Anterior cruciate ligament (ACL) graft failure and concomitant ACL tears are more frequent in children/adolescents than adults. Recent literature demonstrating improved functional outcomes and decreased risks of meniscal and/or chondral injury with surgical treatment of ACL injuries in children have led more surgeons to perform early ACL reconstruction, even in skeletally immature patients. This trend has been facilitated by the development and validation of surgical techniques that may spare the proximal tibial and/or distal femoral physes. (1)

As data becomes available on the outcomes of ACL reconstruction in children and adolescents, there is growing evidence that subsequent injury rates are significantly higher than in adults. Both multicenter Orthopaedic Outcome Network (MOON) and the Danish ACL Registry have reported graft failure rates 2-3 fold higher in adolescents than in adults. (2-4) In addition, the risk of injury to the contralateral ACL is at least as high as the risk of graft failure, and young age is a known risk factor for this injury. (2, 5) The combined risk of subsequent ACL injury (ipsilateral/contralateral) in school-aged children returning to competitive sports is as high as 25-35%. (6, 7) Thus, secondary prevention of ACL injury after reconstruction is a critical area for research and clinical improvement.

The purpose of our study was: (1) to describe return to play characteristics after ACL reconstruction in a pediatric cohort, and (2) to identify risk factors related to return to play that correlate with subsequent ACL injury. We hypothesized, based on recent reports of delayed recovery of quadriceps strength and neuromuscular control in young patients, that earlier return to high-risk sports would lead to an increased risk of ACL re-injury. (8, 9)

Methods

We analyzed a continuous cohort of patients under the age of eighteen years. Subjects underwent isolated, primary ACL reconstruction with autograft between 2006 and 2014 and had minimum 2-year follow-up. Return to play characteristics were described, and multivariable Cox regression modeling was used to identify predictors of a second ACL injury. Candidate variables included patient factors (age, sex, physical status, tibial slope, notch width index), surgical characteristics (graft type, surgical technique), measures of recovery (time to return to sport, duration of physical therapy), and patients’ pre and post-operative sports involvement (primary and secondary sports, number of sports).

Results

A total of 112 subjects met inclusion criteria while 85 (76%) had complete follow-up data and were analyzed. Mean age was 13.9 +/- 2.1 years (range 6 - 17 years); 77% had open physes. Mean follow-up was 48.3 +/- 15.3 months. Seventy-seven patients (91%) returned to sports, and 85% returned to the same sport. Mean Marx activity score at final follow-up was 13.7 +/- 3.5 (range 0 - 16). The mean activity score of final follow-up was 13.7 +/- 3.5 (range 0 - 16).

Conclusion

We reviewed a single center cohort of 85 pediatric athletes undergoing ACL reconstruction over an eight-year period. Return to sport was very high in this group (91%). The secondary ACL injury rate was also high (31.8%), and commensurate with other studies in the literature. Most interestingly, earlier return to sport was identified as an independent risk factor for a second ACL injury. The timing of return to sport has not been previously linked to ACL re-injury, and may present an opportunity for risk reduction by modification of return to play protocols. Further research is necessary to identify the best way to combine time from surgery with objective markers of neuromuscular recovery to guide return to play decisions in young athletes.