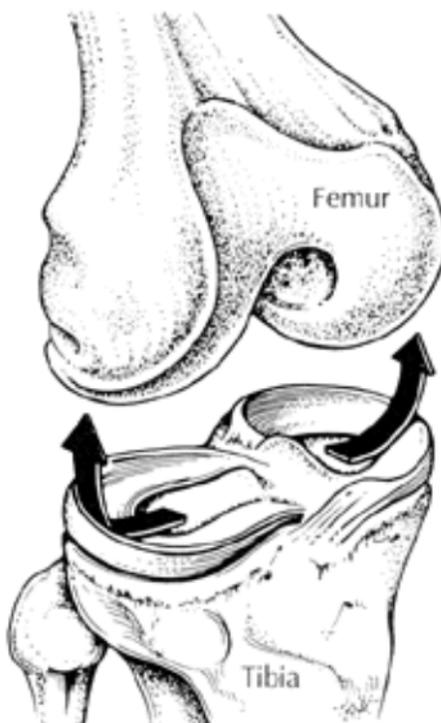
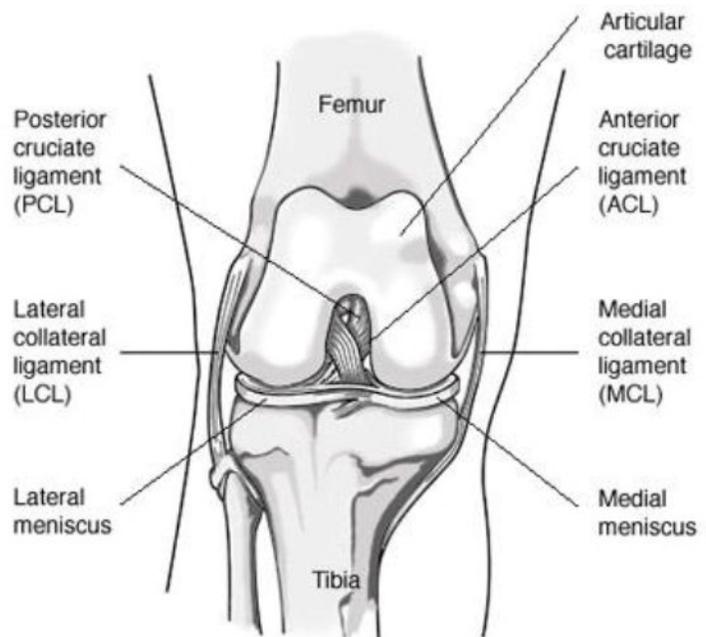


KNEE: ***Meniscus Tears • Cartilage Damage***

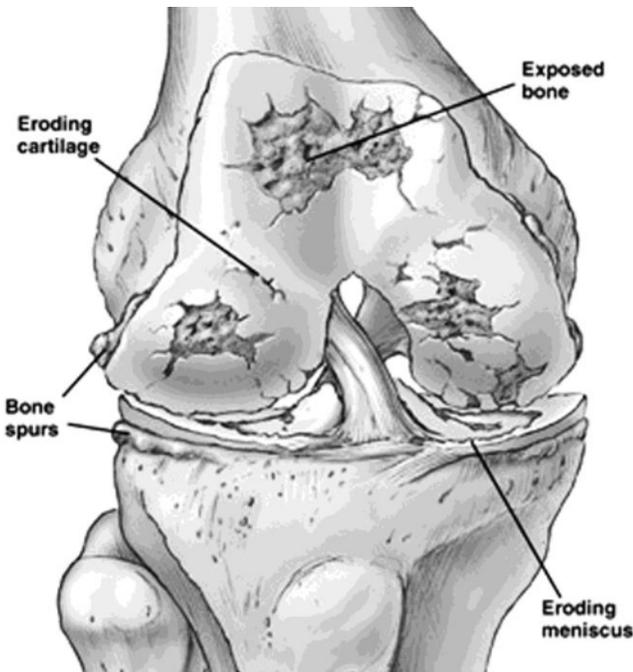
As we age and remain active, the menisci and cartilage often get injured or wear out. Many factors contribute to this, but genetics, a past history of injury or surgery, overuse, and body weight seem to be the most important causes.

Articular cartilage is the tough but smooth covering on the end of bones in most joints. It allows gliding without much resistance and works with the meniscus to cushion the ends of the bone.



The **meniscus** is located between the femur and the tibia. There are two menisci in the knee, the medial meniscus (*inside of the knee*) and the lateral meniscus (*outside of the knee*). The menisci are made of fibrocartilage, a special type of cartilage. They function as shock absorbers and force distributors that help to stabilize the knee.

Injuries to the meniscus are the most common, and the medial meniscus is torn more often than the lateral meniscus. The meniscus injury may occur gradually from repetitive use or rapidly during a single twisting, pivoting episode. As the body ages, the meniscus becomes less able to withstand the stresses placed on the knee and is more likely to tear. In addition, a meniscus tear leads to more stress on the articular cartilage and can cause the cartilage to wear more quickly.



When the **articular cartilage** is injured, either suddenly due to injury or slowly over time with arthritis, the joint no longer glides smoothly. This irregularity can cause pain, swelling, cracking, popping, or locking. Because the cartilage covers all of the bones, this can cause pain in any location around the knee. The severity of the injury can vary from mild cartilage softening to more moderate fissuring and thinning of the cartilage, and even to full-thickness loss of cartilage (down to the bone).

Diagnosis (What is causing my pain?)

History and Physical Exam: Your provider will discuss your symptoms with you, including their onset, things that aggravate or alleviate the pain, and any pertinent past injuries or surgery. Examining both the normal and painful limbs is also critical to hone in on the correct diagnosis.

Imaging: X-rays are usually obtained to look at the skeletal alignment (varus or valgus; ie, bow-legged or knock-kneed) and to look for bony signs of advanced osteoarthritis like bone spurs, cysts, or loss of joint space. If a significant soft-tissue or cartilage problem is suspected, an MRI may be obtained as well.

MRI: A Magnetic Resonance Image (**MRI**) study is different from an x-ray because it allows us to see the soft tissues (cartilage, ligaments, and meniscus) around the knee. It also takes longer than an x-ray and can be troublesome for people who are claustrophobic. When an individual continues to have pain, swelling, or any signs of locking or giving way, an MRI is reasonable. An MRI will specifically look for problems that can be addressed with surgery. These problems include a loose piece of cartilage floating in the knee (loose body), a full thickness cartilage defect in a younger patient, a meniscal tear, or a significant ligament injury.

Other studies: Your provider may order labs, a bone scan, full alignment xrays or an ultrasound to help make the proper diagnosis.

Treatment

The goal of all treatment for meniscal tears and cartilage injuries is to decrease pain and restore function. Often this initially involves more conservative therapies, with progression to more invasive therapy if the pain continues.

It is important to know that at this time there is no perfect way to restore articular cartilage after injury, and we are still trying to understand exactly what happens when cartilage is injured. For small or focal defects (think “small pothole”), newer cartilage restoration techniques can help fill the void with either stem cell derived cartilage or cadaver cartilage. For more global damage (think “roads in Mammoth in April”) there are fewer restorative techniques that are effective. The end result for these cartilage problems is *degenerative joint disease*, also known as *osteoarthritis*. In this situation, a course of conservative treatment including physical therapy, injections or bracing is typically tried for as long as possible. Ultimately though, partial or total joint resurfacing (aka arthroplasty or replacement) may become the best option if symptoms dictate.

Non-Operative Treatment

Relative Rest • Physical Therapy

Relative rest followed by **supervised physical therapy** is often a first-line treatment of cartilage injuries. Relative rest means:

- Daily stretching and gentle range of motion to prevent stiffness
- Icing your knee for 15-20 minutes once or twice daily
- Acetaminophen (Tylenol) or anti-inflammatory medications like ibuprofen or naproxen as necessary to help with pain control
- Activity modification to low-impact “knee friendly” activities like cycling, swimming, or the elliptical trainer

The goal of **supervised physical therapy** (with home exercises) is to regain range of motion and strengthen the muscles around the knee to decrease some of the forces across the cartilage surfaces.

Bracing

If there is a mechanical alignment problem around the knee (patients who are more “knock-kneed” or “bow-legged”), then an **unloader brace** may be helpful. The brace redirects force off of the worn area of cartilage and places it on healthier areas. This may help to improve symptoms and tends to work best for people who need to wear the brace for a few hours of activity every day.

Injections

There are three types of injections used around the knee.

A **cortisone injection** (“steroid shot”) may help to improve symptoms in those with more advanced cartilage damage but should be used sparingly in young patients. The pain relief from the injection varies from patient to patient, but can last from weeks to many months.

Viscosupplementation or “**lubricant**” injections are another option. This involves either one larger injection or once-weekly injections over three to five weeks. These seem to help the knee glide more smoothly, nourish the articular cartilage, and reduce pain associated with cartilage injury. It is difficult to tell who will

benefit; about half of the patients who get the viscosupplement injections will have a good response with pain relief that may last several months, but about 30% will not notice a difference.

Platelet Rich Plasma or “PRP” injections have recently gained popularity. These work by obtaining a concentrate of the naturally occurring growth factors from the platelets in your own blood. The growth factors can then be injected into a joint or tendon that is degenerative, which in turn recruit healing cells to the area.

Research is still ongoing, but a recent double blinded randomized control trial (Patel, *American Journal of Sports Medicine*, Feb. 2013) indicated superior results compared to placebo in patients with mild to moderate knee osteoarthritis. This is the most expensive of the injection techniques, however, and insurance coverage varies. PRP can also be used for overuse syndromes around the knee, like IT band problems, quadriceps or patellar tendonitis, or pes or hamstring bursitis.

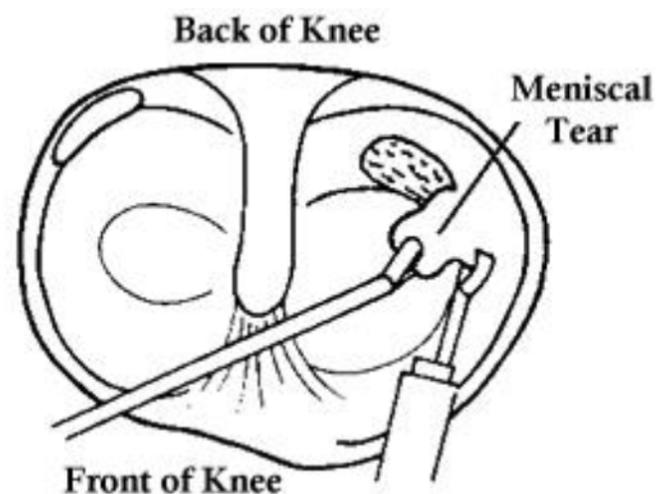
Surgery

If you continue to have pain and disability despite non-operative care, then **arthroscopic surgery** is reasonable. This is outpatient surgery with an arthroscope (a camera used to look into the joint) and two or three small incisions around the knee to look and work inside.

Meniscectomy (Excision)

Meniscal tissue has a poor blood supply which means that most meniscal tears will not heal. Taking out the torn piece (excision) and smoothing the edges of the meniscus can help the knee to function more normally and improve pain and swelling. This also helps prevent the tear from getting larger or displacing. We do try to preserve as much normal meniscus as possible because the meniscus does not regenerate after it is removed.

Recovery after meniscectomy is usually swift, with immediate weight bearing using crutches for support only, and range of motion. Most patients have near normal knee function by 4-6 weeks after surgery. The success of the surgery is



closely related to the state of the cartilage around the meniscal tear. For patients with moderate to advanced arthritis or cartilage degeneration, arthroscopy should not be the first line of treatment.

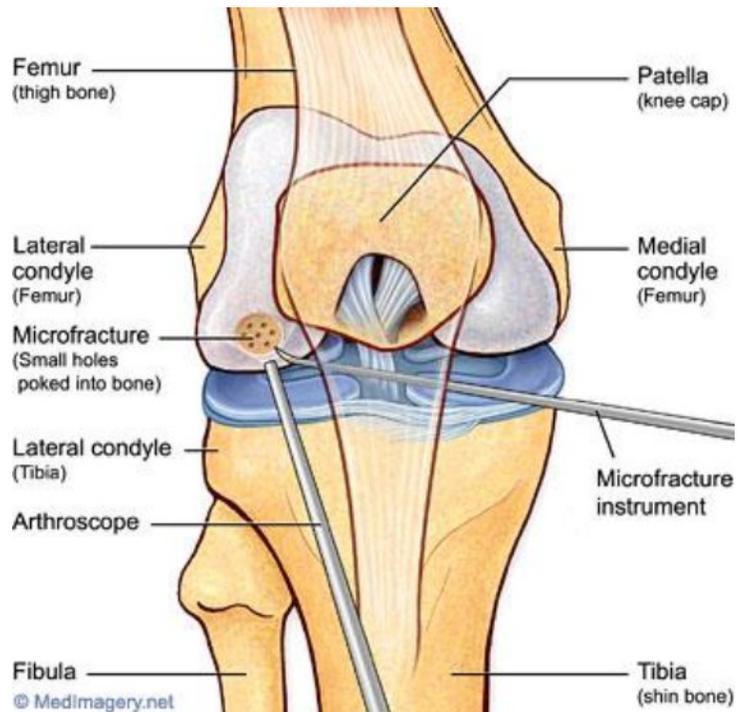
Chondroplasty

Smoothing out significant irregularities on the cartilage surface and taking out loose cartilage can also help reduce pain, catching or locking, and swelling. This is often done in conjunction with meniscal or ligament surgery. Because articular cartilage does not re-grow or regenerate, this treatment is only to alleviate symptoms and does not reverse the arthritic process. After this procedure, recovery is usually swift, and weight bearing is allowed immediately with crutches for support only. Most patients are able to return to full activity in 4-6 weeks.

Microfracture

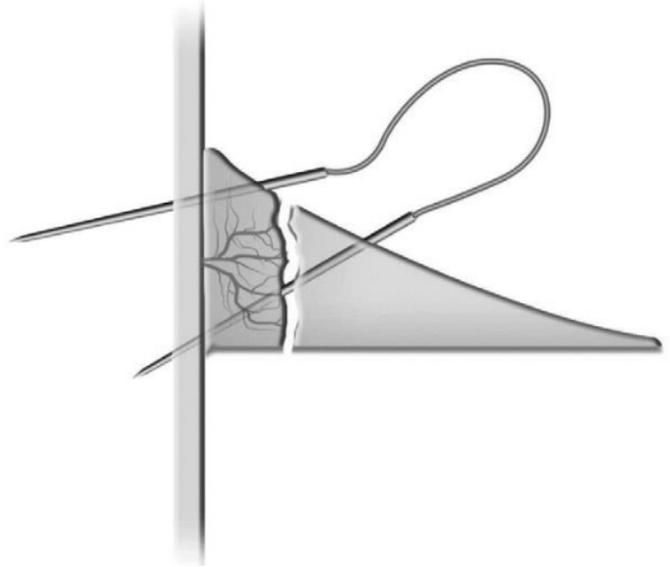
The goal of performing a microfracture is to get “**scar cartilage**” (fibrocartilage) to fill a cartilage defect. Microfracture only works for smaller sized defects. The basic idea is to make multiple small holes in the bone at the cartilage lesion so bone marrow will fill the defect and develop into scar cartilage. This is not normal cartilage, but can help to prevent the cartilage lesion from expanding. It does significantly change the post-operative recovery though, generally including at least **six weeks of non weight-bearing** (crutches).

Supervised physical therapy is essential for a smooth recovery after a microfracture, and running and athletic activities are not allowed for at least 4-6 months to allow the cartilage to mature.



Meniscus Repair

There are some instances when the meniscus can be repaired (sewn back together). This depends on the size and location of the tear, the age of the patient, and if the tear is associated with an ACL tear. The final decision regarding repair is made at the time of surgery. When a repair is performed, there may be another 1-2 inch incision on the inside or the outside of the knee. The sutures we use only hold the meniscus in place while the body tries to heal the tissue. Consequently, we try to limit stress on the meniscus during the first **six weeks** after surgery by **limiting weight bearing** (with **crutches**) and knee flexion (with a **brace**). Because of the difficulty in getting the meniscus to heal, it is critical to follow the specific rehabilitation program. Activities such as squatting, kneeling, and running are not allowed for at least eight weeks following repair.



Cartilage Restoration

There are several new technologies that all allow surgeons to restore or replace damaged cartilage with newer, healthier cartilage. In general, these techniques are best suited for younger patients who have a focal cartilage defect. Patients who are overweight, use tobacco, or who have more diffuse cartilage damage throughout the knee are usually better treated with arthroplasty (partial or total replacement).

- 1) **OATS** (Osteochondral Autograft or Allograft Transfer—also referred to as **mosaicplasty**): This involves taking a bone plug with the overlying cartilage envelope from elsewhere in your knee or from a cadaver donor. The plug is then inserted into the damaged area. This is best suited for mid-sized defects on the femoral condyles. Recovery ranges from 3 to 9 months, depending on the size and source of the graft.
- 2) **ACI** (autologous cartilage implantation—also called Carticel): Two operations are required. A knee arthroscopy is first done to confirm the size and shape of the defect, and to take a cartilage biopsy. Cartilage stem cells are then derived from the biopsy and grown in the lab. In a second operation (done through an open incision), the stem cells are then

- placed into the defect and covered with a patch to hold them in place. This technique can restore near-normal cartilage to the defect, but recovery is prolonged (generally one year or longer) and sometimes the transferred cartilage either doesn't grow well, or overgrows and has to be trimmed back. This technique is also very expensive.
- 3) **Allograft cartilage graft:** these are newer products on the market and haven't been extensively tested. Generally the minced cartilage graft is placed into a defect that has been microfractured (see above), and this serves as a graft to help the microfracture heal better.
 - 4) **Osteotomy:** This is not a new technique, but it is often needed if one of the cartilage restoration techniques is performed. If the knee is out of alignment, then the alignment should be corrected either before or at the same time as cartilage restoration is performed. This takes the excess pressure off the healing new cartilage. Osteotomy involves cutting the tibia or the femur to change the angle of the bone, then fixing it with a plate to hold it in place while it heals.

Osteotomy can also be done alone for patients with extensive damage in only one compartment of the knee, permanently unloading the damaged cartilage and placing more weight on the remaining healthy cartilage.

Risks

Although most patients have relief after knee surgery, it is not uncommon to have stiffness or soreness in the knee after the operation. The **risks** associated with knee surgery are generally low, but there are some **specific complications** that can occur:

- *Continued pain or stiffness due to scarring in the knee*
- *Progression of meniscus tearing*
- *Non-healing of the meniscus (if a repair was attempted)*
- *Development or progression of knee arthritis*

A more **general complication** of surgery can also occur. These include:

- *Deep venous thrombosis (aka "blood clot" or DVT)*
 - *Be sure to tell your surgeon if you have a history of blood clots—blood thinners may be used after surgery to help minimize the risk of forming more clots after surgery*
- *Infection (all patients receive antibiotics at the time of surgery to decrease this risk)*

- *Nerve injury (associated with numbness, weakness, or paralysis)*
- *Vascular injury or compartment syndrome*
- *Complications associated with the anesthesia*

QUESTIONS?

If you have questions or concerns about any of these issues related to your knee, please discuss these with us at any time.

Internet Resources • Helpful Websites

Industry sponsored surgical animations

American Academy of Orthopaedic Surgeons

Mayo Clinic

eOrthopod

<http://www.orthoillustrated.com>

<http://orthoinfo.org>

<http://www.mayoclinic.com>

<http://eorthopod.com>