

Orthopaedic Observations

A Matter of Medicine...

TM Pending

“My Knee Hurts!” Patellofemoral Syndrome

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Physical therapy is the provision of services provided to individuals and communities used to maintain, develop, and restore movement and functional activities. Physical therapy services are performed in situations when an individual's movement and functional status are endangered. The individuals status may be endangered due to aging, trauma, or

disease. As health professionals, therapists provide individuals with an assessment, diagnosis, and treatment plan. Therapists see patients daily in various settings to treat complaints of various aches and pains. One of the most common complaints is knee pain which can be either a microtrauma (repetitive activity) or macrotrauma (acute trauma). In order to treat patients suffering from knee pain, the therapist must be competent in differential diagnosis of various pathologies that may refer pain to the knees. A common diagnosis in the knee is that of patellofemoral syndrome.

In order to understand patellofemoral syndrome, one must first review the anatomy of the knee. The knee is a joint that is highly vulnerable to traumatic or repetitive injuries. The knee joint is comprised of 2 bones, the femur “sitting” on the tibia. The joint depends on its ligaments and the surrounding musculature to provide strength and stability. The main joints of the knee are the tibiofemoral joint and the patellofemoral joint. The tibiofemoral joint, the largest joint in the body, is a hinged joint that allows flexion and extension. The patellofemoral joint is a plane joint and the patella contains the body's thickest layer of cartilage, which is found on the dorsal aspect.

The knee consists of 4 ligaments and 2 menisci which aid in the stability of the joint. The ligaments are the anterior/posterior cruciate ligaments, and the medial/lateral cruciate ligaments. The ACL/PCL ligaments limit anterior and posterior translation of the tibia on the femur and the MCL/LCL limit varus/valgus movement of the knee. Fin-

ally the medial/lateral menisci act as shock absorbers and aid in lubrication and nutrition of the knee.

The surfaces of the femur and the tibia are not similar, which allows for the movement of the two bones different amounts. The motions of the knee are flexion and extension. Full knee flexion is 135° and knee extension is 0° but may be -15° (hypertension), which is more common in women than men. During the movements of flexion and extension of the knee various parts of the patella articulate with the femoral condyles. Malalignment and/or abnormal tracking of the patella can lead to patellofemoral syndrome.

The patella has many important functions. It improves the efficiency of knee extension during the last 30°, acts as a guide for the patellar tendon, and it helps to control the capsular tension in the knee. Various positions of the knee during activity will increase the forces the body feels through the patellofemoral joint.

Patellar Loading with Activity

Walking	0.3 times the body weight
Climbing Stairs	2.5 times the body weight
Descending Stairs	3.5 times the body weight
Squatting	7 times the body weight

Patellofemoral syndrome is caused by malignment of the patella and/or by abnormal tracking of the patella. The malignment or abnormal tracking causes increased and inappropriate forces between areas of the patella and the femur. Most often a patient experiencing patellofemoral pain will present with a lateral glide of the patella with the knee in full extension. Other factors associated with this syndrome are weak vastus medialis obliquus, excessive

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pronation, excessive knee valgus, patella alta, and hypomobility in the iliotibial band, hamstrings, gastrocnemius, and vastus lateralis. Patellofemoral syndrome will cause damage to the articular cartilage on the dorsal aspect of the patella.

The exact cause of patellofemoral syndrome is unknown but it is more common in adolescences, greater in females than males, and is directly related to activity level. In the older population, patellofemoral syndrome will be associated with osteoarthritis. Patients that present with patellofemoral pain most often describe a gradual onset of anterior retropatellar pain that occurs following an increase in physical activity. The pain is increased during activities that increase the patellofemoral forces such as running, jumping, climbing, and squatting. Pain to palpation will be noted at the lateral border of the patella and joint crepitus may be palpated during active movements of the knee when the patella is manually compressed into the trochlear groove. Visible atrophy may be seen in the quadriceps particularly along the vastus medialis obliquus. Complaints of burning pain may also be described by the patient when sitting for prolonged periods of time or while ascending stairs.

Patients diagnosed with patellofemoral syndrome will often have an increased Q angle. The Q angle in males is typically 13 degrees and 18 degrees in females. The Q angle is measured using the anterior superior iliac crest, the mid patella, and the tibial tubercle. Alterations in the Q angle will affect the biomechanics of the patellofemoral joint. The Q angle is increased by genu valgum, increased femoral anteversion, a lateral positioned tibial tuberosity, and from a tight lateral retinaculum.

Clarke's sign is a special test that is used by physicians/physical therapists when attempting to confirm the diagnosis. The test is performed by applying pressure proximal to the upper pole of the patella with the examiner asking the patient to contract the quadriceps. A positive sign will elicit retropatellar pain or the inability to fully contract the quadriceps.

Conservative treatment is the mainstay with patients that present with patellofemoral syndrome with surgical intervention being rare. The physician may prescribe non steroidal anti-inflammatory drugs or recommend taking acetaminophen to decrease inflammation. In severe cases, a cortisone shot may be recom-

mended by the physician. Physical therapy would include: controlling edema, strengthening, stretching, improving pain-free range of motion, and the discussion and implementation of activity modification. Patellar mobilizations will be used to increase the medial glide of the patella. Strengthening activities will focus on the quadriceps specifically the vastus medialis obliquus and consist of open and closed chain exercises. Exercises may include quad sets, straight leg raises, short arc quads, long arc quads, mini squats, and isometric hip adduction. Stretching will focus on the hamstrings, tensor faciae, iliotibial band, rectus femoris, and gastroc soleus complex. Patellar taping may also be used by the physical therapist to improve the resting position of the patella, maintain normal tracking and decrease irritation during dynamic activities while rehabilitating.

Most patients that present with patellofemoral symptoms will respond well to physical therapy returning to their activities pain-free within 4-6 weeks. It is important to keep in mind that exacerbations may occur with increased activity level. Failure to address the symptoms will result in increasing knee pain ultimately affecting the patients ability to participate in pain-free activities of daily living and leisure activities as well as continued damage/wearing of the articular cartilage on the dorsal aspect of the patella.

Magee, David J. Orthopaedic Physical Assessment. Philadelphia: Saunders, 2002.

Jonathan graduated from Quinnipiac University with a Bachelors in Health and Science Studies in 2006 and then with his Masters in Physical Therapy in 2007. He started with The Orthopaedic Group, LLC in 2004 as a physical therapy aide while pursuing his Masters Degree At Quinnipiac. Jonathan's participation in sports throughout his life as well as various athletic injuries have led him into the orthopedic field. He has a particular interest in the treatment of shoulder pathologies. Recently, Jonathan completed his clinical affiliations with a primary focus in outpatient orthopedics with extensive work in manual therapy.