SPORTS SHORTS

GUIDELINES FOR PEDIATRICIANS

ACL Injuries in Female Athletes

Issue 14

American Academy of Pediatrics

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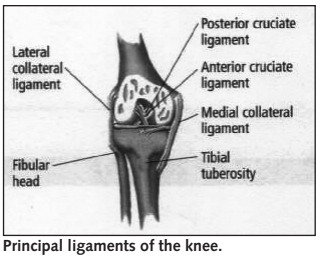


Principal ligaments of the knee.

What is the ACL (Anterior Cruciate Ligament)?

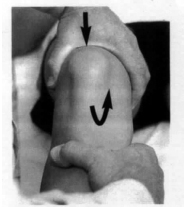
It is the ligament connecting the femur and tibia inside the knee joint and provides the majority of stability in the knee. The ACL is the primary restraint (protector) to anterior translation (shifting) of the tibia relative to the femur and is a secondary restraint to rotation and angulation; particularly during weight bearing. It is named cruciate for "cross" because it crosses the posterior cruciate ligament (PCL) inside the knee.

When should one suspect an ACL tear?

Usually associated with sudden knee pain & giving way from a twisting, valgus (knock-kneed), or hyperextension-type injury. Some athletes will feel a "pop" with or without pain & usually are unable to continue to play. Knee swelling (hemarthrosis) develops over next 24 hours, often rapidly. Physical examination can be difficult. The most important test to perform is the **Lachman test.** See diagram below. Looseness in the knee with increased motion between the tibia and femur is an ACL injury until proven otherwise. Examination of the uninjured knee for comparison is helpful. Hamstring tightness or spasm during the Lachman test could mask the instability and result in a missed or delayed diagnosis.

Knee Effusion

Right Knee



The left hand stabilizes the femur while the right applies an anterior translational force. The knee is relaxed and flexed 20° to 30°.

Lachman Test (Left Knee)

What imaging is necessary?

Four view radiograph series including a standing AP, lateral, tunnel or skier's view, and sunrise or Merchant view to assess for possible fracture, physeal (growth plate) damage, osteochondral lesions and loose bodies. MRI should not be considered as an initial screening tool but may be indicated in cases of ligamentous instability, possible meniscal or cartilage injury or persistent symptoms of swelling, pain and/or instability for more than three weeks.

What is the treatment?

An athlete with a suspected ACL injury should not be allowed to return to sport participation without an evaluation by a primary care sports medicine specialist or an orthopedic surgeon. **Early referral** is recommended. For young, active individuals ACL reconstruction provides the best opportunity for a successful return to agility sports. Young athletes with open physes or growth plates should still be referred early for surgical consultation although sometimes reconstruction is delayed due to skeletal immaturity.

What can the primary care physician do to start treatment?

Initial treatment includes rest, ice, and use of crutches until the athlete can walk without a limp. Knee immobilizers are not necessary and use should be limited to 1-2 weeks. Early range-of-motion exercises are important. Full extension & flexion should be regained as soon as pain & swelling permits. Physical therapy is often helpful both pre and post-surgery. ACL braces (off the shelf or custom made) are very poor at controlling translational or rotational forces but are useful for initial treatment and post-operatively. The use of a brace will not substitute or avoid the need for surgery. Nonoperative treatments have limited sucess and often still result in recurrent instability and irreversible damage to intra-articular cartilage; often within months to a few years following the ACL injury.

Why is the ACL more commonly injured in females?

Environmental (shoes, playing surface), **hormonal** (estrogen levels/menstrual cycle) and **anatomic** (thigh-knee angle) factors, although somewhat controversial, are all thought to play a role in the increased ACL injury risk to female athletes. **Biomechanical risk factors** seem to be the most important. For example, females perform cutting maneuvers and land from jumps in a more erect position than males with straighter knees and hips with their feet in a "flat-footed" or pronated position. This generates abnormally high tension on the ACL. A safer landing position is with the hip and knee more flexed and this is the concept behind new strategies aimed at preventing ACL injuries. Injury prevention, if possible, starts at a young age by teaching children "safe" movement patterns. This includes good jumping/landing techniques, strengthening muscles and regular physical activity.

SUMMARY

Mechanism of injury	non-contact collapse into valgus (knock-kneed) +/- "pop"
Physical examination	swelling, ↓ ROM, **instability w/ Lachman's test**
Imaging	x-rays often normal; MRI 85-90% accurate for ACL tears
Initial treatment	bracing, physical therapy, limit activity -avoid cutting, jumping
Definitive treatment	surgical reconstruction for complete tears and some partial tears
Associated injuries	common: look for meniscal tears, other cartilage or collateral ligament injuries and consider growth plate injuries if skeletally immature

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Doctor: This side of "Sports Shorts" is for your use; flip side can be photocopied and given to your patients

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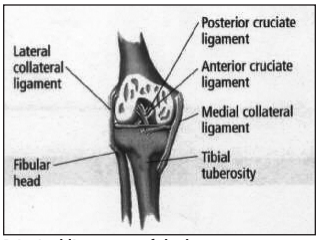

Principal ligaments of the knee.

What is the ACL (Anterior Cruciate Ligament)?

It is the ligament connecting the femur (thigh bone) and tibia (shin bone) inside the knee joint and provides the majority of stability in the knee. The ACL protects the knee during pivoting and shifting during running and jumping/landing. It is named cruciate for "cross" because it crosses the posterior cruciate ligament (PCL) inside the knee.

Knee Effusion

When should one suspect an ACL tear?

Usually associated with sudden knee pain & giving way from a twisting, knock-kneed, or overextension-type injury. Some athletes will feel a "pop" with or without pain & usually are unable to continue to play. Knee swelling develops over next 24 hours, often rapidly. The athlete often has a feeling of "looseness", weakness or instability in the knee.

When should an injured athlete seek medical care?

1) Any time there is moderate or severe pain, swelling and/or the inability to bend or straighten the leg completely.
2) When an athlete cannot continue to play that day or has difficulty with walking, running or jumping for the next few days after the injury.
3) When an athlete complains of "looseness" or giving way in the knee from either a new or an old injury. *Any athlete with a suspected ACL injury should NOT be allowed to return to sport participation without an evaluation by a primary care sports medicine specialist or an orthopedic surgeon.* Continuing to play sports with a torn ACL can lead to further injury and/or permanent damage.

Which athletes get ACL tears?

Any athlete can tear their ACL. Common ages are 15-25 years old. Female athletes are injured 7-8x more frequently than males. ACL tears occur in all sports but jumping, cutting, pivoting sports such as basketball, soccer and volleyball are highest risk.

Will tests need to be done?

Almost all suspected ACL injuries are severe enough that xrays are necessary. Sometimes additional tests such as MRI's (magnetic resonance imaging studies) are also required.

What is the treatment?

The most successful treatment for an ACL injury is usually arthroscopic surgery. A new ligament is made to "reconstruct" the old injured ACL. The surgery is usually not performed as emergency surgery so the treatment starts with rest, ice and crutches as needed. Braces are often helpful early on and temporarily after surgery. Physical therapy is important both before and after surgery to work on bending and straightening, to decrease pain and swelling and to help walk without a limp.

Is surgery necessary?

Most ACL tears need surgery. Fortunately approximately 9/10 athletes (90%) have successful surgeries and return to their sports about 6 months. In general once recovery is complete, athletes do not have pain or weakness with running and jumping. Athletes that choose to avoid having recommended surgery can have problems with pain, weakness, giving out and can develop knee arthritis at young ages. Athletes should follow their doctor's treatment plan to try to have the best possible recovery.

Are ACL tears preventable?

Unfortunately, many of these injuries are not preventable. However, some recommendations that might help with prevention are to teach young athletes good running, jumping, landing and squatting techniques. Parents, coaches, athletic trainers and physical therapists should continue to reinforce good sports technique at all ages. Strengthening muscles and participating in regular physical activity may also help.

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