercise is performed properly.

Side-lying clam exercises should also be initiated to address the hip abductors. The patient can initially perform this activity with no resistance. Position the patient in side-lying with their feet together and knees at 45 degree flexion. Then instruct them to lift the top thigh up and back. Adding bands to increase resistance is feasible once the patient is able to demonstrate proper form.

Next, progress the patient to double-limb weight-bearing exercises, such as squats. Initially, the patient should be instructed to maintain a knee angle of 0-50 degrees when performing squat exercises. One study assessed the amount of compressive patellofemoral forces and stresses during a wall squat and one-legged squat, suggesting that greater compressive forces are seen at angles greater than 60 degrees. Hamstring flexibility should also be assessed continually at this stage, considering that reduced hamstring length has a correlation with increased patellofemoral stress during a squat exercise.

Vibration exercise may also be effective in generating increased muscle force and recruitment in a squat exercise without increasing joint angle. Use a static position in a knee angle up to 50 degrees while increasing acceleration of the platform to generate more force instead of increasing joint angle or placing additional weight loads on the patient. Strength gains have been reported to be similar to conventional strength training.

Once squats have been completed successfully, the patient can progress to squat side-walking. At a 45 degree angle and with an exercise band wrapped around the thigh, the patient should be instructed to walk sideways from one side of the room to the other, focusing on externally rotating and abducting the hips during the movement.

The next phase of rehabilitation involves progressing from double-limb weight-bearing exercises to single-leg exercises. These can be in the form of single-limb sit to stand, step-downs, single-leg squats, single-leg deadlifts, and eventually forward and multiple-angle lunges. As with the squat exercise, research has shown that keeping early angles between 0 and 50 degrees in forward and side lunges is warranted, considering the increased compressive forces with greater angles.
In addition, lunges should be performed with a long step rather than a short step, considering short step produces more significant compressive forces on the patellofemoral joint.26 The long lunge emphasizes the glutes, while the short lunge emphasizes the quadriceps, thereby making it an ideal exercise to address gluteal weakness.

Finally, rehabilitation can encompass more functional sport-specific exercises, such as double-limb vertical jumps and double-limb landings, and then ultimately to sport-specific movements that the patient would be doing upon discharge.

The hip joint is one of the most overlooked areas in the treatment and rehabilitation of patellofemoral syndrome. By addressing the hip muscles and joints with appropriate stretching and strengthening, in addition to lumbopelvic dysfunctions with spinal manipulation, you can provide a much more effective rehabilitation program for patients who present with this common condition.

References


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