Rehabilitation Principles of the Anterior Cruciate Ligament Reconstructed Knee

Twelve Steps for Successful Progression and Return to Play

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KEYWORDS

• Proprioception • Neuromuscular training • Return to play • Functional rehabilitation

KEY POINTS

- Rehabilitation after anterior cruciate ligament reconstruction is a gradual and progressive progress.
- When available and appropriate use objective criteria to advance from one phase to another.
- Emphasize restoration of full knee extension and flexion after surgery.
- Stabilization for the knee joint occurs from above (hip/core) and from below (foot/ankle).
- Use objective criteria to progress a patient to return to sports activities.

INTRODUCTION

Anterior cruciate ligament (ACL) injuries often require surgical intervention followed by an extensive course of rehabilitation because without treatment they frequently result in functional and athletic limitations. Approximately 200,000 ACL injuries occur annually in the United States, making the nearly 150,000 ACL reconstruction surgeries one of the most common orthopedic procedures performed.[1–9] An evidence-based and well-designed rehabilitation program plays a critical role in any successful outcome after ACL reconstruction. Excellent outcomes after ACL surgery, including a return to unrestricted activities and preinjury levels, are generally expected.[10–12]

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However, in reality, ACL injuries and surgery are so common and frequent that the seriousness of the pathology is often forgotten. The severity is evident in studies demonstrating that between 40% to 90% of patients exhibit radiographic osteoarthritis (OA) 7 to 12 years after ACL surgery,[13,14] and that there is a 10 times greater rate of OA in the ACL injured knee.[15] The disabling impact that ACL injuries can have on athletes is evident by reported statistics showing that only 78% of NBA players return to competition after ACL surgery and of those 44% exhibited a decrease in standard statistical performance categories and player efficiency ratings.[16] Similarly adverse return to play statistics have been reported in professional football players showing careers altered and even shortened by approximately 2 years with an overall decrease in performance of 20%.[1,17,18] Additionally, a systematic review of 48 studies reporting return to sport parameters demonstrated that 82% of patients undergoing ACL reconstruction returned to some form of sports, whereas only 63% returned to preinjury levels of participation and a mere 44% to competitive athletics.[11] Although generally present more often in low-level athletes, Kinesiophobia, the fear of movement or reinjury, is the most common reason cited for not being able to return to a preinjury level of participation.[11,19]

The frequency with which ACL injuries occur during strenuous work and athletic activity coupled with the severity of these knee injuries and the difficulty exhibited returning athletes to unrestricted, high-level activity demonstrates the need for a sequential, progressive, and structured approach to the rehabilitation program after ACL surgery. Current programs emphasize full passive knee extension,[20–24] immediate motion,[20,23–29] immediate partial weight bearing (WB),[23,24,30,31] and functional exercises.[23,32,33]

The current trend in ACL rehabilitation began in 1990 when Shelbourne and Nitz[21] reported improved clinical outcomes in patients who followed an accelerated rehabilitative approach rather than a conservative one. These patients exhibited better strength and range of motion (ROM) with fewer postoperative complications. Furthermore, the accelerated group had fewer patellofemoral pain complaints and an earlier return to sport. Numerous authors, including the two of us, have used components of an accelerated approach to ACL rehabilitation with excellent results since 1994.[24,34–39] Howe and colleagues[40] has also demonstrated improved outcomes—greater motion, improved muscular strength, and enhanced earlier function—with formal, supervised rehabilitation when compared with patients receiving no supervised rehabilitation.

Herein we provide a scientific basis for the rationale behind our ACL rehabilitation program and outline the 12 critical steps essential to the process of the successful rehabilitation and return to play after an ACL reconstruction (**Box 1**). The ultimate goal of any sound rehabilitation program is not only a successful outcome today, but also an asymptomatic knee 5 to 10 years later.

ANTERIOR CRUCIATE LIGAMENT REHABILITATION: TWELVE CRITICAL STEPS FOR SUCCESS

Using a criteria-based, evidence-based constructed approach to rehabilitation after ACL surgery is essential to systematically and successfully progress a patient through the rehabilitation process and maximize their odds of an uncomplicated and complete recovery. This type of approach strives to combine a stable knee that is functionally asymptomatic. The rehabilitation program phases, goals, and criteria for progression from phase to phase after an ACL reconstruction are outlined in **Box 2**.