

Treating pediatric ACL injury with advanced surgical techniques



In the past decade, there has been a significant increase in the number of anterior cruciate ligament (ACL) injuries among young athletes. One study found an 11 percent increase in pediatric ACL injuries each year between 2000 and 2010. The ACL, a ligament that runs diagonally in the middle of the knee, prevents the tibia from sliding out in front of the femur. When the ACL ruptures, or tears, the knee becomes unstable.

Historically, ACL reconstruction for very young patients was sometimes delayed because of concern that using adult surgical techniques would damage children's physis, or growth plates. While drilling through the physis of children with significant growth remaining may lead to a leg-length deformity or malalignment, not all skeletally immature children are at risk. Furthermore, deferring surgery has increasingly been shown to put a child at greater risk for progressive injury to the meniscus — the cartilaginous structure that serves as a cushion between the tibia and the femur — and articular cartilage that covers the ends of the tibia and femur.

Injury prevention is key for adolescents

UCLA offers pediatric sports-injury prevention evaluation of children at high risk of ACL injury. This includes boys and girls who play football, basketball or soccer during puberty, when they are at greatest risk for injury. After examination by a sports-medicine physician, a child may be referred to a certified physical therapist. The therapist observes the child's movements during physical activity and prescribes exercises to help prevent injury. One study found a 72 percent decrease in ACL tears among female high-school soccer players participating in an exercise program concentrating on neuromuscular control and hamstring strengthening.

"A therapist can look at the way a child jumps or changes directions and identify mechanical abnormalities associated with a higher risk of ACL tear. They can prescribe an exercise program to address these weaknesses to decrease the risk of ACL injury," says Richard E. Bowen, MD, clinical professor of orthopaedic surgery and chief of UCLA's Youth Sports Medicine Program. "ACL rupture can be a devastating injury, so the best way to address the problem is to prevent the injury."

With both pediatric and sports-medicine orthopaedic surgeons working in collaboration, UCLA offers a full range of reconstructive options to provide optimal care to each patient. This includes advanced techniques that preserve the integrity of the physis in younger patients who have more growth remaining, and established reconstruction techniques suitable for teen and collegiate athletes who are closer to skeletal maturity.

With a wide area of overlap, UCLA pediatric and sports-medicine orthopaedic surgeons are part of a collaborative team that offers patients and their parents an unusual level of choice in ACL reconstruction.

Surgical methods vary based on age, expected growth

The recommended surgical technique to reconstruct a torn ACL is patient-specific and depends not only on age, but the projected skeletal growth remaining. An X-ray or MRI will reveal the status of the growth plate in the knee.

- The physal-sparing iliotibial band technique is one of the few surgical options available to the very young. This non-anatomical procedure uses the central one-third of the iliotibial band that runs on the outside of the thigh as a graft source. The tendon is harvested and rerouted through the notch in the femur (middle of the knee) and tied back down to the tibia, almost serving as a sling.
- The all-epiphyseal technique, which is an anatomical procedure that uses a hamstring graft to reconstruct the ACL, is an option appropriate for children ages 10 to 12 if their bones are large enough.
- A transphyseal technique, which drills across the physis with a hamstring graft, is recommended in the pubescent child who has less growth remaining.
- For post-pubescent youths with closed growth plates, the options include either the hamstring graft or bone-patellar tendon-bone graft (the same graft procedure commonly used in adults). Using the patient's own tissue to replace the ACL whenever possible is recommended because healing is more reliable, and re-injury rates can be lower.

Who is most at risk?

ACL injuries are most commonly seen among the pediatric population in sports that require athletes to jump and pivot quickly. These include football, basketball, soccer and skateboard riding.

National injury rates are roughly equal between male and female pediatric patients. However, when adjusted for the number of playing hours, adolescent females have a two-and-a-half to six times higher rate of injury playing soccer or basketball compared to adolescent males. The relatively higher rate of ACL tears among female athletes is likely to be a multifactorial health issue that may include poor neuromuscular knee control when landing from jumps.

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