

Meniscal Injuries

There are two types of cartilage in the knee, articular cartilage and meniscus cartilage. Articular cartilage is made up of collagen, proteoglycans and water. It lines the end of the bones that meet to form a joint. The primary function of the articular cartilage is to provide a smooth gliding surface for joint motion. Articular cartilage glides against other articular cartilage with approximately five times less friction than rubbing ice on ice (Figure 1).

The meniscus cartilage in the knee includes a medial (inside) meniscus and a lateral (outside) meniscus (Figure 2). Together they are referred to as menisci. The menisci are wedge shaped, and are thinner toward the center of the knee and thicker toward the outside of the knee joint. This shape is very important to its function. The primary function of the menisci is to improve load transmission. A relatively round femur sitting on a relatively flat tibia forms the

knee joint. Without the menisci, the area of contact force between these two bones would be consolidated, increasing the contact stress by 235–335% (Figure 3). The wedge shape menisci increase this contact area significantly. The menisci also provide some shock absorption, lubrication and joint stability.

There are two categories of meniscal tears, acute traumatic tears and degenerative tears.

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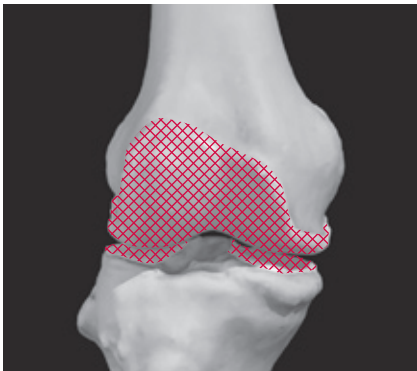


Figure 1. Articular cartilage (shown here from the front of the knee, without the kneecap)

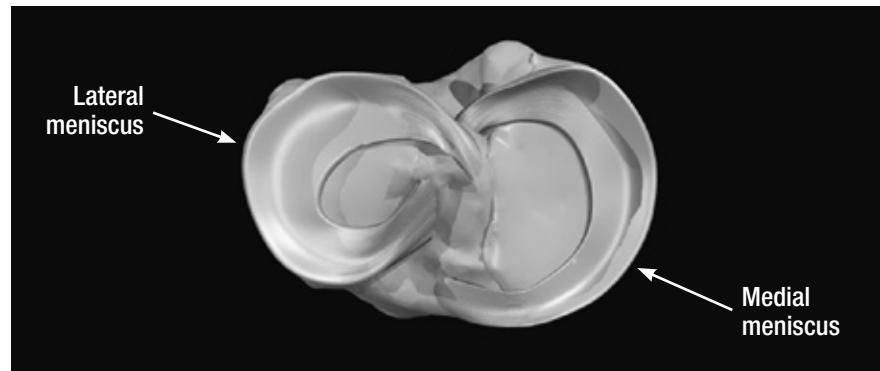


Figure 2. Meniscus cartilage (shown here from above the knee, without the femur)

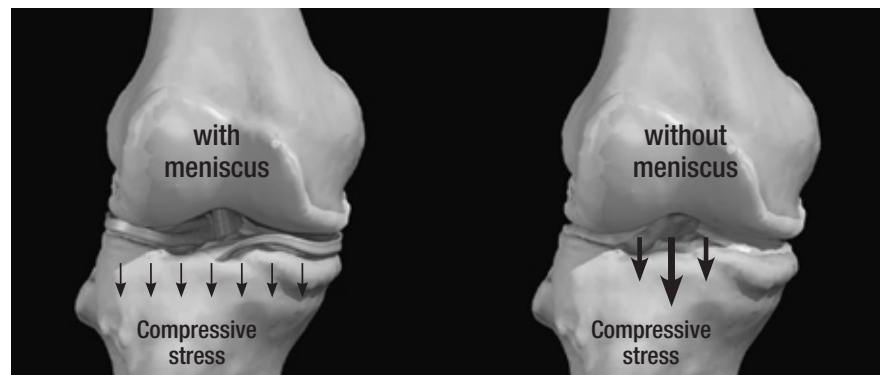


Figure 3. Consolidation of compressive forces without meniscus

Degenerative tears

Degenerative tears occur most commonly in middle-aged people and take place when repetitive stresses severely weaken the meniscal tissue. Degenerative tears are not caused by acute (current) trauma or injury, but may be more symptomatic following them. This process of tissue degeneration makes it very unlikely that a surgical repair will heal or that the surrounding meniscus will be strong enough to hold the sutures used to repair it. One report showed that less than 10% of meniscal tears occurring in patients greater than forty years of age are repairable.

Symptoms of a degenerative meniscus tear include swelling, pain along the joint line, catching and locking. Most often degenerative tears are surgically removed or excised. Occasionally a patient may be able to regain function through rehabilitation.

Acute traumatic tears

Acute traumatic tears occur most frequently in athletes as a result of a twisting injury to the knee when the foot is planted. Symptoms of an acute meniscus tear include swelling, pain along the joint line, catching and locking. These tears can often be diagnosed by the history of the problem and a good physical examination. Sometimes an MRI will be used to assist

in making the diagnosis (Figure 4).

If an athlete suffers a meniscal tear, the three options for treatment include: non-operative rehabilitation, surgery to trim out the area of torn meniscus or surgery to repair (stitch together) the torn meniscus. The treatment chosen will depend on the location of the tear, the size of the tear, the sport the athlete is returning to, ligamentous stability of the knee and any associated injury.

The location of tear is important because the outer portion of the meniscus has a good blood supply, whereas the inner portion has a very poor blood supply. Blood supply is necessary for the healing process. Without an adequate blood supply, the area of torn meniscus will most likely have to be removed.

After meniscal surgery rehabilitation with a physical therapist or licensed athletic trainer will be needed to restore range of motion, strength and movement control to guide the athlete's return to sports. If the meniscus is repaired there may be a period of restricted knee flexion, especially during weight bearing, to protect the healing tear and the sutures used to repair it.



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References

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- Ulrich GS and Aronczyk SP. The basic science of meniscus repair. *Tech in Ortho*, 8(2): 56-62, 1993.
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Figure 4. MRI image of a meniscal tear