

## Anterior Cruciate Ligament Rupture

### Introduction:

Everyday new athletes walk through the athletic training room doors looking for help with an injury. Injuries vary from a small recovery time to an extensive rehabilitation project. An anterior cruciate ligament (ACL) rupture is a third degree sprain and requires surgery and along with six months of rehabilitation for a full recovery. This paper will provide is an overview of an ACL rupture, from the mechanism of injury to the full rehabilitation process and every step in between.

### Body:

With any knee injury there are many structures involved in the mechanism of injury because it is such a vulnerable joint. It is more common to have a non-contact ACL tear in sports than a contact tear and it is also more common that women tear their ACLs because of difference in hip alignment. The structures involved in an ACL tear are the femur and its condyles, and the tibia its condyles. Along with the femur and the tibia are all the ligaments and tendons surrounding the knee joint which include the patellar tendon, the anterior cruciate ligament (ACL), the posterior cruciate ligament (PCL), the medial collateral ligament (MCL), the lateral collateral ligament (LCL) and the meniscus (medial and lateral). A common way to tear the ACL is to pivot with full body weight on the knee; this causes the femur and the tibia to rotate in opposite directions partially tearing or rupturing the ligament. Hip adduction and internal rotation, external rotation of the tibia relative to the femur, internal rotation of the tibia on the foot, and forefoot pronation are additional ways in which to tear the ACL (Shimokocki, 2008). An improper landing with compression in the knee joint could cause posterior femoral displacement or anterior tibial translation; these movements could result in an ACL tear as well. In contact sports the ACL could be torn by being hit and hyperextending the knee.


Common ways to tell if an ACL tear has occurred would be: hearing a pop when the injury occurred, laxity of the knee joint, instability of the knee joint, swelling, and pain. Pain would probably be the major factor that would send an athlete to get checked out by an athletic trainer or go straight to the doctor. The swelling would occur immediately after the injury has occurred and the instability would be when weight bearing by the athlete. An evaluation performed by an athletic trainer would include range of motion (ROM), strength/resistance, and specific tests. Some of the specific tests include: Lachman's Test (tests for ACL tears), valgus stress test (MCL tears), varus stress test (LCL tears), McMurry's Test (meniscus tears), posterior drawer (PCL tears) and anterior drawer (ACL tears) (MSU-Mankato, 2012). It is better if these tests are done right away before swelling sets in and before muscles try to guard the injured area because this could result in a false negative test. Additionally these tests should always be compared bilaterally starting with the uninjured leg to make sure of injured leg abnormalities; a positive test would be abnormal laxity in the knee joint. Although an athletic trainer is not allowed to confirm that an ACL rupture has taken place, a doctor is allowed to diagnose with the help of an MRI machine.

After having an examination by a doctor and having an MRI done, it can be confirmed that it is a complete anterior cruciate ligament (ACL) tear; which is a third degree sprain. Before the surgery the athletic training staff has the athlete ice and do some rehabilitation to reduce the swell in the knee. In order to return to full play the athlete must be able to demonstrate full ROM, strength, and a good quadriceps to hamstring ratio; the process to achieve this criteria takes roughly six months.

An injury of this severity and location most often requires the use of surgery to repair and install a new ACL whether it will be from a cadaver, a graft from the gracilis, hamstring group or a piece of the patellar tendon. According to Gundersen Lutheran, not all patients are required to wear a knee brace; it is up to the discretion of the orthopedic doctor. In a study conducted by Birmingham et al, there was no significant difference in objective findings between a postoperative patient wearing a knee brace or a Neoprene sleeve (Birmingham et al, 2008). With this said there was a subjective difference between the two because the brace subjects reported feeling more confident in the knee provided with the brace than the sleeve. At this time, the findings are exploratory. If a doctor chooses to have the patient wear a knee brace, there are certain regulations on how long one should wear it and to what degree of mobility it should be set at to help with the healing process. The Gundersen Lutheran ACL rehabilitation program recommends that for the first week the brace should be locked at 0 -90 degrees for walking and sleeping, after that the degree gets set higher to work on the ROM. Eventually the brace will be removed and a sleeve will replace it depending on the athletes activities. A brace in these cases are more likely used than tape because tape loosens over time and the brace can always be retightened by pulling on straps and adjusting it.

After going through pre-surgery rehabilitation and the actual surgery to repair the torn ACL, the athletic training staff will start a rehabilitation program to get the athlete back to playing condition and stability. Research indicates many phases for rehabilitation, and each phase aims to increase intensity to progress the athlete's chance of returning to full play. Throughout the phases cryotherapy (ice) will be used to reduce pain, swelling and inflammation. Depending upon the kind of surgery that the patient had there were certain restrictions put upon the rehabilitation after the surgery. For example, if the patient had a hamstring/gracilis auto graft the patient was to avoid using isolated hamstring strengthening exercises for it would need to recover as well. If the patient had a meniscus repair as well as an ACL repair, the patient should follow the meniscus protocols for the first three weeks and then follow the ACL protocols with use the post-operation brace for four to five weeks.

Phase one of recovery is the maximum protection stage after surgery because the graft is very delicate at this point. Controlling post-surgery pain, swelling, inflammation, recovering ROM and neuromuscular control are major factors in helping an athlete return to play. As stated before, some patients may or may not need a brace or sleeve after surgery, but many doctors recommend the patient to use one. Cryotherapy (ice) is used to reduce swelling and inflammation, which in turn reduces some of the pain. Passive and active ROM increases blood flow to the newly repaired area helping the recovery and controlling gait adjustments due to the injury. Phase two is the moderate protective stage, where walking without crutches and gaining neuromuscular control is the majority of the focus. Increasing to full ROM and progressing exercises for strengthening, stretching and balance is another factor of this phase. At this point if the athlete is utilizing a brace, they should be trying to use a sleeve instead of depending upon the athletes activities. Phase three is gradually increasing strength, stretching ability and balance. Activities should progress to a higher level, becoming more difficult, and exercises



should become more sport specific. The final phase would be increase cardiovascular conditioning and strength of knee stabilizers (Holla 2010).

**Conclusion:**

Even though an ACL tear is a major injury, with the correct surgical procedure and rehabilitation one can return to full ROM and strength from this type of injury. Every step in the process is crucial to the rehabilitation process; if cryotherapy is not utilized after surgery, ROM is difficult to work on and may never return. As shown above, each step has a specific purpose to return a patient or athlete to full strength and ROM.

## References

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