Injury prevention programs key to decreasing ACL tears in young athletes
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Increased organized sports participation among children and adolescents has led to a rise in the number of injuries in this population.

Knee injuries are particularly common, and anterior cruciate ligament (ACL) injury continues to command the attention of athletes, parents, coaches and medical professionals due to the increasing rate of injury and subsequent reconstruction over the past two decades.

A recent study reviewed the incidence of ACL injury in patients ages 6-18 years from 1994-2013 (Beck NA, et al. Pediatrics. 2017;139:e20161877). The authors found an overall ACL injury rate of 121 injuries per 100,000 person-years with the highest rates in 17-year-old males (422/100,000) and 16-year-old females (392/100,000). Perhaps a more important finding was that over the 20-year period, there was an average annual increase in the injury rate of 2.3%.

There also has been a commensurate increase in ACL reconstruction (ACL-R) surgeries in pediatric patients over the same period. An examination of a state-based database found that from 1990 to 2009, the rate of pediatric ACL-R increased from 17.6 to 50.9 per 100,000 (Dodwell ER, et al. Am J Sports Med. 2014;42:675-680).

Certain athletes at increased risk

As these studies have shown, high school athletes are at particularly high risk for sports-related ACL injury. In addition to age and sex, choice of sport also is linked with risk of ACL injury.

A recent meta-analysis quantified this risk and found that while ACL injuries are overall more common in boys, the rate of injury risk per athlete exposure (e.g., practice/game time) was highest in girls (Gortnizky AL, et al. Am J Sports Med. 2016;44:2716-2723). In boys, the highest risk sports for ACL tear included football, lacrosse and soccer, and the highest risk sports in girls included basketball, soccer and lacrosse. The relative risk of injury in girls basketball vs. boys basketball and girls soccer vs. boys soccer was 3.80 and 3.67, respectively, highlighting the ACL injury gender gap.

After injury, reconstruction of the ACL usually is recommended because evidence shows that surgery results in decreased rates of further intra-articular injury (i.e., meniscal or cartilage tears) due to persistent instability (Fabricant PD, et al. J ISAKOS. 2016;1:10-15) as well as increased rates of return to sport (Fabricant PD, et al. J ISAKOS. 2016;1:62-69).

Compounding the problem of youth ACL injury is the fact that pediatric patients undergoing ACL reconstruction continue to be at relatively higher risk of re-injury or contralateral ACL tear compared to adults. A recent study of pediatric patients who had undergone ACL reconstruction found that despite a very high rate of return to sport (91%), the overall ACL re-injury rate (e.g., ipsilateral or contralateral ACL tear) was 32%, which is significantly higher than the reported re-injury rates of up to 5% in adults (Dekker TJ, et al. J Bone Joint Surg Am. 2017;99:897-904). Additionally, the authors found that the only independent predictor of repeat ACL tear in their cohort was time to return to sport, with earlier return associated with increased risk of re-injury.

Preventing new or repeat ACL tears

Studies have shown that certain modifiable risk factors related to altered biomechanics and neuromuscular
control (such as dynamic knee valgus) are associated with increased risk of non-contact ACL tear. Injury prevention programs aim to address these deficiencies in structured ways. These training programs focus on plyometric (i.e., jump training) and balance exercises in addition to traditional strengthening and stretching. Technique training and structured feedback to athletes regarding proper athletic form also are common components. Athletes are retrained to jump, land and cut in biomechanical positions that reduce the strain on the knee.

These programs have been shown to be effective in lowering the rate of ACL injuries. To be most effective, they can be incorporated into preseason and in-season training in high school athletic programs as well as return-to-sport training following ACL reconstruction.

Because ACL injuries pose such a significant burden on patients, families and medical systems, participation in injury prevention programs that target children and adolescents in at-risk sports is important and may be a cost-effective strategy to address the rise in youth ACL injury rates (Swart E, et al. J Bone Joint Surg Am. 2014;96:705-711).

Take home points

- Youth ACL injury continues to be a significant problem in the athletic pediatric population.
- High school age female athletes are at particularly high risk for ACL tear.
- Outreach, education and implementation of injury prevention programs that have been proven to reduce the risk of injury are important strategies to help decrease the incidence of this potentially devastating injury.

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