
THE SAN DIEGO KNEE CLINIC

The Knee and Running

Article I: Chondromalacia

We will be offering counseling on diet and exercise. If interested, please contact my office and schedule a medically supervised *Health and Orthopedic Fitness* assessment appointment which will include a spine and joint health assessment evaluation. This assessment will not be covered by health insurance.

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The problem with running and knee pain is the mind. The mind of the runner is psychologically attuned to accept pain as a reward for fitness. As the runner becomes fit, he regards pain as a necessary evil. Thus, running becomes a lesson in pain tolerance. However, since injury also produces pain, the runner must differentiate the pain of running. Both hover about a fine line. It is easy to experience muscle fatigue, lactic acidosis, and "the wall" by running through and past our fitness level. The debilitating acute or chronic pain of injury is to be avoided and not sought out. Thus, the runner must educate himself to avoid the pain of injury. Unfortunately, most of us athletic souls have experienced numerous injuries and are just trying to avoid the next injury. In my opinion, the more fit and rested the runner, the lower his frequency of injury. The less fit are the athlete's muscles, tendons, ligaments, and joints, the more prone to injury. Ninety percent of injuries involving the knee are a result of training errors, and the prime training problem is overtraining, especially in novice runners. The runner does "too much, too fast" and experiences the pain of injury, and then tries to "run through" his pain, making the injury more severe.

There is no hard and fast regimen for avoiding knee injuries since we are all different. Our muscles, tendons, and joints exist in varying degrees of strength and durability. A gradual program of only slight increases in weekly activity allowing for at least two rest days per week permits the tendons, muscles, and joints a chance to gradually strengthen. "Too much, too fast" leads to injuries. "No pain, no gain" is only partially true. "Train, don't strain" is more appropriate.

With the above in mind, how, specifically, do we face knee pain or "runner's knee"? The knee is the perfect joint to discuss the principles of running injuries. The knee is comprised of ligaments, tendons, muscles, menisci (cartilages), synovial membranes, synovial fluid, bursae, and a spongy bone lining substance called "articular cartilage." To understand how the runner should treat his knee pain, the runner should know or learn the basic anatomy of the knee. This is very important because if the runner develops sudden moderate-to-severe pain over a tendon or ligament, he should desist from running immediately.

If the pain is over the muscular area of the knee, especially in the quadriceps region (above the kneecap) or the hamstrings (the back of the thigh), he is less likely to suffer a debilitating problem. If the pain is only slight, he may just need to slow down.

Anatomically, the knee is a rotational hinge joint comprised of the following four bones (Figure 1): patella (kneecap), femur, tibia, and fibula. One can always tell the outside of the knee diagrammatically by finding the fibula, it is always on the outside or lateral aspect of the knee. Connecting the bones together are ligaments.

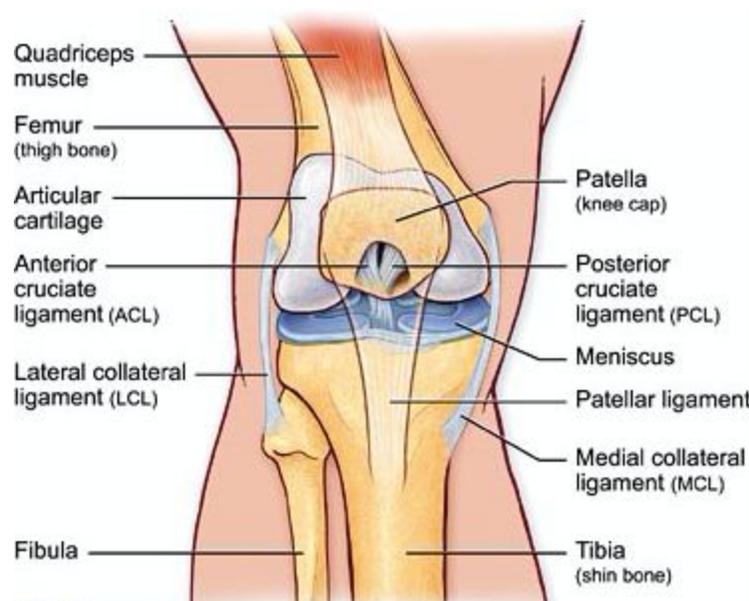


Figure 1. Knee Anatomy

At the knee, there are the following four main ligaments: the medial collateral, connecting the femur and tibia together on the inside of the knee; the lateral collateral ligament, connecting the femur to the fibula; and two ligaments deep inside the knee called the cruciate. The cruciate ligaments connect the femur and the tibia. The anterior cruciate is in front and more commonly injured, and is the most important ligament in the knee. It prevents the tibia from coming too far forward. The posterior cruciate is behind the anterior cruciate. It prevents the tibia from moving too far backward. The ligaments serve as static and dynamic check reins to control the motion of the knee that is powered by the muscles.

The two menisci (or cartilages, Figure 1), are located between the femur and tibia. The inside meniscus is called the medial meniscus. The outside meniscus is called the lateral meniscus. The menisci act as cushions or spacers between the femur and tibia. The meniscus is C-shaped, mobile, and easily injured. A meniscus injury is the most common serious knee injury. Complete tears of the meniscus can accelerate the aging process and arthritis commonly develops.

The most important structure in the knee is called articular (hyaline) cartilage (Bhosale, 2008), which is the spongy lining surface covering the articulating (opposing) surfaces of the femur, patella, and tibia. Articular cartilage receives nutrients by the pumping action of the knee.



Figure 2. Cartilage Injury

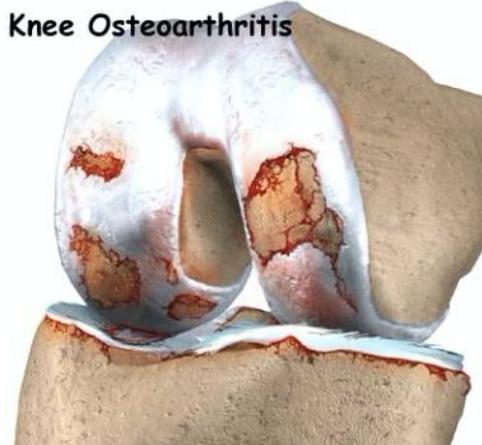


Figure 3. Osteoarthritis

If we lose this spongy material, it may be replaced by another less resistant variety called fibrocartilage. More commonly the articular cartilage is not replaced and eventually bone opposes bone, forming arthritis. Thus, we want to be very careful with pain around the knee, as an injury can lead to debilitating consequences.

Let us proceed with a common malady that affects the knee. The term “runner’s knee” refers to pain about the knee caused by running. The most common problem is “kneecap pain.” Medically this is referred to as “chondromalacia patella” or soft cartilage of the kneecap (Figure 4). The undersurface of the kneecap is normally smooth and lined with articular cartilage, however the bony architecture is irregular.

To explain this, imagine lying on your back with your leg straight. Then, imagine someone drawing a transverse line through the kneecap at a right angle to the leg. If you looked at the kneecap you would see this cross section as depicted in Figure 1. With the repetitive action of running, the kneecap and the underlying femur come into contact in different positions and varying degrees of pressure on the articular cartilage (Bronitsky, 1947). If too much pressure is applied in one area, or there is an external force applied against the kneecap, the undersurface of the kneecap or superficial surface of the femur (rarely) is injured. With an injury, the articular cartilage of the kneecap will become frayed as shown in Figure 3. The fraying can cause audible crackling and washboard-type sounds. If a runner starts developing moderate to severe pain about the kneecap while running, it is recommended to refrain from further exercising. The pain could have developed as result of damaged articular surface and the frayed kneecap. Ice is suggested to be applied, while avoiding excessive bending or other forms of pressure on the kneecap. If the pain lasts more than a few days to weeks, consult your doctor. You may have developed chondromalacia patella (Figure 4).

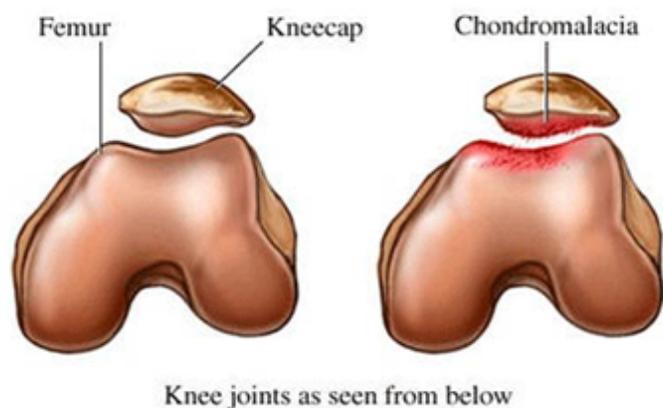


Figure 4. Chondromalacia

X-rays should be taken to check for severe damage. A physical examination will reveal tenderness at the kneecap. The alignment of the hips, knee, or ankles should be evaluated to check for biomechanical abnormality. The hamstrings are checked to see if they are too tight. The feet are very important and commonly are pronated or flat, which can lead to stress concentration at the kneecap. Once the diagnosis of chondromalacia patella is made, then rest, ice after running, anti-inflammatory medication, and a gentle quadriceps exercise program is recommended (Pak, 2013).

Running is permitted, but is limited. If pain persists or worsens, then the amount of running is decreased until the pain disappears (Yildiz, 2003). After six weeks and no diminution of symptoms, then more vigorous treatment such as foot supports and instructed physical therapy are instituted. Occasionally swimming is started. No frog kick is allowed because the kneecap is easily injured with this stroke. Bicycling may be started; however, the leg must be nearly straight on the downstroke as this position allows decreased pressure at the articular surface. Knee braces are occasionally applied in an attempt to change the forces about the kneecap.

Finally, if the knee is still very symptomatic at three to six months after the onset of symptoms, then surgery may be indicated. I will not go into the various surgical techniques involved except to mention that the least amount of surgery performed is the best. A new technique called arthroscopy fits this description and is the usual initial treatment of choice. Arthroscopy should be performed by an expert, usually an orthopaedic surgeon who has performed several hundred surgeries. A microscope is inserted into the knee joint and surgery is performed through a small hole. Initially, with chondromalacia patella, the rough, frayed area is smoothed. Occasionally, other techniques are used if the patella is located in an abnormal position. Other unexpected causes for pain may be found such as loose pieces of bone, cysts, or abnormal synovial membranes called synovial plica. Recovery from surgery and return surgery takes more time to recover. Major surgery, through a large incision, is a last resort, but can also be quite helpful if the kneecap is grossly malaligned and causing stress concentration and fraying of the articular cartilage. Resuming running is a strong possibility after surgery. However, the more severe the articular damage, the less likely is an early return to running. Thus, the answer to “runner’s knee” is early recognition of the problem (Long, 2016). Do not try to run through kneecap pain. Prevention includes wearing the appropriate footwear, taking at least one and preferably two rest days per week, Achilles and hamstring stretching, gradually increasing mileage, and stopping when more than a slight pain occurs.

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