ACL INJURY PREVENTION IN YOUTH ATHLETES
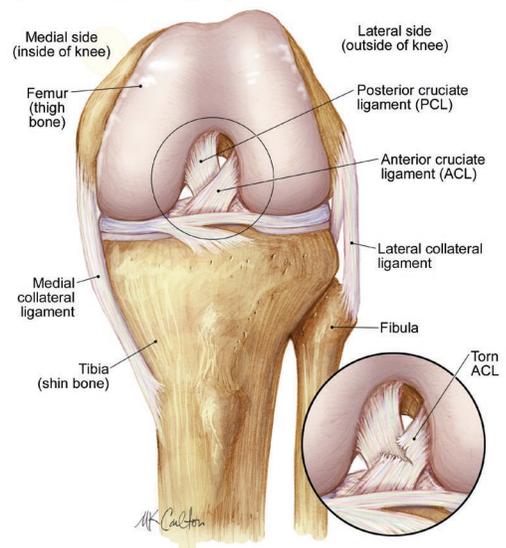
Any sport that requires running, jumping, cutting, pivoting, or landing—such as basketball, football, or soccer—creates a higher risk of ACL tear. In the recent past, there were greater than 3.5 million sports injuries reported annually in children <14, including an increased incidence of anterior cruciate ligament (ACL) tears.

These tears are of particular concern because adolescents with major knee injuries are more prone to functional deficits, poorer quality of life, and increased risk of obesity in the decade following injury. Screening programs may help to identify youth athletes at higher risk of ACL tear. Targeted injury prevention strategies may help reduce the incidence of ACL injury.

Why do ACL injuries occur in kids?

While some ACL tears caused by physical contact or collision may be unavoidable, roughly 70 percent of ACL injuries are non-contact and possibly preventable. Young females are at a 2 to 6 times increased risk of non-contact ACL injury compared to males. While there are many contributing factors that increase the injury risk profile in young females, researchers have identified a few key faulty movement patterns that may put them at higher risk. For example, some female soccer players may perform playing actions with more of a knock-kneed position, or a reduced hip and knee joint range of motion, or decreased hamstring strength, any of which may underlie their increased risk for an ACL injury.

Left knee bones in flexion (bent)

- Medial side (inside of knee)
- Lateral side (outside of knee)
- Femur (thigh bone)
- Posterior cruciate ligament (PCL)
- Anterior cruciate ligament (ACL)
- Lateral collateral ligament
- Medial collateral ligament
- Fibula
- Tibia (shin bone)
- Torn ACL

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Can we screen for ACL injury risk?

Unfortunately, there is no perfect screening test or tool for ACL injury risk detection. The faulty movement patterns described above may be detected prior to injury using landing and cutting maneuvers. Accurate detection of movement patterns can be accomplished using "gold standard" 3D marker-based systems. Limitations of widespread screening using this technique include the requirement of a laboratory setting, increased cost, and the need for highly trained technicians. 2D camcorder-based systems are mobile and less expensive, but there are issues regarding their efficiency and accuracy. Research is now focusing on the development and validation of ACL injury risk screening tools that use Microsoft Kinect. Collaborative researchers are working toward the goal of developing portable, low risk, inexpensive, accurate, and efficient means to screen for ACL injury risk.

How can an ACL injury be prevented?

Understanding the magnitude of the problem is a critical first step. Clinicians and researchers must team up with players, parents, coaches, and athletic trainers to identify high-risk athletes. Joint range of motion can be improved with therapy. Weak muscle groups such as hamstring and hip external rotators and abductors can be targeted to decrease the chance of landing in an at-risk knock-kneed position. Improved balance/coordination during functional movements may also help to decrease risk. Jump routines and learning to pivot properly may help to prevent ACL injury. These exercises and training programs are more beneficial if athletes start when they are young. It may be optimal to integrate prevention programs during early adolescence, prior to when young athletes develop certain habits that increase the risk of an ACL injury.

Summary

The goal of ACL injury reduction may not be far out of reach if we can use safe, efficient, and low cost injury screening methods to identify high-risk athletes alongside targeted neuromuscular training type injury prevention programs.

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