

Editorial Commentary: Put Me Back Into The Game Coach! It's Time, I'm Ready: Time Is of No Essence After An Anterior Cruciate Ligament Reconstruction



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Abstract: Retear after an anterior cruciate ligament reconstruction is unavoidable. Many variables contribute to graft failure after anterior cruciate ligament reconstruction. Time from surgery to return to play is not the sole determinant. Graft maturation and symmetrical return of function need to be more carefully evaluated to reduce the risk of reinjury.

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Benjamin Franklin stated, "You may delay, but time will not." This prophetic statement could be applied to returning after an anterior cruciate ligament (ACL) reconstruction. As a team physician, one is constantly asked by coaches, general managers, owners, and parents when an athlete can return safely after any injury, but especially after an ACL reconstruction. No athlete wants to painstakingly go through a grueling rehabilitation for close to a year and end up retearing the ACL within a few months after returning to his or her sport. Unfortunately, there are no clear-cut, definitive criteria for return to play in the literature following an ACL reconstruction. In their study, "Length of Time Between Anterior Cruciate Ligament Reconstruction and Return To Sport Does Not Predict Need for Revision Surgery in National Football League Players," Okorooha, Fidai, Tramer, Elmenini, Makhni, Verma, Bach, and Moutzouros¹ compiled data using publicly available Internet-based reports from 2009 to 2015 on 95 players who underwent ACL reconstruction. Twenty-three (18%) players required revision ACL reconstruction with a majority (56%) sustaining a reinjury within 10 weeks of returning to football. There was no difference in the time of return to sport between the players who experienced

a retear (48.3weeks \pm 11.0) and those who did not (50.2weeks \pm 10.1).

One of the most devastating complications following return to activity is a second ACL injury. A systematic review of prospective studies with a minimum follow-up of 5 years found that the pooled percentage of autograft failure rates and contralateral ACL tears in the general population was 5.8 and 11.8%, respectively.² In a study that we published in 2016, we found retear rates of 12.8% of the ACL graft and contralateral ACL tears of 7.3% in National Football League (NFL) athletes.³ In this study, they had an 18% failure rate in NFL players. These studies have demonstrated that there is a higher retear rate in NFL athletes compared with the general population. The authors clearly identified that this increased rate of reinjury is likely owing to the high forces generated on the graft while playing professional football. In this study, the authors chose to classify return to sport as return to regular season games. Therefore, they could have missed ACL retears that may have occurred during organized team activities, training camp, or preseason games. In our study, we found that the greatest number of ACL injuries happened in the month of August, but it was not statistically different from the regular season.³

I have found that the time to return to play after an ACL reconstruction is still controversial in the general population. There are some surgeons in the community who are allowing athletes to return to sports 6 months after an ACL reconstruction; however, I do believe that most surgeons are permitting return to sport between 9 and 12 months. Grindem et al.⁴ found that the reinjury

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The author reports that he has no conflicts of interest in the authorship and publication of this article. Full ICMJE author disclosure forms are available for this article online, as [supplementary material](#).

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0749-8063/181219/\$36.00

<https://doi.org/10.1016/j.arthro.2018.10.006>

rate was significantly reduced by 51% for each month that return to sport was delayed until 9 months after surgery, after which no further risk reduction was observed. In this study, they found only that 1 out of 23 retear the ACL graft between 6 and 8 months, but 16 of 23 reinjured the ACL graft between 8 and 12 months, with a majority of those occurring within the first 10 weeks after return to sport. Therefore, 70% of the retears were sustained when most surgeons believed that it was an acceptable time to return to sport. The authors did an outstanding job outlining possible causes for these failures, such as return to sport before complete rehabilitation, graft maturation, graft type, fixation methods, tunnel positions, and concomitant injuries.

The process of ligamentization and graft maturation is one that I believe contributes greatly to retears of the ACL graft. Does the return of muscle strength, speed, and explosiveness mean that the graft is mature enough? In my experience, most NFL players receive the best and most intensive rehabilitation after an ACL reconstruction. In addition, it is inherent for an NFL athlete to be competitive, so they attack this challenge with much vigor and enthusiasm. This intensity often results in an athlete who possesses great muscle strength, agility, and speed faster than most after an ACL reconstruction. However, no matter how aggressively an athlete physically rehabilitates following an ACL reconstruction, we must consider the time it takes for the graft to mature and reach a tensile strength that can withstand the stresses of NFL football. Numerous studies have shown that the ligamentization process may take up to 24 months to complete.⁵ I have seen many magnetic resonance images (MRIs) of knees following an ACL reconstruction at various stages of recovery in NFL players and have found a wide range of graft maturation on these MRIs. This then begs the question, "Do you keep an athlete out of sports until the graft reaches a certain percentage of maturation?" I postulate that there are some grafts, even after 24 months, that do not fully mature, and this could explain the "late" reruptures.

Numerous studies have shown strength and neuromuscular deficits up to 24 months after ACL reconstructions.^{6,7} I agree that we have sent athletes back to play before their strength and function was symmetrical to their uninjured leg, which may contribute to the failure rate. Functional testing has become more popular and used by many to help determine return to play after ACL reconstruction. Some functional tests have become more sophisticated using electrodes to record motion, joint velocities, angular moments, and forces generated by muscles during specific exercises. I do believe that functional testing should be used as 1 criterion to return to sport

after an ACL reconstruction, but as the authors suggested, I wish that there was more standardization with regard to rehabilitation protocols and functional testing.

ACL-injured players earn less than salary-matched controls in NFL athletes.⁸ It would be beneficial financially if the failure rate following ACL reconstruction could be reduced in NFL players. Graft maturation and function play key roles in return to sport. I realize the importance to the athlete and team for a player to return as quickly as possible after an ACL reconstruction, but we must reduce the risk of reinjury. Many professional athletes have told me over the years that after an injury, they want the physician to do everything they can to allow them to return to their sport quickly and safely. Further research in using advanced technology, such as MRI, may help in evaluating the degree of graft maturation that is needed to withstand the forces imparted to the graft during NFL games. Better functional testing is needed to identify deficits in strength and neuromuscular control that not only can be used to determine return to play but also guide the rehabilitation.

I applaud the authors for completing this study, which will give a team physician important data to relay to athletes and front office personnel concerning timing of return to play after an ACL reconstruction as it relates to the relative risk of reinjury. Time from surgery does not increase their risk for re-tear, but the time to return to play should be based on the time it takes for biological recovery of the graft and return to satisfactory function. I believe strongly that an athlete should not return before 9 months after an ACL reconstruction, including professional athletes, and all of my patients undergo a functional test before they return to play. There are inherent risks in any sport, and athletes will continue to re-tear their ACL, but our responsibility as sports physicians is to rely on science to allow these athletes to return after ACL reconstruction with reduced risk.

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