Editorial Commentary: Limited Preoperative Range of Motion Is Associated With Range of Motion Deficits After Anterior Cruciate Ligament Reconstruction: "If the Knee Is Not Straight, Wait"

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Abstract: Optimal timing of anterior cruciate ligament reconstruction (ACLR) remains under debate. Prolonging time between injury and ACLR risks damaging the meniscus and chondral surface, as well as delays return to play. Early ACLR may be associated with postoperative stiffness or arthrofibrosis. We emphasize that optimal timing for ACLR depends on criterion-based return of knee range of motion and quadriceps strength, not a quantitative temporal period. The length of time is far less important that the quality of prereconstruction care provided. Prereconstruction care includes "prehabilitation," including prone hangs focusing on optimizing knee range of motion, postinjury effusion resolution, and mentally preparing the patient for postoperative expectations. Defining preoperative criteria for proceeding with surgery is crucial to decrease the risk of arthrofibrosis. Some patients meet these criteria within 2 weeks, whereas others linger to 10 weeks. Reduction in arthrofibrosis requiring surgical intervention is multifactorial and not solely dependent on the length of time between injury and intervention.

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"Patience is a virtue"; however, when it comes to anterior cruciate ligament reconstruction (ACLR), one must often weigh the risks and benefits of timing. Is it the quantity of time or the quality of care during that time that matters more?

We commend Agarwal, Harris, Tarawneh, Malyavko, Kreulen, Thakkar, Doerre, and Best on their recent publication, "Delay of Timing of Anterior Cruciate Ligament Reconstruction is Associated With Lower Risk of Arthrofibrosis Requiring Intervention."[1] In this retrospective review of the PearlDiver database, the authors identified 15,645 patients undergoing isolated primary ACLR with 2-year follow-up. Using stratum-specific likelihood ratios, they analyzed 2 cohorts (patients older than and younger than 40 years of age) to identify associations between timing of ACLR after injury and incidence of arthrofibrosis. They determined that patients younger than 40 years old who underwent ACLR at least 6 weeks after injury had a 65% reduction in the rate of manipulation under anesthesia and/or lysis of adhesions. Patients 40 years or older had a 35% reduction if time to ACLR after injury was at least 10 weeks.[1] Readers of this article should consider that the methods of this study use time of diagnosis in the medical record (not time of injury) as time 0. As you know, most ACL tears find their way to a diagnostician weeks, months, or even years after the injury occurred, so one questions the validity of using diagnostic codes as a surrogate for time of injury.

This article prompts us to remind our colleagues that there may appear to be a statistical association between time from injury and risk reduction of arthrofibrosis, but we argue that the length of time is far less important that the quality of prereconstruction care provided. Prereconstruction care in our practice encompasses "prehabilitation," focusing on optimizing knee range of motion, postinjury effusion resolution, and mentally preparing the patient for postoperative expectations. Setting preoperative criteria for proceeding with surgery is crucial to decreasing the risk of arthrofibrosis.

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Some patients meet these criteria within 2 weeks, whereas others linger to 10 weeks. We agree with the authors discussing that the reduction in arthrofibrosis requiring surgical intervention is multifactorial and not solely dependent on the length of time between injury and intervention.[1]

Limited preoperative range of motion has been associated with prolonged range of motion deficits after ACLR.[2] Immediately after ACL injury, spinal reflex pathways inhibit quadriceps function due to an involuntary response to intra-articular injury and effusion.[3] If a patient lacks full extension before surgery, why would they be able to reach full extension in the setting of additional postsurgical morbidity? Thus, implementation of prehabilitation programs focused on quadriceps strengthening and knee range of motion has been successful in improving ACLR outcomes.[4] Independent of the number of weeks from injury, an ACLR performed in a patient before the return of physiologic knee extension inherently inhibits their postoperative progression, placing them at risk for stiffness and subsequent procedures.

At our institution, return to normal physiologic knee motion trumps temporal guidelines when deciding to proceed with ACLR. If patients lack full extension, a home exercise program or formal physical therapy regimen is prescribed. We feel strongly that both passive and active extension should be restored. Prone hangs are a must in the preoperative education for the patient and their support system. An excellent resource for patients is the exercise videos found on the "Pre-Surgery ACL Rehabilitation Guidelines and Exercises" page of the MOON Knee Group website.[5] Other modalities, such as neuromuscular electrical stimulation and blood flow restriction therapies, can be beneficial for overcoming the involuntary quadriceps inhibition related to ACL injury. In addition, keep in mind that this prehabilitation phase needs to be monitored and guided, so that overeager patients do not place their menisci or chondral surfaces at risk in the setting of ACL insufficiency. Lastly, there has been more recent data to suggest certain inflammatory markers that play a role in the injury cascade, which may be modulated by medicinal and/or injection means, and this could also benefit the patient before surgery.[6]

This article reminds us that there may be an association between timing of ACLR and risk of arthrofibrosis, but because of the multiple variables not controlled for in this study (graft type, prehabilitation, rehabilitation) and the evidence that preoperative range of motion correlates strongly with return of postoperative range of motion, we argue that surgeons should surrender temporal guidelines and adopt a criterion-based approach when deciding to proceed with surgery. In other words, "if the knee is not straight, wait."

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