Rehabilitation Guidelines for Meniscal Repair

There are two types of cartilage in the knee, articular cartilage and meniscus cartilage. Articular cartilage is made up of collagen, proteoglycans and water and 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. Rubbing articular cartilage on articular cartilage is approximately 5 times more smooth, or with less friction, than rubbing ice on ice.[1]

The meniscus cartilage in the knee includes a medial (inside) meniscus and a lateral (outside) meniscus. Together they are referred to as menisci. The menisci are wedge shaped, being thinner toward the center of the knee and thicker toward the outside of the knee joint (Figures 1–3). 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 relatively small, increasing the contact stress by 235-335% (Figure 4). The menisci also provide some shock absorption, lubrication and joint stability.

There are two categories of meniscal tears: acute traumatic tears and degenerative tears. Degenerative tears most commonly occur in middle-aged people. They typically occur through repetitive stresses to the menisci over time, which severely weakens the tissue. 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 were repairable. Symptoms of a degenerative meniscus tear include swelling, pain along the joint line, catching and locking. Most often degenerative tears are surgically removed. Occasionally a patient may be able to regain function through rehabilitation without surgery.

Acute traumatic tears occur most frequently in the athletic population as a result of a twisting injury to

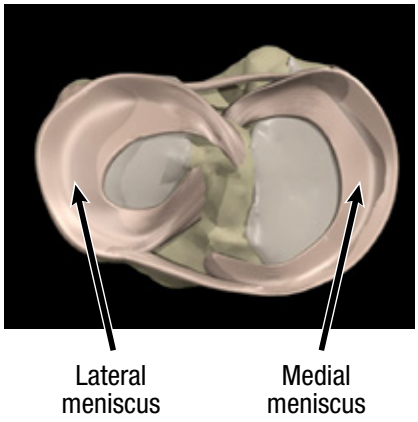

Figure 1 *Meniscus cartilage (shown here from above the knee, without the femur)*

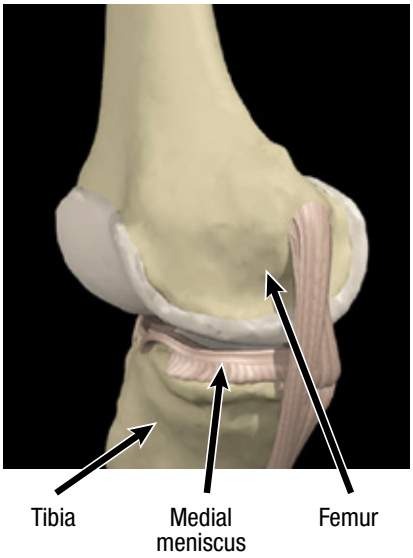

Figure 2 *Medial (inside) view of the knee*

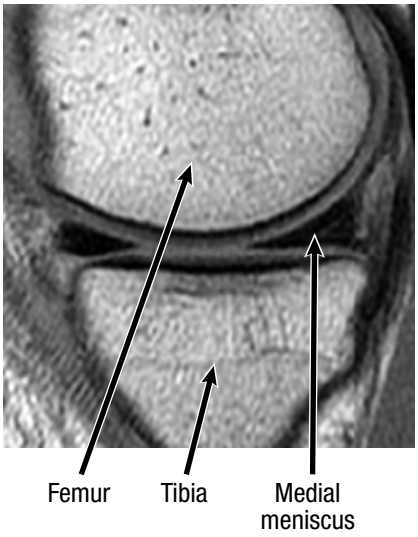

Figure 3 *Normal MRI (saggital view) of the knee, lateral (outside) view*

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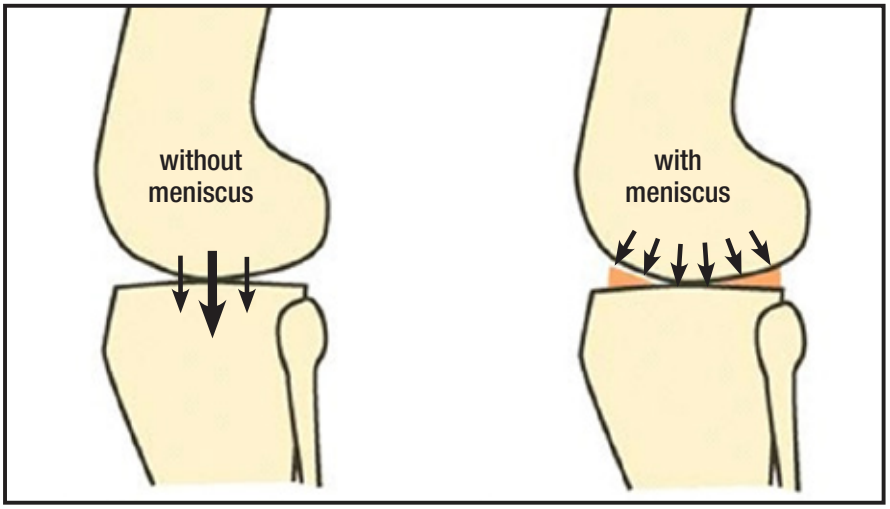

Figure 4 *Schematic representation of the meniscal effect on contact pressure in the knee. Contact area is increased by 50% with addition of menisci. This reduces contact pressures.*

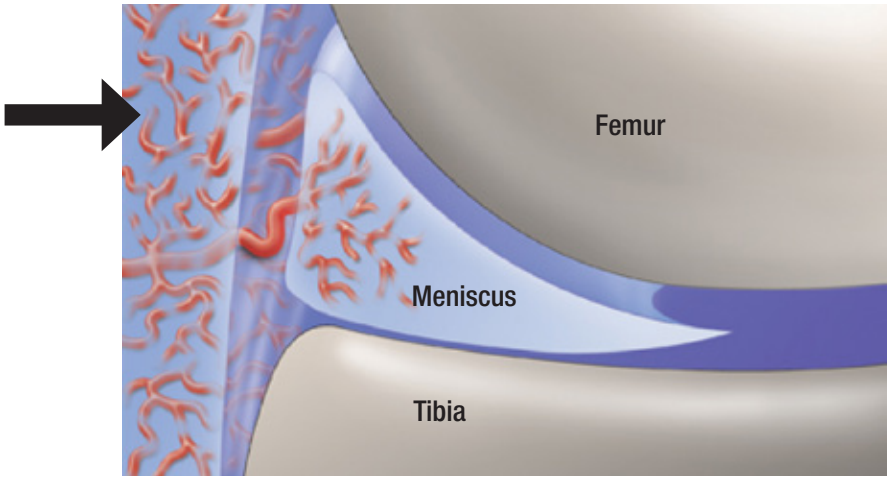

Figure 6 *Perimeniscular capillary plexus (thick arrow) providing blood supply to the outer third of the meniscus.*

the knee when the foot is planted. Symptoms of an acute meniscus tear include swelling, pain along the joint line, catching, locking and a specific injury. Often times these tears can be diagnosed by taking a thorough history and completing a physical examination. An MRI may be used to assist in making the diagnosis. 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 athlete's sport, ligamentous stability of the knee and any associated injury.[2] The location of tear is important because the outer portion of the meniscus has a good blood supply whereas

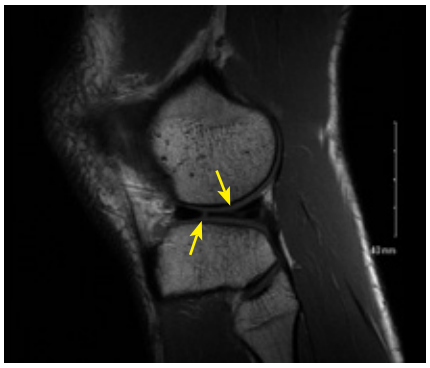

Figure 5 *MRI (saggital view) of a lateral meniscus tear (yellow arrows)*

the inner portion has a very poor blood supply. Figure 6 shows the blood vessels (perimeniscular capillary plexus) entering the outer portion of the meniscus.[3] This blood supply is necessary for a tear or a repair to heal. Without an adequate blood supply, the area of torn meniscus will have to be removed.

After mensical surgery, rehabilitation with a physical therapist or athletic trainer is needed to restore range of motion, strength, movement control and guide the athlete's return to sport. When the meniscus is repaired there may be a period of restricted knee flexion, especially during weight bearing, to protect the repair sutures and the meniscus. The rehabilitation guidelines are presented in a criterion based progression. Specific time frames, restrictions and precautions are given to protect healing tissues and the surgical repair/reconstruction. General time frames are also given for reference to the average individual , but individual patients will progress at different rates depending on their age, associated injuries, pre-injury health status, rehabilitation compliance and injury severity. The size and location of the meniscal tear may also affect the rate of post-operative progression.

Rehabilitation Guidelines For Mensical Repair

PHASE I (Surgery to 4 weeks after surgery)

Note: The physician may extend this phase to 6 weeks for large repairs.

Appointments	• Rehabilitation appointments begin 3-5 days post-operatively and then approximately 1 time per week
Rehabilitation Goals	• Protection of the post-surgical knee • Restore normal knee extension • Eliminate effusion (swelling) • Restore leg control
Precautions	• The patient may gradually wean from two crutches to one crutch to no crutches as long as the knee is in the locked knee brace, and there is no increase in pain or swelling for 4 weeks. • Knee brace locked for all weight bearing activities for 4 weeks • Do not flex the knee past 90°
Range of Motion Exercises	• Knee extension on a bolster • Prone hangs • Supine wall slides • Heel slides (caution with posterior medial meniscus repair secondary to the semimembranosus insertion) • Knee flexion off the edge of the table
Suggested Therapeutic Exercise	• Quadriceps sets • Straight leg raises • 4 way leg lifts in standing with brace on for balance and hip strength • Abdominal isometrics
Cardiovascular Exercise	• Upper body circuit training or upper body ergometer
Progression Criteria	• 4 weeks after surgery • Pain-free gait without crutches • No effusion (swelling)

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PHASE II (begin after meeting Phase I criteria, usually 4 weeks after surgery)

Appointments	• Rehabilitation appointments are once every 1-2 weeks
Rehabilitation Goals	• Single leg stand control • Normalize gait • Good control and no pain with functional movements, including step up/down, squat, partial lunge (between 0° and 60° of knee flexion)
Precautions	• No forced flexion with passive range of motion with knee flexion or weight bearing activities that push the knee past 60° of knee flexion • Avoid post-activity swelling • No impact activities
Suggested Therapeutic Exercise	• Non-impact balance and proprioceptive drills • Stationary bike • Gait drills • Hip and core strengthening • Stretching for patient-specific muscle imbalances • Quadriceps strengthening, making sure that closed chain exercises occur between 0° and 60° of knee flexion
Cardiovascular Exercise	• Non-impact endurance training: stationary bike, Nordic track, swimming, deep water running or cross trainer
Progression Criteria	• Normal gait on all surfaces • Ability to carry out functional movements without unloading affected (injured) leg or pain, while demonstrating good control • Single leg balance greater than 15 seconds

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PHASE III (begin after meeting Phase II criteria, usually 3 months after surgery)

Appointments	• Rehabilitation appointments are once every 1 to 2 weeks
Rehabilitation Goals	• Good control and no pain with sport and work specific movements, including impact
Precautions	• Post-activity soreness should resolve within 24 hours • Avoid post-activity swelling • Avoid posterior knee pain with end range knee flexion
Suggested Therapeutic Exercise	• Impact control exercises beginning 2 feet to 2 feet, progressing from 1 foot to the other and then 1 foot to the same foot • Movement control exercises beginning with low velocity, single plane activities and progressing to higher velocity, multi-plane activities • Strength and control drills related to sport specific movements • Sport/work specific balance and proprioceptive drills • Hip and core strengthening • Stretching for patient specific muscle imbalances
Cardiovascular Exercise	• Replicate sport or work specific energy demands
Return To Sport/Work Criteria	• Dynamic neuromuscular control with multi-plane activities without pain or swelling

These rehabilitation guidelines were developed collaboratively by Marc Sherry, PT, DPT, LAT, CSCS and the UW Health Sports Medicine physician group.

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