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Younger Age of Primary ACL Injury, Decreased Time to Return to Sport Significantly Increases Risk of Secondary ACL Injury in Adolescent Athletes

SAN FRANCISCO (Feb. 12, 2024)—In adolescent athletes who underwent anterior cruciate ligament reconstruction (ACLR), the younger the athlete at the time of primary ACLR and an earlier return to sport (RTS) were significantly associated with an increased rate of secondary [ACL injuries](#), according to new study presented at the 2024 Annual Meeting of the [American Academy of Orthopaedic Surgeons](#) (AAOS). The study, “**Predictors of Anterior Cruciate Ligament Reinjury and Return to Sport in Adolescent Athletes**,” found that when the age of primary ACLR increases by one year, the rate of secondary ACL injury decreases by 29% and a one-month delay in RTS decreases the rate of a secondary ACL injury by 17%.

“In our practice, we noticed we are seeing a larger prevalence of ACL injuries in this younger population, but we haven’t seen literature that specifically looks at the high school age population,” said Bhargavi Maheshwer, MD, lead author and third-year orthopaedic surgery resident at University Hospitals in Cleveland, Ohio. “Many of these athletes were returning for revisions or second opinions after having a re-tear or a contralateral ACL tear, so it is important to outline the trends behind the risk of having an ACL reinjury. Specifically, the variables that are associated with the higher risk of sustaining these injuries and what can we do from a patient education standpoint to address those variables.”

ACL injuries in adolescent athletes are increasing mainly due to the rise of younger athletes playing in competitive sports at an earlier age and an increased awareness of ACL injuries.^{i,ii} For younger athletes, an ACL injury can have a major impact. For example, there is significant downtime associated with an ACL tear, which may lead to mental health issues, they are 10 times more likely to develop early arthritis, and there is a 25-35% increased risk of experiencing a secondary ACL tear.ⁱⁱⁱ Additionally, up to 14% of adolescents who undergo ACLR do not return to their previous level of play.^{iv}

The researchers sought to identify recent epidemiologic trends of ACL injuries and recurrent tear rates in high school athletes, and determine variables related to sustaining a secondary ACL injury. Using a prospectively maintained database from a single institution, the team retrospectively reviewed data for all patients under the age of 18 who underwent primary ACLR from 2015-2020. Patients were eligible if they were 13-18 years old, participated in a high school sport, and underwent evaluation and primary ACLR at a single institution. To be included, patients had to have a follow-up duration of six months or more and had not undergone a prior revision ACLR.

Outcomes included postoperative complications, re-operations, time to RTS (defined as the number of months following ACLR until the patient was cleared to return to the sport by the operating surgeon), and time to re-tear or reinjury. Odd ratios were calculated for baseline patient characteristics and the association with the risk of re-tear. Multivariate Cox regression analysis was performed to identify the relationship between re-tear and potential risk factors. The results included:

- A total of 431 adolescent patients were included with a median follow up of over five years – 20.2% (87) sustained a secondary ACL injury and 79.8% (344) did not.
- Nine percent (39) of patients with a secondary ACL injury experienced a graft failure and 11.2% (48) had a contralateral ACL injury (ACL injury on the uninjured knee).

- Complication rates were low (n=22 6.1%), with 11 patients experiencing arthrofibrosis (3%), one patient (0.2%) with a superficial wound infection managed with antibiotics and one patient (0.2%) with deep infection that required operative irrigation and debridement.
- Patients with a secondary ACL injury were older than those who did not have another ACL tear (mean age at surgery 16.2 ± 1.3 years versus 15.6 ± 1.5 years, respectively, $p=0.003$).
- After adjusting for all variables, a younger age at primary ACLR and time to RTS were significantly associated with an increased rate of secondary ACL injury.

“Nine months is the minimum that we consider it safe to return to sport following ACLR as a rapid return to sport puts you at greater risk of a recurrent injury,” said James Everett Voos, MD, FAAOS, orthopaedic surgeon, chairman of orthopaedics at University Hospitals and head team physician for the Cleveland Browns. “For our younger athletes, we should take the time to ensure they are fully recovered and have had a chance to rehabilitate since they are often skeletally immature and still growing. As orthopaedic surgeons, we need to customize the treatment plan for each athlete as not all ACLs are the same, and counsel patients about their type of injury and when to return to the sport based on their rehabilitation and age.”

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2024 AAOS Annual Meeting Disclosure Statement

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ⁱ Dingel A, Aoyama J, Ganley T, Shea K. Pediatric ACL Tears: Natural History. *J Pediatr Orthop*. 2019;39(Issue 6, Supplement 1 Suppl 1):S47-S49.

ⁱⁱ McConkey MO, Bonasia DE, Amendola A. Pediatric anterior cruciate ligament reconstruction. *Curr Rev Musculoskelet Med*. 2011;4(2):37-44.

ⁱⁱⁱ Healthchildren.org, American Academy of Pediatrics. ACL Injuries in Young Athletes. <https://www.healthchildren.org/English/health-issues/injuries-emergencies/sports-injuries/Pages/ACL-Injuries.aspx>. Published March 29, 2019. Accessed Jan. 16, 2024.

^{iv} Ramski DE, Kanj WW, Franklin CC, Baldwin KD, Ganley TJ. Anterior cruciate ligament tears in children and adolescents: a meta-analysis of nonoperative versus operative treatment. *Am J Sports Med*. 2014;42(11):2769-2776.