

Patellofemoral Problems

Introduction



Welcome to BodyZone Physiotherapy's patient resource about Patellofemoral Problems.

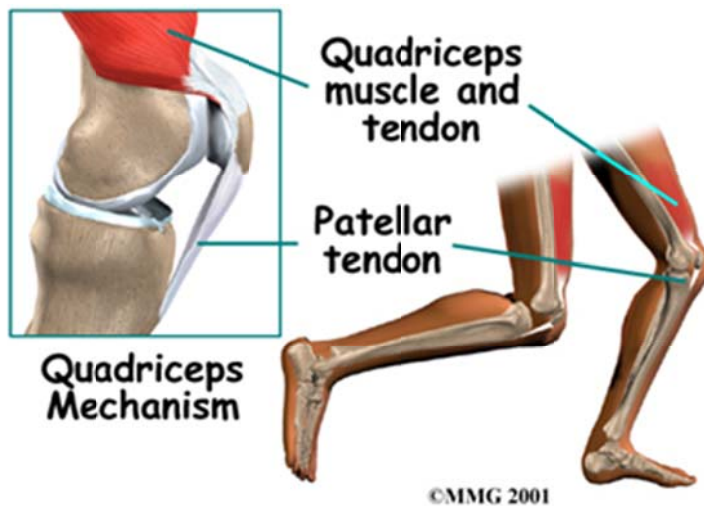
The patella, or kneecap, can be a source of knee pain when it fails to function properly. Alignment or overuse of the patella can lead to wear and tear of the cartilage behind the patella. This produces pain, weakness, and swelling in the knee joint. Several different problems can affect the patella and the groove it slides through in the knee joint. These problems can affect people of all ages.

This guide will help you understand:

- how the kneecap works
- why kneecap problems develop
- what can be done to treat these problems

Anatomy

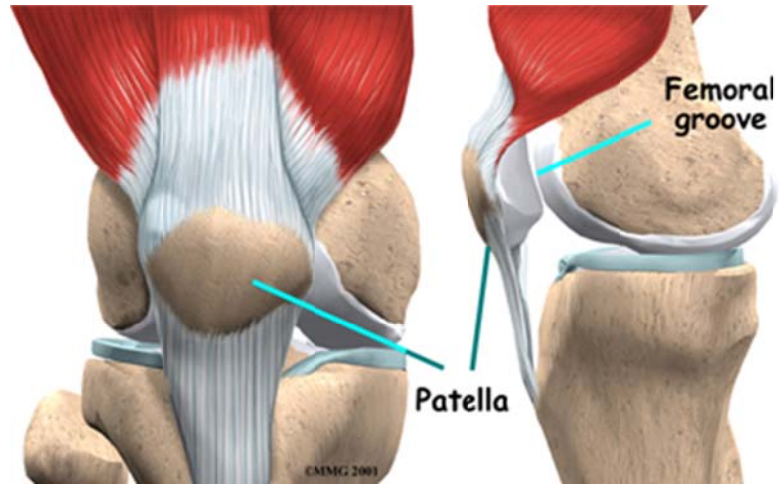
What is the patella, and what does it do?



The patella (kneecap) is the moveable bone on the front of the knee. This unique bone is wrapped inside a tendon that connects the large muscles on the front of the thigh, the *quadriceps* muscles, to the lower leg bone. The large quadriceps tendon together with the patella is called the **quadriceps mechanism**. Though we think of it as a single device, the mechanism has two separate tendons, the *quadriceps tendon* on top of the patella and the *patellar tendon* below it.

Tightening up the quadriceps muscles places a pull on the tendons of the quadriceps mechanism. This action causes the knee to straighten. The patella acts like a fulcrum to increase the force of the quadriceps muscles.

The underside of the patella is covered with *articular cartilage*, the smooth, slippery covering found on joint surfaces. This covering helps the patella glide (or *track*) in a special groove made by the thighbone, or *femur*. This groove is called the *femoral groove*.

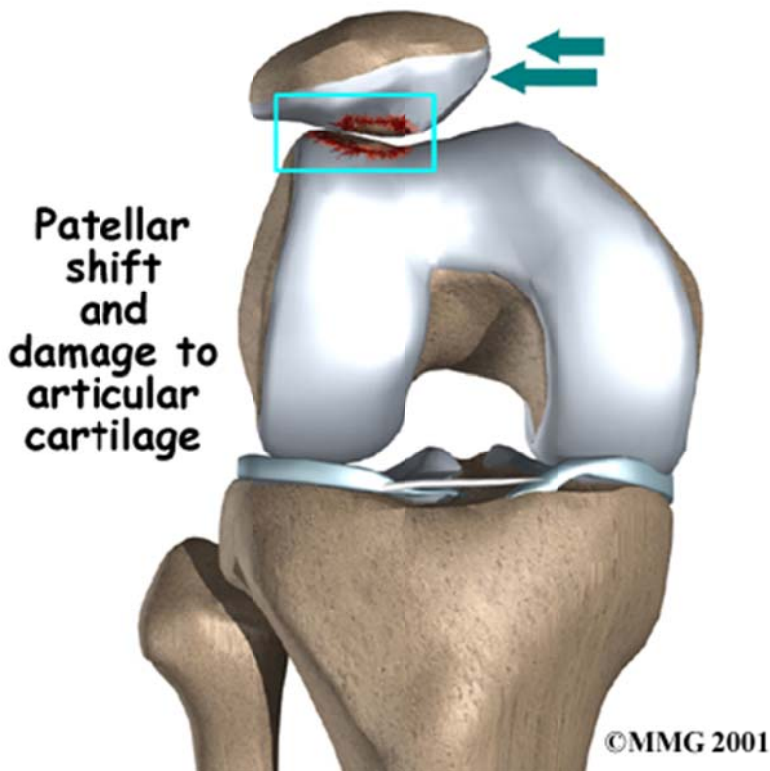


Two muscles of the thigh attach to the patella and help control its position in the femoral groove as the leg straightens. These muscles are the *vastus medialis obliquus* (VMO) and the *vastus lateralis* (VL). The VMO runs along the inside of the thigh and the VL lies along the outside of the thigh. If the timing between these two muscles is off, the patella may be out of track.

Causes

How do these problems develop?

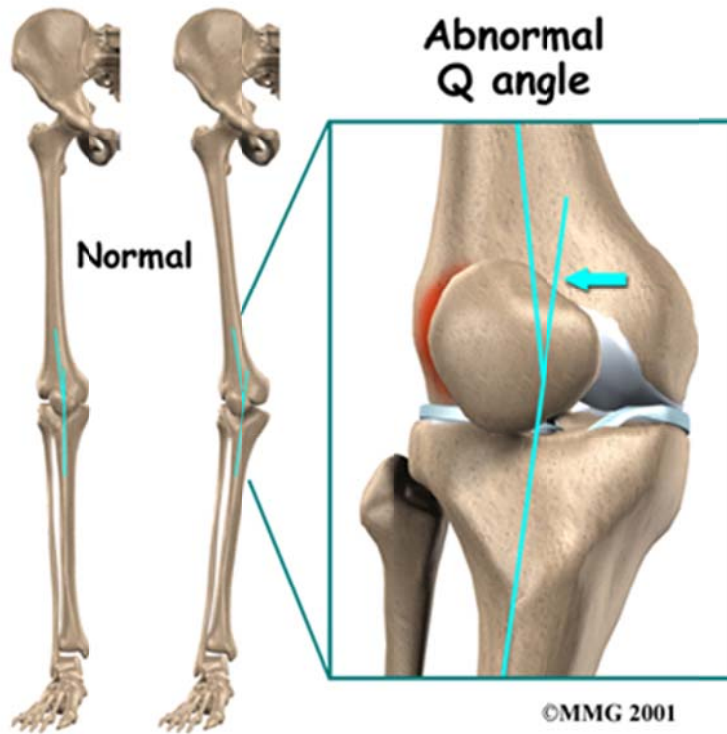
Problems commonly develop when the patella suffers wear and tear. The underlying cartilage begins to degenerate, a condition sometimes referred to as *chondromalacia patella*. Wear and tear can develop for several reasons. Degeneration may develop as part of the aging process, like putting a lot of miles on a car. The patellofemoral joint is usually a part of osteoarthritis of the knee.



One of the more common causes of knee pain is a problem in the way the patella tracks within the femoral groove as the knee moves. The quadriceps muscle helps control the patella so it stays within this groove. If part of the quadriceps is weak for any reason, a muscle imbalance can occur. When this happens, the pull of the quadriceps muscle may cause the patella to **pull more to one side** than the other. This in turn causes more pressure on the articular cartilage on one side than the other. At the same time, this pressure can damage the articular cartilage.

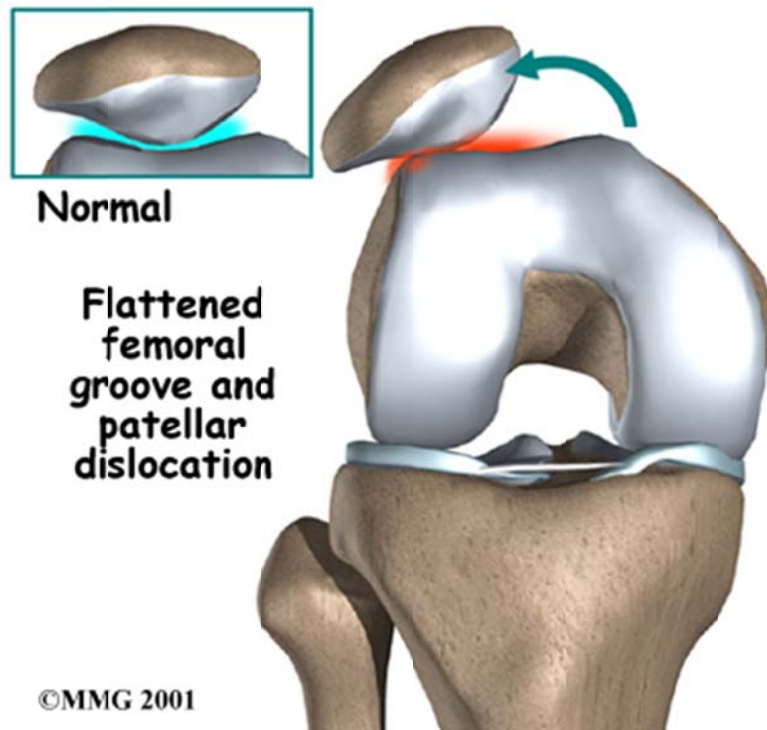
Weakness of the muscles around the hip can also indirectly affect the patella and can lead to patellofemoral joint pain. Weakness of the muscles that pull the hip out and away from the other leg, the hip abductor muscles, can lead to a valgus alignment of the entire leg - including the knee joint and the muscle balance of the muscles around the knee. This causes abnormal tracking of the patella within the femoral groove and eventually pain around the patella. Many people are confused when their physiotherapist begins exercises to strengthen and balance the hip muscles, but there is a very good reason that the therapist is focusing on this area.

A similar problem can happen when the timing of the quadriceps muscles is off. There are four muscles that form the quadriceps muscle group. As mentioned earlier, the VMO is one of these four muscles. The VMO is the section of the quadriceps on the inside of the front of the thigh. The VL runs down the outside part of the thigh. People with patellofemoral pain sometimes have problems in the timing between the VMO and the VL. The VL contracts first, before the VMO. This causes the VL to pull the patella toward the outside edge of the knee. The result is abnormal pressure on the articular surface of the patella.



Another type of imbalance may exist due to differences in how the bones of the knee are shaped. These differences, or *anatomic variations*, are something people are born with. Some people are born with a **greater than normal angle** where the femur and the *tibia* (shinbone) come together at the knee. Women tend to have a greater angle here than men. The patella normally sits at the center of this angle within the femoral groove. When the quadriceps muscle contracts, the angle in the knee straightens, pushing the patella to the outside of the femoral groove. In cases where this angle is increased, the patella tends to shift outward with greater pressure. This leads to a tracking problem as that described above. As the patella slides through the groove, it shifts to the outside. This places more pressure on one side than the other, leading to damage to the underlying articular cartilage.

Biomechanical issues in the foot can change the alignment and rotation of the tibia and alter the angle of pull of the quadriceps tendon. This too can lead to tracking problems of the patella in the femoral groove or breakdown of the patella tendon.



Finally, anatomic variations in the bones of the knee can occur such that one side of the femoral groove is smaller than normal. This creates a situation where the groove is too shallow, usually on the outside part of the knee. People with a shallow groove sometimes have their patella slip sideways out of the groove, causing a **patellar dislocation**. This is painful when it occurs, but it can damage the articular cartilage underneath the patella. If this occurs repeatedly, degeneration of the patellofemoral joint occurs fairly rapidly.

People who have a *high-riding* patella are also at risk of having their patella dislocate. In this condition, called *patella alta*, the patella sits high on the femur where the groove is very shallow. Here the sides of the femoral groove provide a small barrier to keep the high-riding patella in place. A strong contraction of the quadriceps muscle can easily push the patella over the edge and out of the groove, leading to a patellar dislocation. Patella alta is most common in girls and those who have generalized *laxity* (looseness) in their joints.

Symptoms

What do patellar problems feel like?

When people have patellofemoral problems, they sometimes report a sensation like the patella is slipping. This is usually a reflex response to pain and not because there is any instability in the knee.

Others report having pain around the front part of the knee or along the edges of the kneecap. These symptoms may be due to problems with the way the patella lines up in the femoral groove. But symptoms of patellar pain can happen even when the patella appears to be lined up properly.

Patellofemoral problems exist when there is damage to the articular cartilage underneath the patella. This does not necessarily mean that the knee will be painful. Some people never have problems. Others experience vague pain that isn't centered in any one spot. Sometimes pain is felt along the inside edge of the patella, though it may be felt around or behind the patella. Typically, people who have patellofemoral problems experience pain when walking stairs or hills. Keeping the knee bent for long periods, as in sitting in a car or movie theater, may cause pain.

The knee may grind, or you may hear a crunching sound when you squat or go up and down stairs. If there is a certain amount of wear and tear, you may feel popping or clicking as you bend your knee. This can happen when the underside of the patella rubs against the femoral groove. The knee may swell with heavy use and become stiff. This is usually because of fluid accumulating inside the knee joint, sometimes called *water on the knee*. This is unique to problems of the patella but sometimes occurs when the knee becomes inflamed.

Diagnosis

When you visit BodyZone Physiotherapy, your diagnosis will begin with our physiotherapist taking a complete history of your knee problem followed by an examination of the knee, including the patella. Diagnosing problems with the patella can be confusing. The symptoms can be easily confused with other knee problems, because the symptoms are often similar.

Some patients may be referred to a doctor for further diagnosis. Once your diagnostic examination is complete, our physiotherapists at BodyZone Physiotherapy have treatment options that will help speed your recovery, so that you can quickly return to your active lifestyle.

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Our Treatment

Non-surgical Rehabilitation

Although the time required for recovery varies, patients with patellofemoral problems often benefit from four to six weeks of physiotherapy. The aim of treatment is to calm pain and inflammation, to correct muscle imbalances, and to improve the function of the patella.

Treatment for a patellar problem begins by decreasing the inflammation in the knee. Your physiotherapist at BodyZone Physiotherapy may suggest rest and anti-inflammatory medications, such as aspirin or ibuprofen, especially when the problem is coming from overuse. Physiotherapy can help in the early stages by decreasing pain and inflammation. Our physiotherapist may use ice massage, ultrasound and electrical stimulation to limit pain and swelling.

As the pain and inflammation become controlled, our physiotherapist will work with you to improve flexibility, strength, and muscle balance in the knee.

Muscle imbalances are commonly treated with stretching and strengthening exercises. Flexibility exercises are often designed for the thigh and calf muscles. Our physiotherapist will use guided exercises to maximize control and strength of the quadriceps muscles.

Bracing or taping the patella can help you do exercises and activities with less pain. Most braces for patellofemoral

are made of soft fabric, such as cloth or neoprene. You slide them onto your knee like a sleeve. A small *buttress* is placed on the side of the patella to keep it lined up within the groove of the femur. An alternative to bracing is to tape the patella. Our physiotherapist applies and adjusts the tape over the knee to help realign the patella. The idea is that by bracing or taping the knee, the patella stays in better alignment within the femoral groove. This in turn is thought to improve the function of the quadriceps muscle so that the patella stays lined up in the groove. Patients report less pain and improved function with these forms of treatment. Our physiotherapist will also examine and address any biomechanical issues with the foot and ankle with manual therapy or strengthening. He or she may also suggest special shoe inserts, called *orthotics*, to improve your knee alignment and function of the patella.

Post-surgical Rehabilitation

Most patients take part in formal physiotherapy after knee surgery for patellofemoral problems. Patients undergoing patellar shaving usually begin rehabilitation right away. More involved surgeries for patellar realignment or restoration of the articular cartilage require a delay before going to therapy. And rehabilitation may be slower to return to normal bone or cartilage to heal before too much strain can be put on the knee.

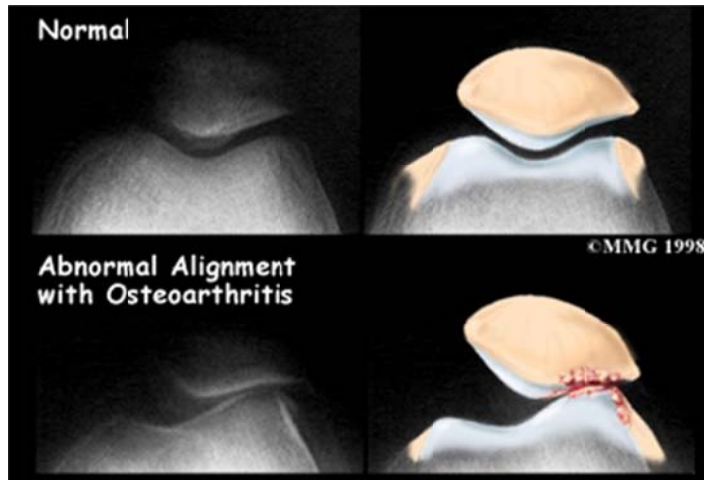
When you begin your BodyZone Physiotherapy program, our first few physiotherapy treatments are designed to reduce the pain and swelling from the surgery. Our physiotherapist will choose exercises to help improve knee motion and tone the quadriceps muscles toned and active again. *Muscle stimulation*, using electrodes over the quadriceps muscle, may be needed at first to get the muscle moving again.

As your program evolves, our physiotherapist will choose more challenging exercises to safely advance the knee motion and function. The key is to get the soft tissues in balance through safe stretching and gradual strengthening.

At BodyZone Physiotherapy, our goal is to help you keep your pain under control, ensure you place only a safe amount of weight on the healing knee, and improve your strength and range of motion. When your recovery is well under way, your visits to our office will end. Although we will continue to be a resource, you will be in charge of doing your exercises as part of an ongoing home program.

Physician Review

X-rays may be ordered on the initial visit to your doctor. An X-ray can help determine if the patella is properly aligned in the femoral groove. Several X-rays taken with the knee bent at several different angles can help determine if the patella is moving through the femoral groove in the correct alignment. The X-ray may show arthritis between the patella and the thighbone, especially when the problems have been there for awhile. This is often referred to as *chondromalacia*.



Diagnosing problems with the patella can be confusing. The symptoms can be easily confused with other knee problems because the symptoms are often similar. In these cases, other tests, such as *magnetic resonance imaging (MRI)*, may be suggested. The MRI machine uses magnetic waves rather than X-rays to show the soft tissues of the body. This machine creates pictures that look like slices of the knee. Usually, this test is done to look for injuries, such as tears in the ligaments of the knee. Recent advances in the quality of MRI scans have enabled doctors to see the articular cartilage on a scan and determine if it is damaged. This test does not require any needles or special dye and is painless.

In some cases, *arthroscopy* may be used to make the definitive diagnosis when there is still a question about what is causing your knee problem. Arthroscopy is an operation that involves placing a small fiber-optic TV camera into the knee joint, allowing the surgeon to look at the structures inside the joint directly. The arthroscope allows your doctor to see the condition of the articular cartilage on the back of your patella. The vast majority of patellofemoral problems are treated without resorting to surgery, and arthroscopy is usually reserved to treat the problems identified by other means.

Surgery

If nonsurgical treatment fails to improve your condition, surgery may be suggested. The procedure used for patellofemoral problems varies. In severe cases a combination of one or more

of the following procedures may be necessary.

Arthroscopic Method

Arthroscopy is sometimes useful in the treatment of patellofemoral problems of the knee. Looking directly at the articular cartilage surfaces of the patella and the femoral groove is the most accurate way of determining how much wear there is in these areas. Your surgeon can also watch as the patella moves through the groove, and may be able to determine whether or not the patella is moving normally. If there are areas of articular cartilage damage behind the patella that are creating a rough surface, special tools can be used by the surgeon to smooth the surface and reduce your pain. This procedure is sometimes referred to as *shaving* the patella.

Cartilage Procedure

In more advanced cases of patellar arthritis, surgeons may operate to repair or restore the damaged cartilage. The surgery needed for articular cartilage is based on the size, type, and location of the damage. Along with surgical fix the cartilage, other procedures may also be done to help align the patella so less pressure is placed on the head of the cartilage.

Lateral Release

If your patella problems appear to be caused by a misalignment problem, a procedure called a *lateral release* may be suggested. This procedure is done to allow the patella to shift back to a more normal position and relieve pressure on the articular cartilage. In this operation, the tight ligaments on the outside (lateral side) of the patella are cut, or released, to allow the patella to slide more towards the center of the femoral groove. These ligaments eventually heal with scar tissue that fills in the gap created by the surgery, but they no longer pull the patella to the outside as strongly as before. This helps to balance the quadriceps mechanism and equalize the pressure on the articular cartilage behind the patella.

Ligament Tightening Procedure

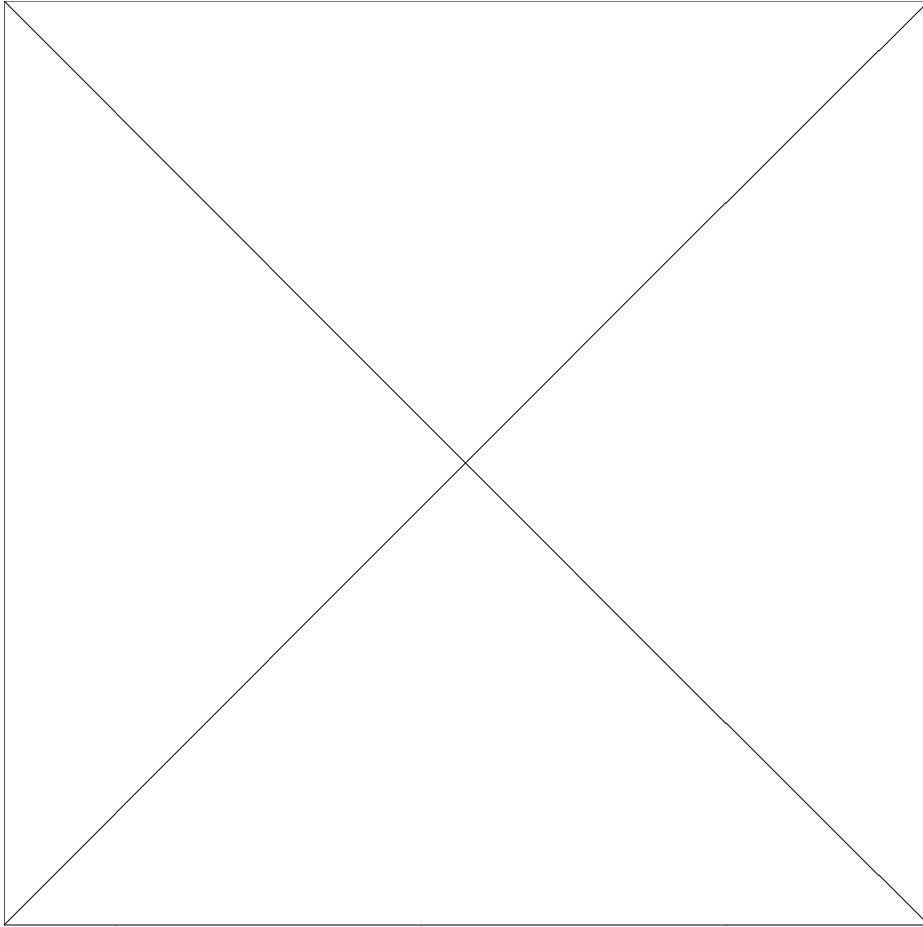
In some cases of severe patellar misalignment, a lateral release alone may not be enough. For problems of repeated dislocations, the surgeon may also need to realign the quadriceps mechanism. In addition to the lateral release, the ligaments on the inside edge of the knee (the medial side) may have to be tightened as well.

Bony Realignment

If the misalignment is severe, the bony attachment of the patellar tendon may also have to be shifted to a new spot on the tibia bone. Remember that the patellar tendon attaches the patella to the lower leg bone (tibia) just below the knee. By moving a section of bone where the patellar tendon attaches to the tibia, surgeons can change the way the tendon pulls the patella through the femoral groove. This is done surgically by removing a section of bone where the patellar tendon attaches to the tibia. This section of bone is then reattached on the tibia closer to the other knee.

Usually, the bone is reattached onto the tibia using screws. This procedure shifts the patella to the medial side. Once the surgery heals, the patella should track better within the center of the groove, spreading the pressure equally on the articular cartilage behind the patella.

View animation of the bony realignment procedure



Arthroscopic procedures to shave the patella or a simple lateral release can usually be done on an outpatient basis and you can leave the hospital the same day. If your problem requires the more involved surgical procedure where bone is cut to allow moving the patellar tendon attachment, you may need to spend one or two nights in the hospital.

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