



Anterior Cruciate Ligament Tear

The anterior cruciate ligament (ACL) is one of four main ligaments which give the knee stability. ACL tears typically occur as a non-contact knee injury occurring while changing directions, pivoting, or landing from a jump. A pop commonly is felt or heard. Usually the athlete cannot continue playing. Marked swelling is commonly noted within a few hours. Within 2-3 weeks, the swelling tends to decrease. Typically, the knee begins to feel normal unless a cartilage tear or severe instability is present. Symptoms such as giving way of the knee commonly may reappear when the person attempts to return to pivoting sports. Symptoms of a cartilage tear commonly are present. Cartilage tears are present in over 60% of knees with ACL tears. ACL injuries lead to cartilage tears due to increased shearing of the cartilage as the knee gives out during the episode of instability. Signs of a cartilage tear include: pain, swelling, catching, difficulty with squatting, joint line tenderness, and pain with flexion and rotation of the knee. Locking of the knee is the most severe cartilage tear symptom.

Excessive motion or looseness of the knee is usually noted on exam after tearing the ACL. The *Lachman test* usually demonstrates the excessive laxity, and often a soft endpoint is noted when the ligament is stressed. A *pivot-shift* may be present. When a pivot shift is present on exam, the knee is unstable. X-rays usually are normal after an ACL injury. An MRI scan can be helpful for decision making if there is any questions about appropriate treatment or in complex injuries to the knee.

The severity of knee laxity (instability) is probably best assessed with the KT-1000 arthrometer. The KT-1000 test is usually performed in physical therapy. The device measures the amount of knee shifting with stress and allows comparison to your uninjured knee. If there is greater than or equal to 3mm side to side difference and greater than 10mm of translation on the injured side, the ACL is torn with 99% certainty. Partial ACL tears can occur. One-third of partial ACL tears will go on to full-thickness ACL tears due to re-injury over time.

Non-surgical treatment of ACL injuries involves avoidance of pivoting, jumping, and cutting sports. *High risk activities* (pivoting sports) for re-injury after an ACL injury include: basketball, tennis, softball, football, soccer, volleyball, racquet ball, waterskiing, and downhill skiing. *Low risk activities* for re-injury include: walking, swimming, biking, cross-country skiing, bowling, weight lifting, and straight ahead running. Use of a hinged knee brace for high risk or pivoting sports can decrease symptoms with recreational athletes, but the brace does not prevent re-injuries. The brace should not be considered an adequate substitute for a normal anterior cruciate ligament. People who re-injure the knee in the brace or who are unstable despite bracing are best managed surgically with reconstruction of the ligament. Knee strengthening exercises can decrease symptoms and decrease risk of re-injury. Generally, older, less active people often can be treated non-surgically. Also, many low demand people with relatively stable knees on KT-1000 testing can safely be managed non-surgically.

Surgical treatment of ACL injuries is usually recommended for young, active patients, particularly if there is a desire to return to pivoting sports. Risk of re-injury is markedly decreased in people with ACL tears managed surgically compared to non-surgically. Also, non-athletes whose knees give out with daily activities can frequently benefit from ACL reconstruction.

ACL reconstruction markedly increases the rate of cartilage tear healing. Repair of meniscus cartilage tears with ACL reconstruction results in healing of the cartilage tear in over 90% of cases. Repair of the meniscus *without* reconstruction of the ACL results in proper meniscal healing in less than 30% of cases. ACL reconstruction is commonly performed using ligament graft of two different types. The advantages of hamstring tendons as a graft source include:

- Decreased pain with the surgery and decreased knee pain with physical therapy
- Lower incidence of chronic pain with kneeling and stair climbing
- More cosmetically pleasing incision appearance (smaller and thinner scar)
- Less hospitalization required (decreased cost) due to lower pain medicine requirements. Costs are further decreased by lower physical therapy requirements.
- Fewer major complications from the graft source (patella fractures, patellar tendon ruptures) occur after reconstructions done using hamstring tendons compared to patellar tendon
- More anatomical reconstitution of normal ACL fiber bundle patterns seen on MRI scans and at second look arthroscopy
- Thicker, stronger graft material with more fiber bundles than using patellar tendon

Disadvantages of hamstring reconstructions compared with middle 1/3 of patellar tendon reconstructions include:

- Fewer long term follow up studies
- Weaker initial graft fixation (brace may be temporarily needed).

Repair of meniscus cartilage tears are performed in preference to excision of cartilage whenever possible with ACL reconstruction. Most long term ACL studies show a much higher rate of return to normal activities after reconstruction when all the cartilage is maintained in the knee.

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