Patellar (Kneecap) Fractures

Because your kneecap (patella) acts like a shield for your knee joint, it can easily be broken. Falling directly onto your knee, for example, is a common cause of patellar fractures.

These fractures are serious injuries and often require surgery to heal. Over the long term, they may cause arthritis in the knee.

Anatomy

The patella is a small bone located in front of your knee joint — where the thighbone (femur) and shinbone (tibia) meet. It protects your knee and connects the muscles in the front of your thigh to your tibia.

The ends of the femur and the undersides of the patella are covered with a slippery substance called articular cartilage. This helps the bones glide smoothly along each other as you move your leg.

Statistics

Patellar fractures account for about 1% of all fractures. They are most common in people who are 20 to 50 years old. Men are twice as likely as women to fracture the kneecap.

Types of Patellar Fractures

Patellar fractures vary. The kneecap can crack just slightly, or can be broken into many pieces.

A break in the kneecap can happen at the top, center, or lower part of the bone. Sometimes, fractures occur in more than one area of the kneecap.
Stable fracture. This type of fracture is nondisplaced. The broken ends of the bones meet up correctly and are aligned. In a stable fracture, the bones usually stay in place during healing.
Displaced fracture. When a bone breaks and is displaced, the broken ends are separated and do not line up. This type of fracture often requires surgery to put the pieces back together.
This x-ray of the knee taken from the side shows a significant gap (displacement) between the broken pieces of the patella.

**Comminuted fracture.** This type of break is very unstable. The bone shatters into three or more pieces.

[Image: A comminuted fracture of the patella.]

**Open fracture.** In this type of fracture, the skin has been broken and exposes the bone. These injuries often involve much more damage to the surrounding muscles, tendons, and ligaments. Open fractures have a higher risk for complications and take a longer time to heal.

**Cause**

Patellar fractures are most commonly caused by a direct blow, such as from a fall or motor vehicle collision. The patella can also be fractured indirectly. For example, your thigh muscles can contract so violently that it pulls the patella apart.

**Symptoms**

The major symptoms of a patellar fracture include pain and swelling in the front of the knee. Additional symptoms include:
- Bruising
- Inability to straighten the knee
- Inability to walk

**Doctor Examination**

After discussing your symptoms and medical history, your doctor will examine your knee. The edges of the fracture can often be felt through the skin, particularly if the fracture is displaced. Your doctor will also check for hemarthrosis. This is swelling deep inside the joint that is usually a result of bleeding caused by the fracture.

**Tests**

X-rays are the most common and widely available diagnostic imaging technique. They create images of dense structures, like bone, so are particularly useful in showing fractures. X-rays are important for showing front and side views of the fracture.

Although rare, a person may be born with extra bones in the patella that have not grown together. This is called bipartite patella and may be mistaken for a fracture. X-rays help to identify bipartite patella. Many people have bipartite patella in both knees, so your doctor may take an x-ray of your other knee, as well.

**Treatment**

**Nonsurgical Treatment**

If the pieces of broken bone have not been displaced by the force of the injury, you may not need surgery. Casts or splints may be used to keep your knee straight. This will keep the broken ends in proper position while they heal.

You will not be able to put any weight on your leg until the bone is completely healed. This may take 6 to 8 weeks, and perhaps longer. Most people use crutches during this period.

**Surgical Treatment**

If the patella has been pulled apart (displaced), you will most likely need surgery. Fractured patellar bones that are not close together often have difficulty healing or may not heal. The thigh muscles that attach to the top of the patella are very strong and can pull the broken pieces out of place during healing.

**Timing of surgery.** If the skin around your fracture has not been broken, your doctor may recommend waiting until any abrasions have healed before having surgery. Open fractures, however, expose the fracture site to the environment. They urgently need to be cleansed and require immediate surgery.

**Procedure.** The type of procedure performed often depends on the type of fracture you have. Before the surgery, your doctor will discuss your procedure with you, as well as any potential complications.
Transverse fracture. These two-part fractures are most often fixed in place using pins and wires and a "figure-of-eight" configuration tension band. The figure-of-eight band presses the two pieces together.

This procedure is best for treating fractures that are located near the center of the patella. Fracture pieces at the ends of the kneecap are too small for this procedure. Breaks that are in many pieces can be overcompressed by the tension band.

Another approach to a transverse fracture is to secure the bones using small screws, wires, and pins. In many cases, these wires and pins will need to be removed about a year or two after the surgery.

Comminuted fracture. In some cases, either the top or the bottom of the patella can be broken into several small pieces. This type of fracture happens when the kneecap is pulled apart from the injury, then crushed from falling on it.

Because the bone fragments are too small to be fixed back into place, they will be removed. Your doctor will attach the loose tendon to the remaining patellar bone.

If the kneecap is broken in many pieces at its center (and they are separated), your doctor may use a combination of wires and screws to fix it. Removing small portions of the kneecap may also have good results. Complete removal of the kneecap is a last resort in treating a comminuted fracture.

Recovery

How long it takes to recover from a patellar fracture will depend on the severity of your injury and whether it required surgery. You and your doctor together can decide when it is best to begin putting weight on your leg, and return to work and other activities.

Rehabilitation

Whether your treatment involves surgery or not, rehabilitation plays a vital role in getting you back to your daily activities. Keeping your leg immobilized in a cast can result in knee stiffness and weak thigh muscles. Specific exercises will help strengthen your leg muscles and restore range of motion in your knee.

Your doctor will tell you when you can begin to put weight on your leg. Initial weight-bearing exercise is usually limited to gently touching your toe to the floor. As your injury heals and your muscles strengthen, you will gradually be able to put more weight on your leg.

Long-Term Outcomes

Arthritis. Patellar fractures often damage the articular cartilage that covers and protects the underside of the bone. Over time, this can lead to arthritis. Severe arthritis occurs in about one out of every four to five patients. Mild to moderate arthritis (chondromalacia patella) is much more common.

Muscle weakness. Permanent weakness of the quadriceps muscle in the front of the thigh is another possible long-term problem. Some loss of motion in the knee, including both straightening (extension) and bending (flexion), is also common. This loss of motion is usually not disabling.

Chronic pain. Long-term pain in the front of the knee is common with patellar fractures.
Your doctor may suggest some lifestyle changes to protect your knee and prevent future problems. These may include avoiding exercise activities that involve repetitive deep knee bending or squatting. Climbing stairs or ladders should be avoided, as well.

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Reviewed by members of the Orthopaedic Trauma Association

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