[ Editorial ]

Pediatric Challenges

Anterior cruciate ligament (ACL) injury in the adolescent athlete is an increasingly common occurrence. Early sports specialization, travel teams coupled with improved physical examination skills, and the routine use of magnetic resonance imaging have all led to the more frequent occurrence and detection of an ACL injury. Thirty years ago, most tears of the ACL in children went undetected, at least initially. Recurrent injury is what often led to orthopaedic evaluation. Some would argue that injury rates have increased dramatically in adolescents with the development and emphasis on highly specialized youth sports, especially in soccer and basketball. However, it may be that our awareness of the injury and our ability to diagnose have allowed increased recognition of these injuries. Once the diagnosis of an ACL injury in children is made, most recent studies indicate that prompt surgical repair should protect the menisci and articular cartilage. Most authors agree that treating children with ACL tears nonoperatively while allowing participation in jumping/turning/twisting sports is a formula for disaster and should not be recommended. It is pretty clear that the risks of nonoperative treatment outweigh the risks of growth plate injury with current operative techniques. It is also pretty clear that while an ACL reconstruction may render the knee stable, preventing pivoting or “giving way” episodes, and allow the adolescent to return to sports, we cannot say that these reconstructive procedures will prevent the premature onset of osteoarthritis (OA). In fact, adolescent athletes who tear their ACL could be at the highest risk for developing early OA regardless of operative or nonoperative treatment just because the injury occurs early in their lifetimes.

It is the responsibility of the clinicians caring for these patients to educate children and their parents on these facts as we continue to improve our treatment regimens. As a surgeon, I can’t help but believe that rendering a knee stable with a biomechanically sound ACL reconstruction should protect the menisci and the articular cartilage and ward off premature OA. Unfortunately, the truth is that this is not evident from ACL reconstruction (ACL-R) outcome studies. The reality is that once the ACL is torn, the die may be cast, and we may not be able to reverse the OA outcome. In fact, it may also be true that our reconstructions are just not good enough to restore normal mechanics and ward off OA. The ACL-R grafts most commonly used today do match the biomechanic function of the ACL. It is possible that the only way to restore the native ACL architecture may be to repair the torn ligament or regenerate a new ligament through tissue engineering. Whether these 2 routes of treatment can reverse the course of posttraumatic OA remains to be seen. What is clear today is that current ACL graft techniques are not preventing the premature development of OA.

While surgeons should not be satisfied with our current techniques of ACL reconstruction, our colleagues in the rehabilitation field also face formidable challenges, especially with adolescents. The recent study by Greenberg et al titled, “Strength and Functional Performance Recovery After Anterior Cruciate Ligament Reconstruction in Preadolescent Athletes” highlights some of these challenges. While the study group was small (16 patients), the age group (mean age, 12.23 years; range, 8.51-14.88 years) is of high interest. Only 56% (9/16) of patients were able to achieve a limb symmetry index (LSI) of 90% for quadriceps strength by a mean of 7 months. What’s interesting is that these were all hamstring reconstructions where the extensor mechanism was unaltered. Yet it was difficult to achieve high-level quadriceps function. At a mean of 12 months, only 38% (6/16) of patients were able to satisfactorily complete all functional hop tests. At a mean of 15 months postsurgery, only 25% (4/16) of patients were able to achieve an LSI of ≥90% on all testing parameters. The authors of the article should be commended for bringing these shortcomings to our attention. No doubt youngsters pose many challenges that adults may not during the rehabilitation process.

Starting with the physiologic challenges, as the authors point out, the low levels of circulating androgens in adolescents may prohibit muscle hypertrophy. Improving the neuroefficiency of the leg muscles may be all that this group is capable of during rehabilitation. Second, the issue of postoperative pain would be expected to be more formidable with children since most would have less experience with this menace of life. While rehabilitation motivation is usually not a problem for athletes, keeping kids focused on these efforts day after day, week after week, and month after month requires special rehabilitation skills. Last but not least, adequately sized rehabilitation equipment may also limit opportunities for children. Most

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exercise centers don’t feature equipment built for kids. How often have you seen a pediatric leg press machine or elliptical? So the real question arising from this report by Greenberg et al.1 may be: How did those youngsters who did fully recover strength and function do it? Were they the athletes in specialized urban rehabilitation facilities, or were there other factors that got them all the way back? I’d like to think that these were the farm kids working hard on chores at home, but I don’t know if that’s true. While this article brought forth many important factors, it raised many more questions in my mind.

It is clear that despite 40+ years of escalating ACL research, we are not where we would like to be in terms of our surgical or rehabilitation outcomes. Our ACL grafts neither reproduce normal anatomy or function nor do they ward off premature OA. Our rehabilitation efforts often end with suboptimal results, and premature OA is the frequent end result for far too many of these patients. I think that it’s clear that we have a lot of research that needs to be done. We need better results! Our kids deserve better!

—Edward M. Wojtys, MD
Editor-in-Chief

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