Rehabilitation Guidelines for Knee Arthroscopy

Arthroscopy is a common surgical procedure in which a joint is viewed using a small camera. This technique allows the surgeon to have a clear view of the inside of the knee, which helps diagnose and treat knee problems. Recent advances in technology have led to high definition monitors and high resolution cameras. These and other improvements have made arthroscopy a very effective tool for treating knee problems. According to the American Orthopaedic Society for Sports Medicine, more than 4 million knee arthroscopies are performed worldwide each year.[5] Knee arthroscopy can be used to treat mensical and articular cartilage tears, fat pad impingement and chronic plica irritation.

There are two types of cartilage in the knee, articular cartilage and meniscus cartilage. Articular cartilage is made up of collagen, proteoglycans and water, which line 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 (i.e. less friction), than rubbing ice on ice.[3] A wide range of injuries can occur to the articular cartilage during sports injuries, trauma and degenerative processes. Smaller, partial thickness tears of the articular cartilage can cause pain, swelling, or catching in the knee. These types of tears can be treated with arthroscopy by removing the torn or frayed articular cartilage with a shaver. The goal of this is to remove the damaged articular cartilage while preserving the remaining intact articular cartilage.

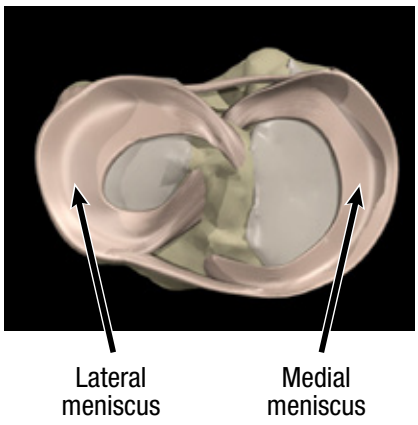

Figure 1 *Lateral and medial meniscus of the left knee (shown here from above the knee, without the femur)*

The meniscus cartilage in the knee includes a medial (inside part of the knee) meniscus and a lateral (outside part of the knee) meniscus (Figures 1 and 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 periphery of the knee joint (Figures 1 and 3). This shape is very important to its function since the primary function

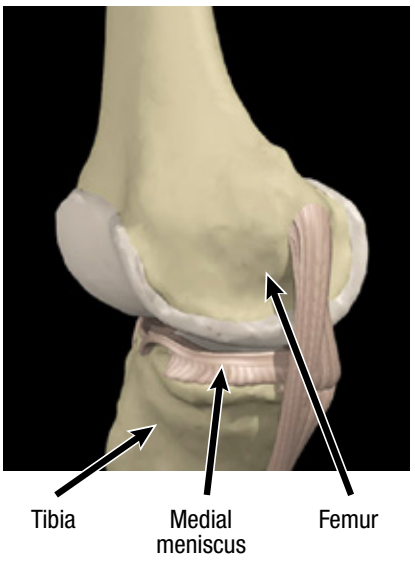

Figure 2 *Medial (inside) view of the knee*

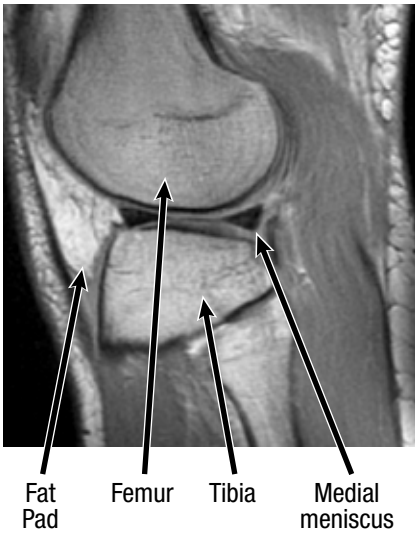

Figure 3 *Normal MRI (saggital view) of the knee, lateral side (outside)*

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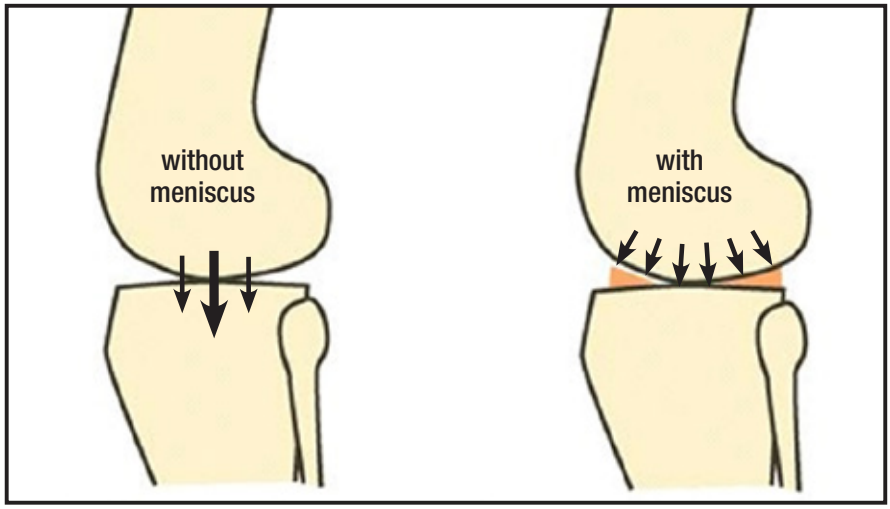

Figure 4 *Schematic representation of the meniscal effect on contact pressure in the knee. Contact area is increased by 50% with addition of menisci. This reduces contact pressures.*

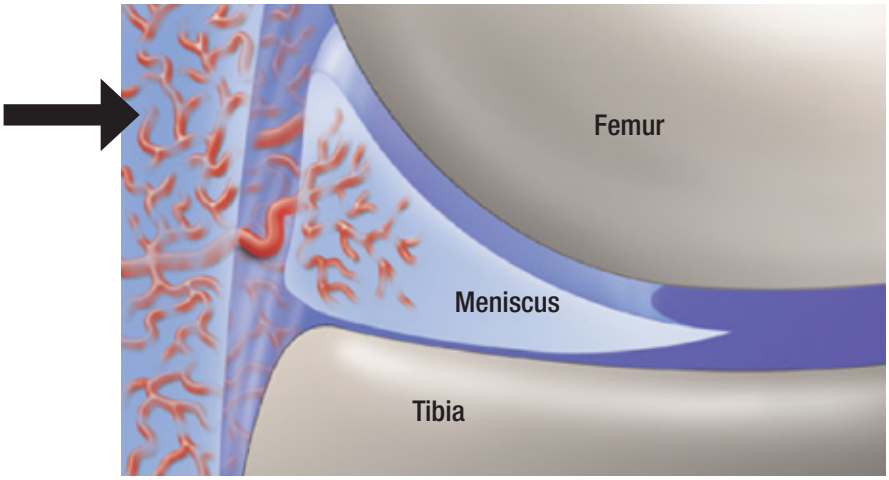

Figure 6 *Perimeniscular capillary plexus (thick arrow) providing blood supply to the outer third of the meniscus.*

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 occur most commonly in

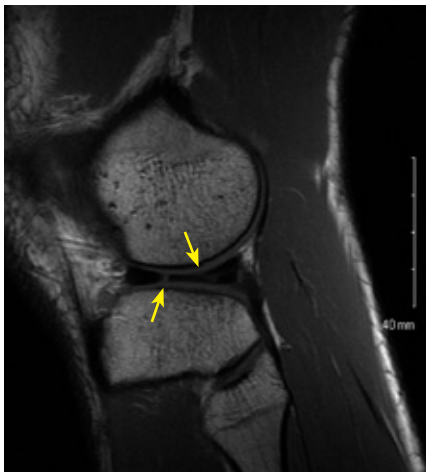

Figure 5 *MRI (saggital view) of a lateral meniscus tear (yellow arrows)*

middle-aged people as a result of repetitive stresses to the menisci over time, which severely weaken the tissue and cause a non-acute, degenerative tear. 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 use to repair it. One report showed that less than 10% of meniscal tears occurring in patients more than forty years of age were repairable. Symptoms of a degenerative meniscus may tear include swelling, pain along the joint line, catching, and locking. If a degenerative tear is symptomatic it is usually surgically removed. This is called a partial menisectomy, which is termed partial because the surgeons only remove the segment of meniscus containing the tear as opposed to removing the entire meniscus.

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Acute traumatic tears occur most frequently in the athletic population 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, locking and a specific injury. Often times these tears can 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. The arrow in Figure 3 shows a normal meniscus on an MRI, but the arrows in Figure 5 show a torn meniscus.

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 to which the athlete is returning; ligamentous stability of the knee; and any associated injury.[2] The location of the 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 vessels (the perimeniscular capillary plexus) enter the peripheral one third of the meniscus,[1] this blood supply is necessary for a tear or surgical repair to heal (Figure 6). Without an adequate blood supply, usually the area of torn meniscus has to be removed.

Other structures in the knee that can cause pain and limit function when injured or chronically inflamed are the fat pad (Figure 3) and the plica. These problems can arise from a variety of causes, but if they do not improve with non-surgical measures it may be necessary to use knee arthroscopy to remove the tissue. Secondary problems may also arise from injury, such as scar tissue or cysts, which need to be removed.

After knee arthroscopy, rehabilitation with a physical therapist or athletic trainer is usually required to optimize the outcome. Rehabilitation will focus on restoring range of motion, developing strength and movement control, and guiding the athlete's return to sport. 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, 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 also may affect the rate of post-operative progression.

PHASE I (surgery to 2-3 weeks after surgery)

Appointments	• Rehabilitation appointments begin 3-5 days after surgery
Rehabilitation Goals	• Protect the post-surgical knee • Restore normal knee range of motion • Normalize gait • Eliminate swelling (i.e. effusion) • Restore leg control
Precautions	• Use axillary crutches for normal gait • Avoid impact exercises for the first 4-6 weeks if the articular cartilage was debrided
Range of Motion (ROM) Exercises	• Knee extension on a bolster • Prone hangs • Supine wall slides • Heel slides
Suggested Therapeutic Exercise	• Quadriceps sets • Isometric wall press • 4 way leg lifts in standing for balance and hip strength • Gait drills
Cardiovascular Exercise	• Upper body circuit training or Upper Body Ergometer (UBE)
Progression Criteria	• Normal gait • No effusion • Full knee range of motion

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PHASE II (begin after meeting Phase I criteria)

Appointments	• Rehabilitation appointments begin once every 1 to 2 weeks
Rehabilitation Goals	• Good control with single leg stand • Good control and no pain with functional movements, including step up/down, squat, partial lunge
Precautions	• Post-activity soreness should resolve within 24 hours • Avoid post-activity swelling
Suggested Therapeutic Exercise	• Non-impact balance and proprioceptive drills • Stationary bike • Hip and core strengthening • Stretching for patient specific muscle imbalances • Quadriceps strengthening
Cardiovascular Exercise	• Non-impact endurance training; stationary bike; Nordic track; swimming; deep water run; and cross trainer
Progression Criteria	• Normal gait on all surfaces • Ability to carry out functional movements without unloading the affected 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)

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
Suggested Therapeutic Exercise	• Impact control exercises beginning 2 feet to 2 feet, progressing from 1 foot to other and then 1 foot to same foot • Movement control exercises beginning with low velocity, single plane activities and progressing to higher velocity, multi-plane activities • 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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