TWIN CITIES ORTHOPEDICS
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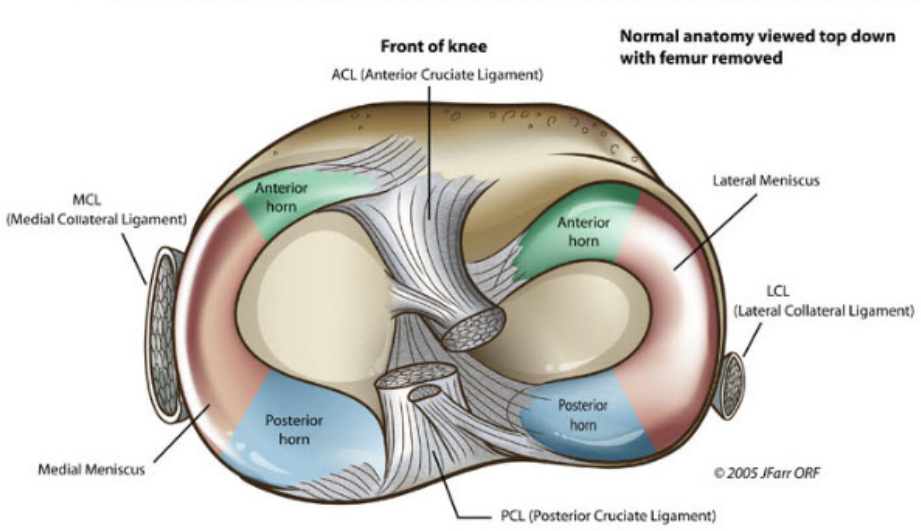
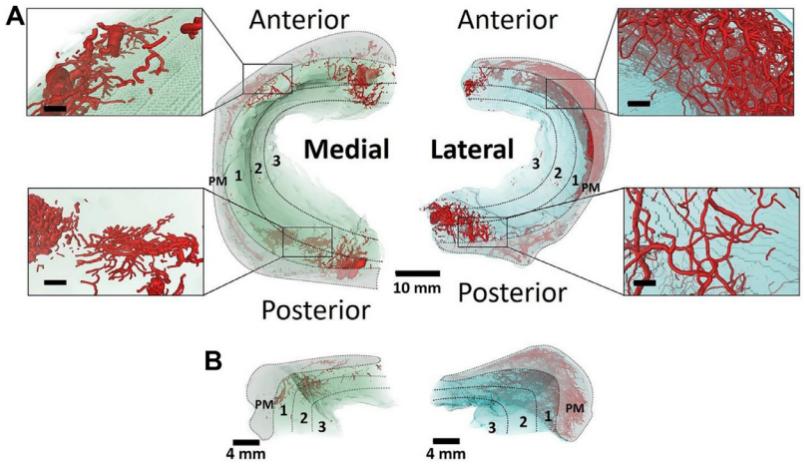
Meniscus Tears

The menisci are essential C-shaped structures that help protect the cartilage surfaces in the knee joint. There is a medial meniscus on the inside of the knee and a lateral meniscus on the outside of the knee. Each meniscus is anchored to the tibia at the anterior and posterior root attachments. The menisci transmit 40-80% of the load across the knee with hoop stresses. Loss of the meniscus has been shown to increase loads on the cartilage by 2 to 3 times.



The menisci have a thicker outer portion where there is excellent blood flow and a thinner inner portion with decreasing blood flow. This is important as the blood flow is essential to healing potential. These can be called the red-red zone (zone 1 in photo below, indicates good vascularization or blood flow), white-white zone (zone 3, poor vascularization) and the transition red-white zone. Generally white-white zone tears are not repaired given the minimal blood vascularity present.



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What are the options for meniscus tears?

The preferred treatment for patients with a meniscus tear depends on many factors including their age and activity goals, whether the tear is traumatic, and the level of underlying arthritis present. For many meniscus tears, initial nonoperative management is a reasonable choice. Typically, meniscus tears are diagnosed with an MRI.

Traumatic tears happen suddenly, usually during sports or activities that involve twisting, pivoting, or a sudden change of direction on a planted foot. These are more common in younger, active people and may have the best chance of healing. Degenerative tears develop gradually over time as the cartilage weakens with age and normal wear. These are more common in adults over 40 and may occur with everyday activities like squatting or kneeling. While these tears may be able to be repaired, some cannot be repaired due to the degeneration of the meniscus tissue.

For most patients with symptomatic meniscus tears and minimal osteoarthritis, we recommend an arthroscopic meniscus repair. This means that we use sutures in order to stitch the meniscus tear back together in an attempt to get the tear to heal. The goal of a repair is to both help with symptoms, but also to try to slow arthritis progression in the knee by maintaining the shock absorbing capacity of the meniscus with the goal of delaying a knee replacement for as long as possible.

Some meniscus tears are more of a mechanical source of pain or not repairable, for which a partial meniscectomy may be indicated. A partial meniscectomy is when the injured tissue is removed to remove the mechanical source of pain. This is analogous to having a “pebble in your shoe” and removing that pebble with surgery. The downside of a meniscectomy is that you lose valuable meniscus tissue and it will likely inevitably lead to arthritis in the future.

Lastly, if your knee has advanced osteoarthritis, there likely is also a meniscus tear present. However, typically the symptoms are related to the osteoarthritis and we would not expect much improvement with arthroscopic procedures. Once the osteoarthritis is significant and a patient’s quality of life is impacted, a knee replacement is likely the best option.

This website has additional patient information about meniscus tears from a reputable source: https://orthoinfo.aaos.org/en/diseases--conditions/meniscus-tears/

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What symptoms are typical for meniscus tears?

- Pain along the inner or outer side of the knee (at the "joint line")
- Swelling that develops over several hours after injury
- Clicking, catching, or popping in the knee
- A feeling that the knee is "locking" or "giving way"
- Difficulty fully straightening or bending the knee
- Stiffness, especially after sitting for a long time

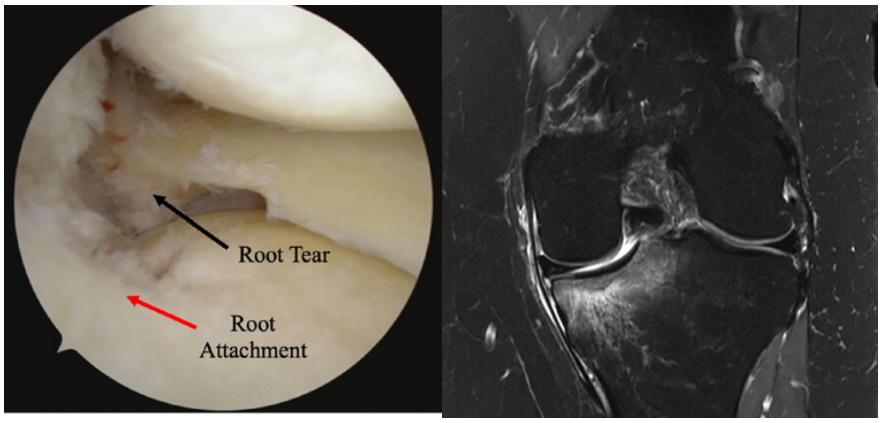
It is important to note that not all meniscus tears cause symptoms. Some tears found on MRI scans cause no pain at all.

What types are meniscal tears are there?

There are many different types of meniscus tears with broad categories including root tears, radial tears, horizontal cleavage tears, bucket handle tears, and vertical/longitudinal tears. Some tears are a combination of multiple types. Each of the subsections below will describe these tears in more detail.

Root Tears

Meniscus root tears are common injuries seen in patients in which the meniscus partially or completely detaches from its tibial attachment. Typically, the medial side is more of an isolated injury in middle-aged patients, while lateral root tears are often seen with ACL tears. Complete root tears have been shown to lead to significantly increased contact pressures in that affected compartment of the knee, similar to a total meniscectomy (which means having no meniscus at all). Often the cartilage/deeper bony structures in that area of the knee will have increased stress and it is possible or even likely to have an insufficiency fracture or increased swelling in the bone as a result (MRI below).



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Not all root tears need to be treated with surgery. Partial tears that are not causing symptoms generally are treated with physical therapy and observation. Root tears in the setting of significant arthritis are less likely to be successfully treated with surgery and often we do not treat these with surgery. However, if you do have a root tear and do not have much arthritis, we typically recommend a meniscus root repair. Studies show that a root repair has the lowest risk of arthritis at 10-year follow-up and are the most cost-effective treatment for root tears. Performing a meniscectomy for these types of tears may even make you worse than doing no surgery. Dr. LaPrade was recently part of an international consensus statement among experts that recommended repairing root tears present in those without arthritis.

Studies have shown that nonoperatively treated medial meniscus root tears generally fail nonoperative treatment by 10 years at a rate of 95%. The lowest reported rate of needing a total knee replacement at 5 years is with a repair in comparison to nonoperative treatment or meniscectomy, but it is important to note that a small amount of patients may still need a total knee arthroplasty even with a root repair (up to 10% at 5 years). Risk factors for failure of a root repair include increased arthritis prior to surgery, varus (“bowlegged”) alignment, elevated BMI, and noncompliance with being non-weightbearing after surgery. Age itself does not seem to be as big of a risk factor for failure.

Studies have shown that having surgery within 3 months after a root repair gives you the best long-term results versus delaying surgery, but patients do have a high chance of improvement even with delayed surgery. Studies have reported complication rates of 10% and failure rates of 3% after root repair.

We typically repair root tears with sutures into the meniscus tissue that are then tied over a button or anchor on the tibia (see figure below). We know that an anatomic repair is essential for restoring the biomechanics of the knee joint, and we ensure that we perform an anatomic repair for optimal results (figure below demonstrates contact pressures after a root tear and repair both in anatomic and nonanatomic locations). Importantly, due to the unstable nature of the meniscus tear, studies recommend non-weightbearing and use of crutches for 6 weeks for optimal healing.

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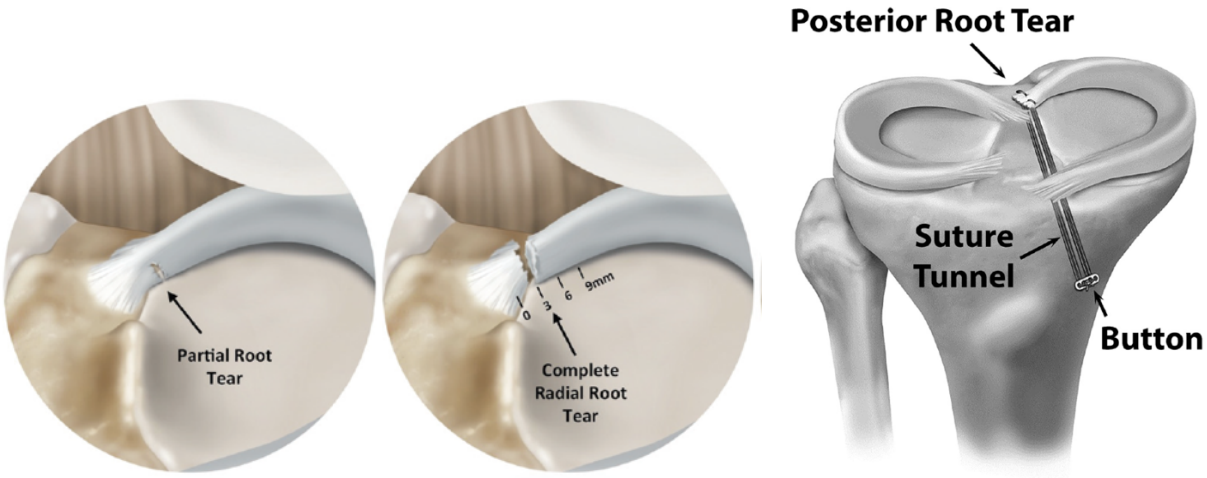

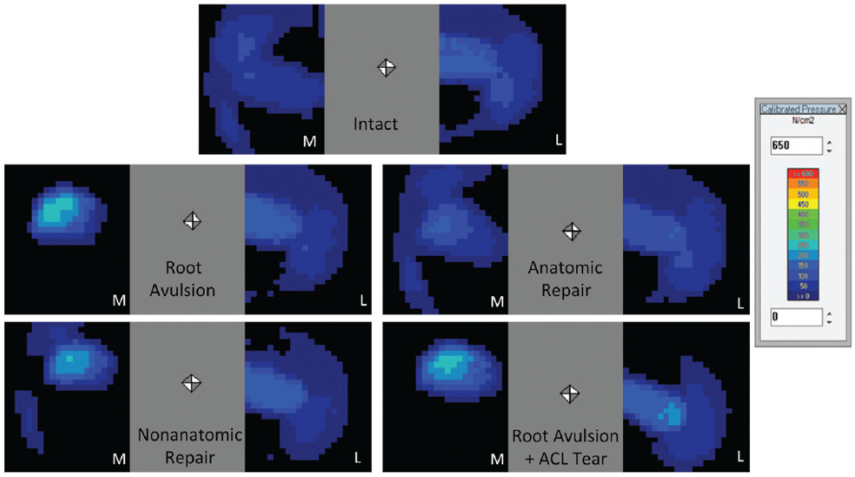

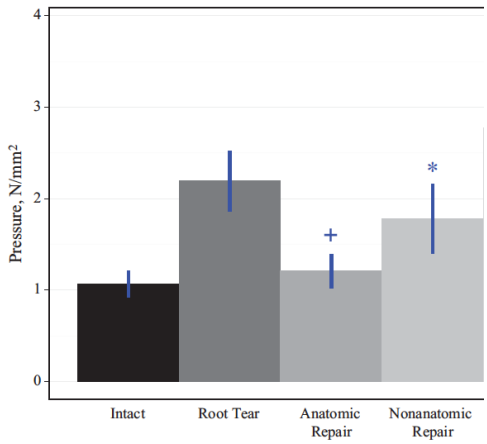

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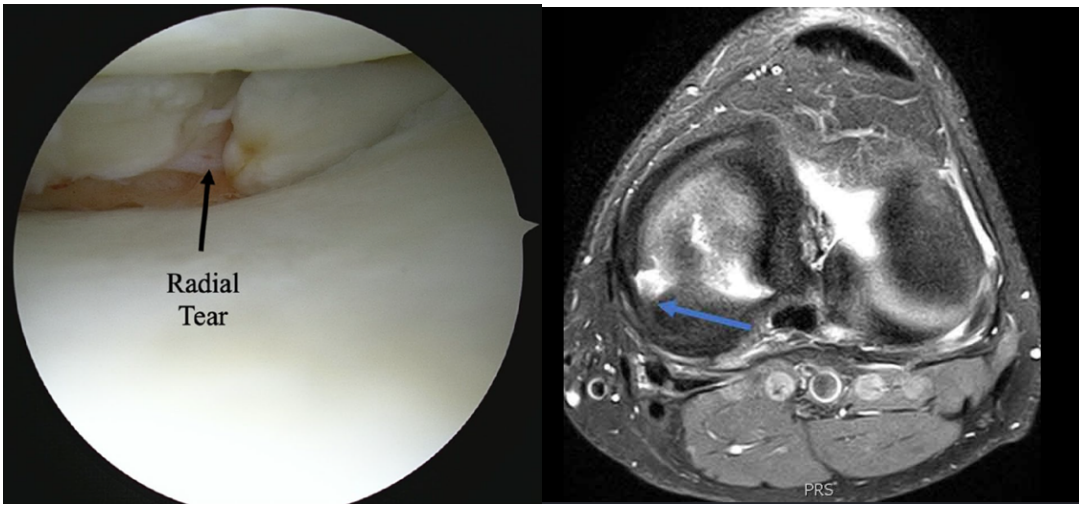
Radial Tears

Meniscus radial tears are similar to root tears in that they involve a tear that is perpendicular to the meniscus body and are either partial or full thickness across the meniscus width. This type of tear disrupts the hoop stresses of the meniscus, which prevents the normal load transmission function of the meniscus. This places the cartilage at higher risk of cartilage wear or arthritis. While smaller partial radial tears may be treated without surgery or partial meniscectomy, larger tears are a bigger issue and are likely best treated with repair for most patients. Just as in root tears, complete radial tears may disrupt the entire function of the meniscus. Therefore, for young patients or patients that do not have significant arthritis and can tolerate crutches/6 weeks of nonweightbearing after surgery, a repair is generally recommended. Dr. LaPrade was recently part of an international consensus statement among experts that recommended repairing radial tears that have appropriate repairable meniscus tissue and no significant arthritis.



There are many different repair techniques for repairing radial tears including all-inside, inside-out, or outside-in repairs. The chosen technique depends on where the tear is located and the complexity of the tear (see figure below). For many of these, we consider utilizing an inside-out repair which does involve an incision over the inside or outside of the knee to allow for as many sutures as possible. In addition, the suture configuration varies based on the type of tear. The suture configuration will often involve a “hashtag” or a transtibial repair technique to maximize the strength of the repair (examples of both below). There are no studies that show a superiority of one technique over another and in general we expect these tears to have an 80% success rate of healing. We generally choose whatever method is best for each individual tear and person. These radial tears do require being on crutches and nonweightbearing for 6 weeks if repaired for optimal results.

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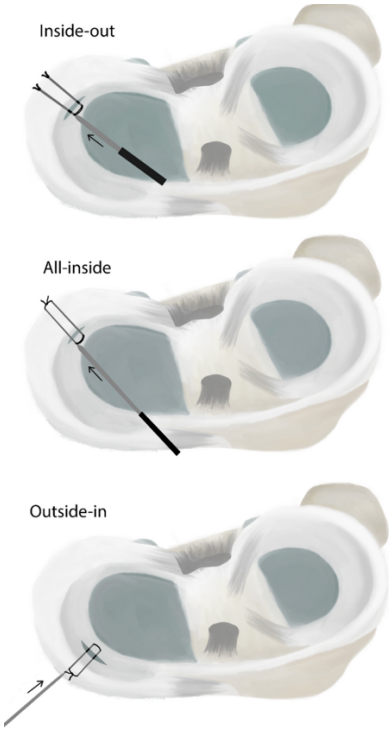

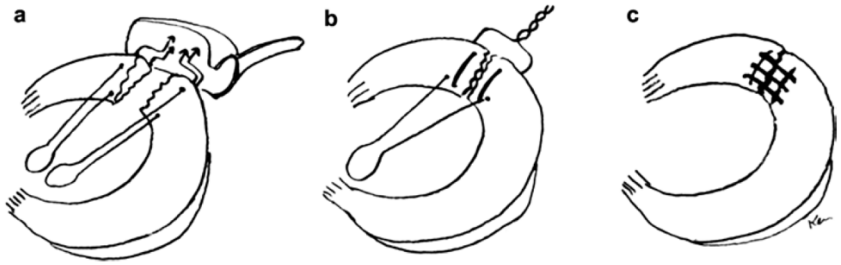

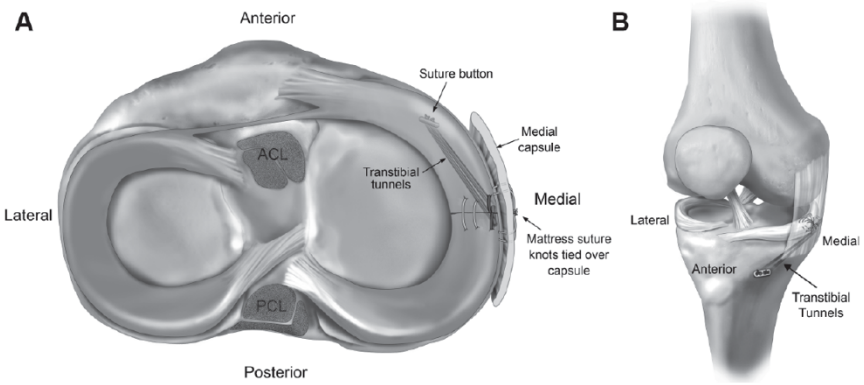

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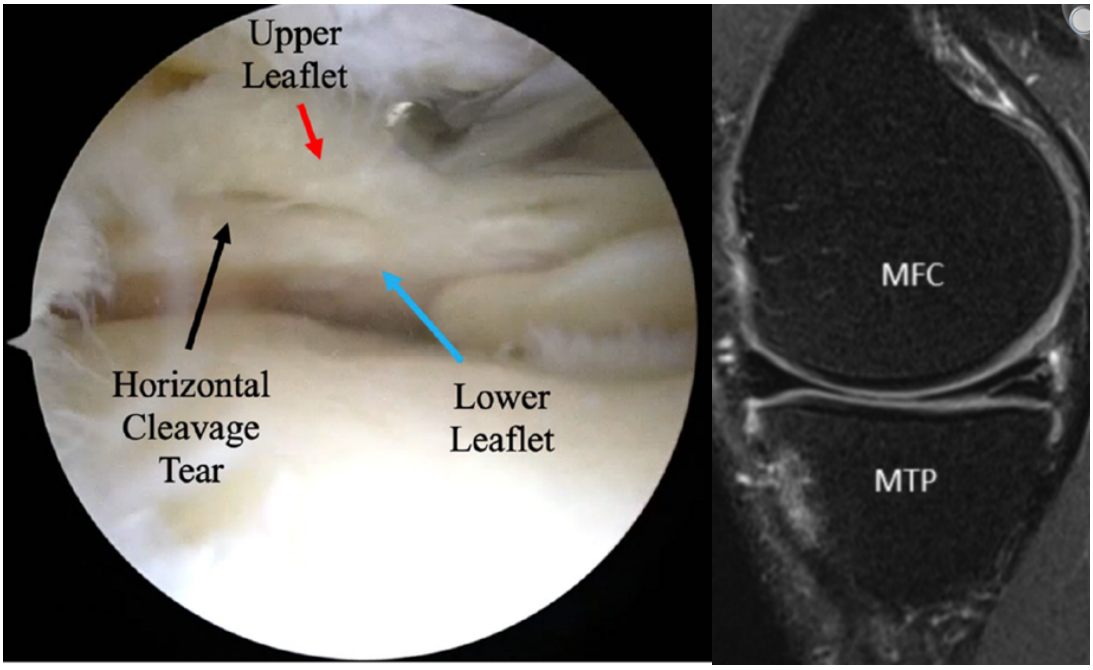
Horizontal Cleavage Tears

Meniscus horizontal cleavage tears involve a tear that splits the meniscus horizontally into superior and inferior leaflets. These are relatively common tears that can be present acutely or chronically and do not always cause symptoms. These can be treated without surgery or with surgery, typically based on the length and type of symptoms.



A horizontal cleavage tear does preserve some function of the circumferential collagen fibers of the meniscus. Biomechanical studies report that these tears may not significantly change contact pressures in the knee versus a normal meniscus; therefore, choosing to treat these nonoperatively may not place patients at significantly higher risk of arthritis. A partial meniscectomy in which the inferior aspect of the tear is removed has been shown to significantly increase the contact pressures in that area of the knee (up to 43+% higher). A partial meniscectomy may help with symptoms for a period of time, but it also will lead to a higher risk of arthritis. Therefore, repair of these tears, which has restored contact pressures to normal in biomechanical studies, is typically our preferred treatment option for those patients with persistent symptoms without much arthritis. Typically, we are able to repair many of these with all-inside circumferential “hay bale” repair (just 2 small arthroscopic portal incisions) but occasionally if there is a large parameniscal cyst or a larger tear an inside-out repair can be performed. Success rates with repair are generally reported to be greater than 80%. These do require being nonweightbearing on crutches for 6 weeks due to the shear stresses on the meniscus after repair.

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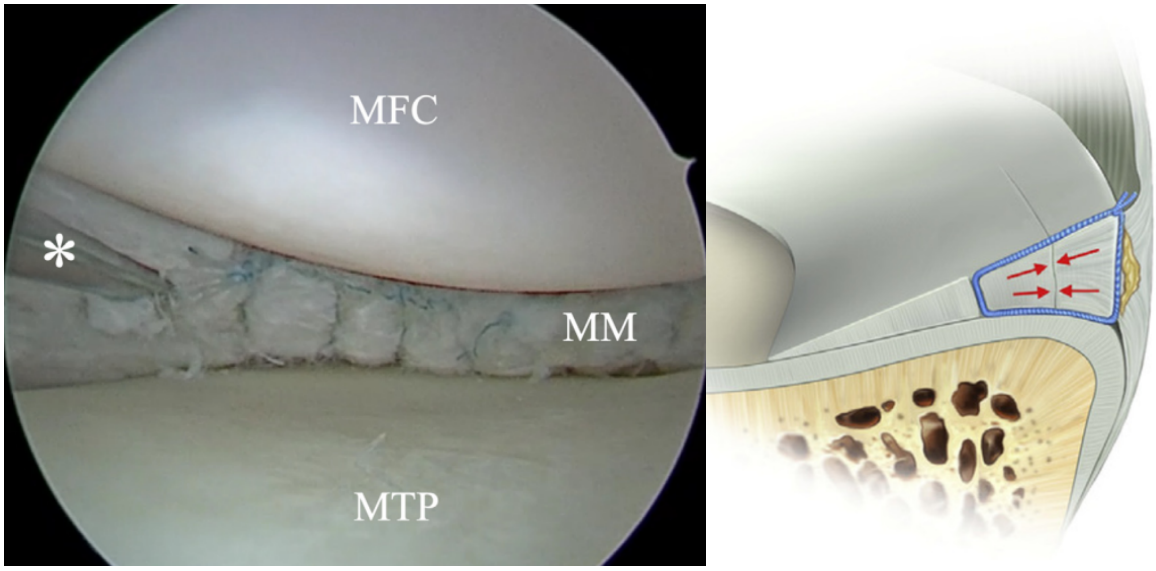

Vertical/Longitudinal Tears

Vertical or longitudinal tears of the meniscus run in line with the fibers of the meniscus and generally have less of an impact on the biomechanics of the meniscus in comparison to other meniscus tears. These often are located in the outer periphery of the meniscus (red-red or red-white zones) where there is better blood flow and potential for healing. Smaller tears may not always require repair if they are not causing symptoms. If they are symptomatic, they typically are treated with a repair to preserve the meniscus tissue and decrease the risk of the tear progressing to a larger tear. Many of these are seen with an ACL tear (often a medial meniscus ramp tear) and therefore are repaired. These tears have high healing potential and reported success rates of up to 85-90%, with higher healing rates when an ACL reconstruction is performed. These tears are more stable after repair and therefore they may allow for braced weightbearing after surgery. These are often treated with all-inside repair.

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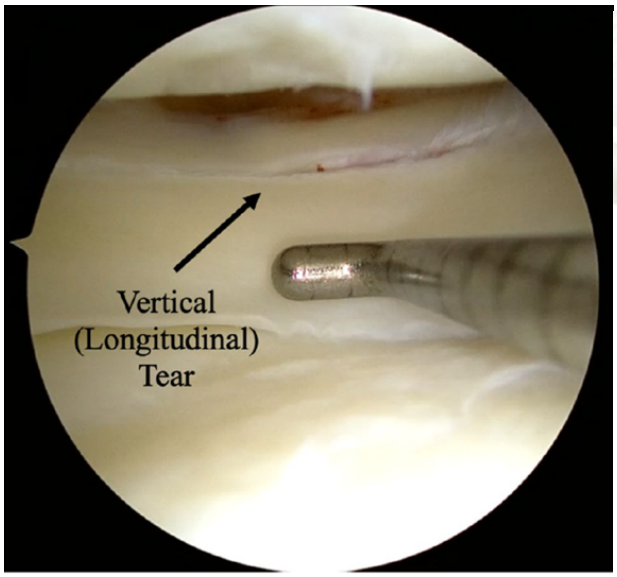
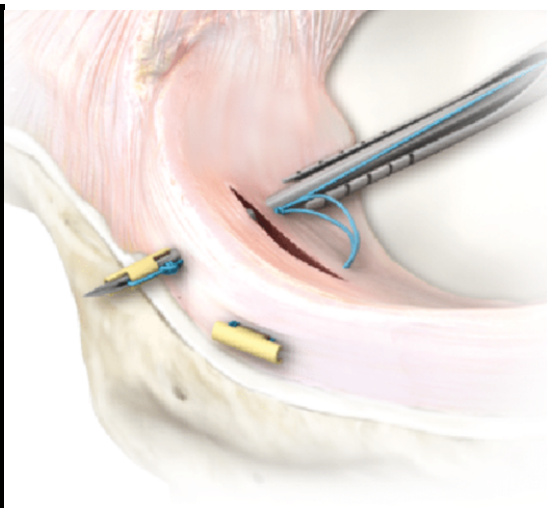
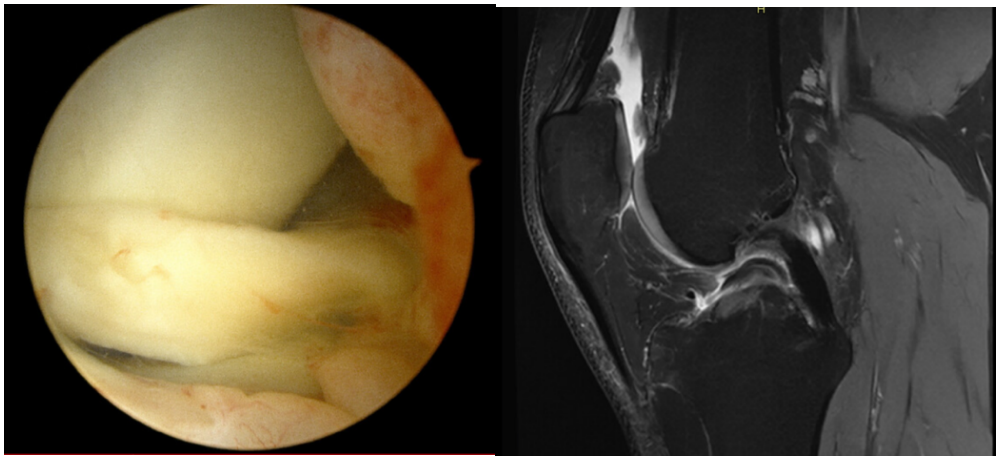




Bucket Handle Tears

Bucket handle tears are a type of longitudinal tear of the meniscus where a large portion of the meniscus is torn and displaced into the center of the knee. It generally causes significant mechanical and locking symptoms. These tears can happen to the medial or lateral meniscus and nearly always are treated with surgery on an urgent basis as many patients are unable to fully straighten their knee. We generally believe that the sooner the tear can be treated the higher likelihood of a successful meniscus repair. In Dr. LaPrade's practice, these are almost always recommended for a repair as the bucket handle tear generally involves a very large piece of the meniscus and a partial meniscectomy will significantly increase the contact pressures in the joint, which will increase the risk of arthritis and worsen long-term outcomes for patients.



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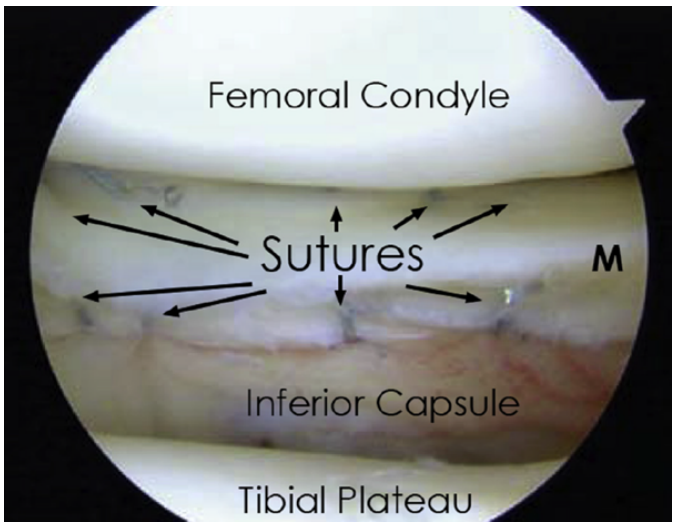
Typically, in Dr. LaPrade's practice, these bucket handle tears are treated with inside-out meniscus repair to try and maximize the healing potential of these tears. This technique allows for as many sutures as needed for a stable repair. The success rate is generally 85-90% for healing after a bucket-handle repair. A bucket handle repair has been shown to have lower rates of arthritis and progression to knee replacement versus partial meniscectomy. Typically these tears involve being nonweightbearing for 6 weeks after surgery to maximize the chances of healing.



Physical Therapy Protocols

The PT protocol will be dependent on the presence of any other injuries, with the final protocol being determined after surgery. Examples of PT protocols are on Dr. LaPrade's website: https://tcomn.com/physicians/christopher-laprade/.

Dr. LaPrade has utmost trust in the Twin Cities Orthopedics physical therapists, who helped design the PT protocols that he uses. He will generally recommend at least one visit with them postoperatively, even if a patient will do their PT at a non-TCO location.

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