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New Steps to Help Prevent Knee Injuries in Teen Sports

By KATHERINE HOBSON

A torn knee ligament is one of the most debilitating injuries that routinely hit young athletes. Now, medical researchers are deciphering why women are at much greater risk for the problem than men and how it can be prevented.

An estimated 90,000 varsity high-school and college athletes a year suffer an injury to the anterior cruciate ligament, or ACL, which connects the thigh bone to the shin bone. Women are between four and six times as likely as men who play the same sports to be injured, partly because they rely more on ligaments to compensate for less-developed muscles, researchers say. The riskiest sports for ACL tears are soccer, basketball, volleyball, football and skiing, all of which involve sudden stops, changes in direction and jumps.

An ACL tear can have big consequences. Surgeons usually replace the torn ligament with a tendon from another part of the patient's body or from a cadaver. Months of recovery time follow. And years later, patients, especially women, face an increased risk of osteoarthritis. Partial ACL tears may heal without surgery.



Getty Images

"One movement means a year out," says Stephen Chaconas, associate director of elite-level travel soccer for the Capital Area Soccer League in Raleigh, N.C., which has programs for kids aged 4 to 18. "That's all it takes—one bad step, one bad jump or an extra bit of weight in the wrong direction at the wrong time." The league has had seven ACL tears in the past year, all but one in female athletes.

Jaide Garcia, a defender on the women's soccer team at Loyola Marymount University in Los Angeles, sat out most of her sophomore season after tearing her ACL during the third game of the year, which required surgery. "A girl was

dribbling at me at an angle," the 21-year-old says. "I stepped forward on my left foot and was about to cut to my right, when I heard and felt my knee pop."

During puberty, both boys and girls add inches and pounds at a rapid pace. But boys see a much greater increase in power than girls, says Timothy Hewett, a professor and director of sports medicine research at Ohio State University's Sports Health and Performance Institute. When girls and young women go out on the soccer field or basketball court, "they don't have the power," so they learn to rely on certain muscles rather than others to compensate and put more strain on their ligaments, he says.

To stabilize their knee joints, women tend to use their front thigh muscles, or quadriceps, for example, rather than the muscles on the back of the legs, Dr. Hewett says. And because their legs and hips are less powerful, women have a harder time controlling their trunks. As a result, women's knees are more likely to collapse inward, in a knock-kneed position, and suffer injury.

Dr. Hewett and colleagues have developed an exercise program to help prevent ACL injuries. The program, done for six to eight weeks in the preseason, consists of strength-training to build underdeveloped muscles,

agility training to learn how to land correctly, plyometrics and other exercises. A shorter warm-up is done before practices and games. The researchers are seeking to isolate the most effective parts of the program to create a shorter workout, he says.

4 to 6

A young woman athlete is four to six times as likely as a man to suffer an ACL tear.

Other programs are aimed at preventing ACL injuries by only changing the warm-up routine. The Prevent Injury and Enhance Performance (PEP) Program, developed by Santa Monica Sports Medicine Foundation, in California, includes warm-up drills like bounding runs, to increase flexibility and

strength in the hip, and lateral diagonal runs, to learn to pivot off one's leg without having the knee collapse inward. That compares to a typical warm-up routine, which might consist of running a few laps and some stretching.

Holly Silvers, director of research at the foundation, says the PEP program can be completed in about 15 minutes once players learn the routine. "It's all about compliance," she says, and "most coaches don't have strong feelings about how kids warm up," making it relatively easy to swap in a new program.

Mr. Chaconas says the Capital Area Soccer League last month brought in an athletic trainer and physical therapist to help injured kids. It also adopted a warm-up routine called Performance Enhancement and Kinetic Control (PEAKc), developed by Darin Padua, director of the sports medicine research laboratory at the University of North Carolina at Chapel Hill. Among the exercises: one-legged squats and lateral jumps.

Research comparing players in injury-prevention programs with other athletes doing standard warm-up and training routines found the programs can reduce the risk of ACL injury by an average of 50%, Dr. Hewett says.

Dr. Padua says it makes sense to intervene to prevent injuries in kids as young as 10. It isn't clear that the same prevention programs are effective for those younger athletes and researchers are seeking to adapt them for preteens, he says.

Experts are also studying how best to identify who is at risk. Dr. Hewett's methods, which are done in a laboratory, consist of taking such measurements as the length of the tibia and the range of motion in flexing the knee. By following study participants over several years, Dr. Hewett says the testing appears to predict with about 80% accuracy who is likely to have an ACL injury.

Another prediction tool, the University of North Carolina's Landing Error Scoring System, aims to rate athletes' risk of injury based on how they land after jumping off a box.

Dr. Hewett says as many as 25% of those who injure their ACL are going to do it again.

Carmen Quatman was 17 when she tore her left ACL as a high-school volleyball player, requiring surgery. She returned to volleyball while attending Edinboro University in Pennsylvania, but tore her ACL again, due to a poor graft placement from the first surgery, she says. Dr. Quatman, now 30, has since developed osteoarthritis and is finishing up several months of rehab following a cartilage-restoration procedure. Intrigued by orthopedics during her first injury, Dr. Quatman worked with Dr. Hewett on the prevention research and is now an orthopedic-surgery resident at Ohio State.

Experts say that no prevention program can be expected to stop all ACL injuries. Part of the problem is the intensive culture of youth sports, says Ms. Silvers. "The whole notion of sport-specificity at a very young age is extremely dangerous," she says. "You're basically using the same muscles all year round. That's why these [injury] numbers continue to increase."