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What Is An ACL Tear?

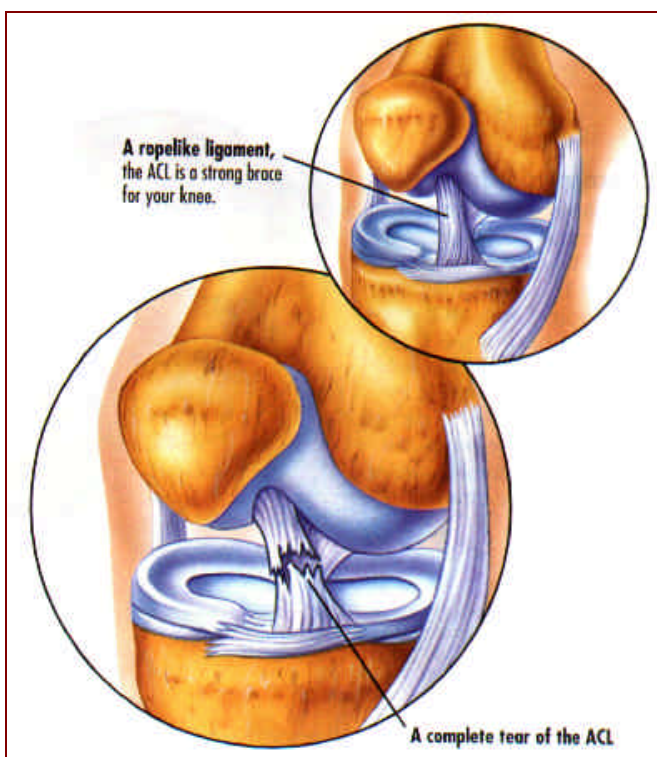
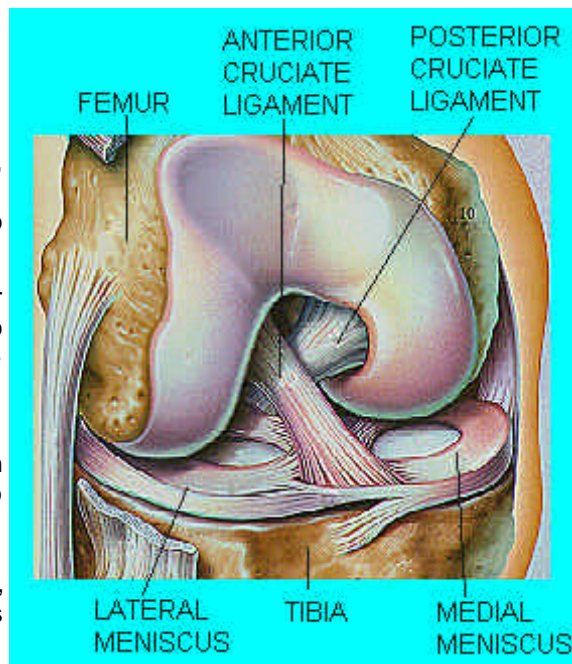
The Anterior Cruciate Ligament (ACL) is the main support structure of the knee that prevents rotation of the Femur (thigh bone) on the Tibia (shin bone). The ACL also prevents the Tibia from translating forward on the Femur. This ligament is injured more than we would like in sports.

The news is full of ACL tears in professional and collegiate ranks. Recently, a Miami Dolphins player returned to football less than 3 months after surgical reconstruction of his ACL. This is not the normal return to participation time for "normal" athletes.

Over the past 10 years the medical profession's ability to adequately repair a torn ACL has grown tremendously. Rehabilitation after this injury has also advanced significantly. Ten years ago, after surgical repair of the ACL the patient was placed in a cast for six weeks. Today, the knee is moved even before the patient wakes up from the anesthetic.

The knee is a hinge joint, comprised of three bones and four main ligaments. The joint has one plane of motion, flexion and extension. Due to this construction, a slight amount of rotation does occur, but the ligaments limit this motion. The three bones are the Femur, Tibia and Patella (knee cap). The four ligaments in the knee are the ACL, Posterior Cruciate (PCL), Medial Collateral (MCL), and Lateral Collateral (LCL). These ligaments connect the Tibia and Femur and provide the structural integrity to the knee.

The ACL and PCL were named for their location. The two ligaments are located in the middle of the knee and cross one another (cruciate is Latin for cross). The ACL has its origin on the front, or anterior, aspect of the Tibia, while the PCL originates on the back, or posterior, aspect of the Tibia. The MCL is located on the inside, or medial, aspect of the knee and the LCL is located on the outside, or lateral, aspect of the knee.



As stated earlier, the knee is a hinge joint that allows for flexion and extension only. The muscles above and below the knee joint are the prime movers. That is we can walk, run, jump, and climb due to these muscles. If the knee joint has been injured, we lose the ability to perform these functions properly. In the case of the ACL tear, the knee will feel unstable, and give out. The old phrase "Trick Knee" is most often associated with an ACL-deficient knee. When walking or climbing, the knee will suddenly "give out," usually to the side, and the individual falls to the ground.

This give out is due to the knee having a rotational instability. When weight is borne on the ACL-deficient knee, the Femur has a tendency to rotate on the Tibia. This causes pain and places the knee in a position that is unnatural. Consequently, the muscles can not control the motion of the knee, and it gives way. This "giving out" is even more apparent when an athlete attempts to cut, start, or stop during competition. When the knee is unstable, cutting, starting or stopping places severe rotational stress on the knee.

If an unstable knee is not repaired, the constant rotation will cause other structures to be damaged. The most common associated injury is a meniscal tear. The meniscus is a "C-shaped" object located between the Tibia and Femur that acts as a shock absorber. When the meniscus is torn, it causes pain, popping, swelling, and giving way. Another associated injury with a chronically unstable



Common Meniscal Tears

knee is degenerative changes to the joint surfaces, or arthritis. The constant rotation of the femur begins to “wear away” the joint surfaces.

Treatment of an ACL injury begins with proper recognition of the injury. There are still a few times when an ACL tear is misdiagnosed. Magnetic Resonance Imaging (MRI) can be used to assist in the diagnosis of an ACL tear as well as giving the physician the opportunity to see if other structures have been injured.

Rehabilitation begins immediately after the injury. Initial rehab should include ice, gentle knee motion, quad setting, straight leg raising, and protected weight bearing. The worst thing that can be done is to not move or use the knee. When the ACL ruptures, the knee fills with blood, becomes stiff and painful. Gentle motion will help to “milk” the blood out of the joint to improve pain and function. When the knee is not moved the blood in the joint becomes clotted and sets up like Jell-O®. When this occurs, motion becomes more painful and the removal of the blood takes longer.

It is very important to use the quad muscles. When the knee is injured they will shut down and not work. In order to function in life these

muscles must be able to work properly. Performing quad sets (tightening the quad muscles), straight leg raises and hamstring curls will help to limit the amount of muscle atrophy (loss of muscle size and strength) that occurs due to the injury.

Most orthopaedic surgeons will have the patient wait two to four weeks after the original injury before repairing the ACL. This is done to reduce the swelling, return normal quad function and to decrease pain. If the surgery is performed immediately after the injury the body will experience a double insult from the injury and trauma of surgery, this makes the initial recovery very difficult.

The surgical treatment for ACL ruptures can be performed in one of three ways. One method of repair is to use a patellar bone-tendon-bone graft. This technique utilizes the middle one-third of the patellar tendon with an attached piece of bone from the patella and tibia. This bone-tendon-bone graft is then used to replace the damaged ligament.

Another surgical method utilizes a graft taken from the hamstring tendons. The hamstring tendon is used to replace the torn ACL in the same manner.

The third surgical procedure utilizes a patellar bone-tendon-bone graft from a cadaver donor. This procedure is most often used in people who have returned from a previously reconstructed ACL.

In all three of these procedures, drill holes are made in the Tibia and Femur where the ACL originates. The new ligament is passed through the holes and held in place with interference screws.

Rehabilitation after surgery has come a long way in the past ten years. Today, most orthopaedic surgeons begin rehabilitation the day after surgery. Early rehabilitation begins with protected weight bearing, quad setting, straight leg raising, cycling, and guarded knee extensions.

The early phase of the recovery is protected to guard against the new ligament pulling loose from the screws that hold it in place. As with any fracture, the bone hole must fill in with new bone before the rehab can become too aggressive. This process takes about six weeks.

Rehab continues to progress during the first six weeks as the patient progresses. Exercises to develop balance, strength and coordination are instituted. These include stork stands, body weight linebacker squats, stair climber, and calf raises. Further progression in the rehabilitation will bring more complex activities such as closed chain terminal knee extensions, leg press, one leg squats, and balance activities with unstable footing.

The second six weeks of the controlled rehab revolves around more complex activities. The activities include complex balance, lateral motion, and greater strength. Activities such as slide board, a progressive running program, one-leg leg press, and balance with very unstable footing can be used.

Near three months post-op the controlled rehab ends, and the patient continues rehab on his/her own. It is very important to continue strengthening the leg during this time. Between three and six months the repaired ACL is at its weakest point. During the first three months the tissue has very limited blood supply and is degrading. The body slowly brings the new blood vessels into the area but not fast enough to stop the degradation process. The athlete must be aware of this so that he/she does not re-tear the ACL. Rehab should continue while avoiding cutting and pivoting.

ACL tears are no longer the end of an athlete's career. If the surgical and rehab techniques used today were available to Gayle Sayers, Joe Namaith, or the more recent athletes of 20 years ago, their careers would probably have lasted five or ten years longer. The ACL can be repaired with no loss in function or strength. Many athletes return to play stronger and faster than before the injury.