

# What to Do About Quadriceps Injuries

## Physiotherapy in Ottawa Area for Knee

Is your 'quad" injured? Physiocare Physiotherapy & Rehab Centre clients suffering from quadriceps injury may find this article of interest, which explains the conservative and surgical treatment options for quadriceps injury and tendinosis.

Many will remember the attack on U.S. ice skater Nancy Kerrigan when she was struck on the knee during a practice session by a hired assailant. The injury forced her to withdraw from the competition at that time. Most traumatic knee injuries are not that dramatic but can be very disabling just the same. In this review, orthopedic surgeons from the University of Colorado team up with experts from the New York University Hospital for Joint Diseases to review quadriceps tendon injuries. The assessment, diagnosis, and treatment of three problems are covered: quadriceps tendinosis, partial quadriceps tears, and complete quadriceps tendon ruptures.

The quadriceps muscle along the front of the thigh is made up of four muscles that attach to the quadriceps tendon: rectus femoris, vastus lateralis, vastus medialis, and vastus intermedius. Together, the quadriceps muscles, patellar tendon (where the quadriceps tendon attaches around and below the patella), and the patella (kneecap) form the extensor mechanism. The extensor mechanism is the motor that drives the knee joint and allows us to walk. It straightens the knee when the quadriceps muscle contracts making it possible to climb up stairs or get up from a sitting position.

Any injury to the quadriceps muscle or tendon affects the extensor mechanism causing pain, loss of knee extension, and loss of function. You've probably heard of tendinitis, an acute inflammatory process affecting tendons. But what is quadriceps tendinosis? The term tendinosis tells us that the injury is chronic (been there a long time). When examined under a microscope or with advanced imaging such as ultrasound or MRI, there is degeneration of the tissue but without any sign of inflammation.

A specific type of patellar tendinosis seen in athletes who repeatedly jump is known as peripatellar tendinosis or more commonly known as jumper's knee. At first there's an inflammatory response to overuse or repetitive motion. Acute inflammation occurs as tiny tears called microtears develop around the patellar tendon. These microtears can occur where the tendon inserts on the patella or on the tibial tuberosity, a bump on the lower leg bone just below the kneecap. The inflammatory process ends resulting in scar tissue that replaces the destroyed tendon tissue. That's when a tendinitis becomes a tendinosis.

Tendon tears are usually the result of an active injury either while engaged in a sports activity or from a fall. Less often, as in the case of the skater, trauma from a direct blow can cause the same kind of damage. Besides athletes, older adults are at risk for quadriceps tendon tears. For a long time, it was believed that a loss of balance and fall led to tendon ruptures. But more recent evidence has shown that weakness of the tendon from age-related degeneration causes tendon rupture first, then the fall. The fall is the result of the loss of knee joint stability from the torn tendon.

Older men, especially older black men seem to be affected most often. The injury doesn't just come out of the blue. Other risk factors include the use of certain antibiotics (fluoroquinolones) or steroids. Having a chronic, systemic health problem like diabetes, lupus, rheumatoid arthritis, gout, or kidney disease increases the risk of quadriceps tendon rupture considerably.

Although the patient with a quadriceps tear is in pain, he or she is usually still able to contract the quadriceps muscle and extend the knee. If the entire tendon is torn, then this motion becomes impossible and the injury is declared a rupture. Without the quadriceps muscle, the patient cannot extend the knee or stand on the leg and walk. It's clear that there is a significant problem!

To make sure the exact problem is diagnosed and the proper treatment planned, diagnostic imaging is needed. The orthopedic surgeon may begin with X-rays to see if there are any bone fractures or a change in the position of the patella. Ultrasound testing is next. The ultrasound can show any defects in the quadriceps tendon. It is a quick, easy, and painless test that is also less painful to the pocketbook (i.e., much less expensive than MRIs). But MRIs may be needed if the surgeon suspects damage inside the knee joint.

Once the diagnosis has been made, a plan of care is developed. It may involve rest and activity modification with physiotherapy to help alleviate pain at first. Surgery isn't usually required for tendinosis. The patient with this problem will progress through rehab to restore normal function, flexibility, strength, and motion of the knee (and leg). It's only when all these things have been tried with no success that the surgeon may have to consider removing some of the degenerated tissue. Fibrosis and calcification (hardening) of the tendon may make recovery impossible without surgical intervention.

Partial tears are treated in a similar fashion. If there's been significant bleeding into the joint, the surgeon may have to remove the fluid that has built up. The procedure helps speed up healing. The old R.I.C.E. standby (rest, ice, compression, elevation) is still used. Antiinflammatory drugs may be prescribed for some patients. But research has shown that the use of these medications can delay tendon healing, so they are no longer used routinely. The leg is kept straight in a splint for three to six weeks depending on how big the tear is.

Once the patient can contract that muscle and lift the leg up off the table, the immobilizer can be taken off and rehab begun. Failure to recover following this formula means the patient becomes a surgical candidate. The surgeon cleans up the area removing any scar tissue, debris, and frayed edges of the torn tendon. This procedure is called debridement. Then the torn layers of the tendon are stitched back together. Surgical repair of this type is almost always required for a complete tendon rupture -- and usually the sooner, the better.

There are different ways to repair a complete quadriceps tendon rupture. The surgeon may use drill holes, screws, sutures, suture anchors, or wires to reattach the tendon to the bone. It all depends on the location of the rupture, the condition of the tissues, and the extent of damage. It may be necessary to reinforce the defective tendon, especially if the patient is older with obvious signs of tissue degeneration.

The leg is protected in a brace or cast that holds the knee in 30 degrees of flexion. That means the patient can't straighten the knee all the way. This position allows the tendon to heal without any pulling on the fixation site from the muscle contracting. After surgery, patients may begin walking on the leg right away. That's a fairly new approach based on studies that show early mobilization actually helps tendons heal. Some surgeons tell their patients to put full weight on the leg. Others recommend only partial weight-bearing for the first six weeks and then progress to full weight.

When tendon repair has been delayed long enough, the torn end of the quadriceps tendon retracts or pulls back. Scar tissue around the torn end of the tendon can make it difficult to just pull it back down and reattach it (this can be done more easily when the procedure is done soon after the injury). If the surgeon can't get the tendon down close enough to reattach it at least near its original insertion point, then the procedure changes from a tendon rupture repair to a reconstruction procedure. This calls for some fancy footwork on the part of the surgeon.

The authors discuss various surgical options for reconstruction. It may be possible to take a piece of tendon from the hamstring muscle behind the knee and use it to make the quadriceps tendon long enough to reattach. Other options include a V-shaped turn down flap and Leeds-Keio ligament, a manmade device that promotes the formation of collagen tissue around it. In this way, the body fills in the gap with its own repair tissue. Another approach is to cut the quadriceps muscle itself to make it longer. The authors describe this technique (Codvilla quadriceps lengthening technique) for surgeons planning treatment for these patients.

A follow-up look at patients with quadriceps tendinosis and partial tears shows good results and satisfied patients. Repair or reconstruction of tendon ruptures can be more problematic. Some patients don't get their full motion (extension) back. That means they won't have full strength or full function of that knee and leg. Even those who do get their full motion back don't get full strength. In fact, studies show that half of all repaired quadriceps tendon ruptures result in quadriceps muscle weakness even years later. Rerupture of the tendon is always a concern.

The authors conclude that the more involved quadriceps tendon ruptures (compared with tendinosis or partial tears) are rare but treatable. Any time a condition is rare, research to provide evidence of the best way to treat it is difficult. Currently, there are no large studies comparing treatment approaches or even outcomes from different surgical procedures. Research is needed to answer these questions, look at who is at risk for complications, and answer the question about delayed weight-bearing post-operatively (i.e., how soon can patients put full weight on the knee).

Reference: David J. Hak, MD, MBA, et al. Quadriceps Tendon Injuries. In *Orthopedics*. January 2010. Vol. 33. No. 1. Pp. 40-46.