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# COMMENTARY & PERSPECTIVE

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## What Do We Really Know About Rehabilitation After ACL Reconstruction?

Commentary on an article by L.M. Kruse, MD, et al.: "Rehabilitation After Anterior Cruciate Ligament Reconstruction. A Systematic Review"

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The authors of this investigation appropriately used a systematic review to identify articles concerning anterior cruciate ligament (ACL) rehabilitation that had a Level of Evidence of I or II. The search methodology, level of evidence, and inclusion criteria were clearly defined. They assembled the articles that met their entry criteria into five groups: postoperative bracing (six studies), accelerated strengthening (six studies), home-based rehabilitation (two studies), neuromuscular training (nine studies), and miscellaneous (six studies). The disparity in methodology used in these twenty-nine articles did not allow the authors to use the more powerful methodology of a meta-analysis. The conclusions that they presented at the end of each of their sections were generally adequately supported by the studies they investigated.

Although the studies evaluated in this systematic review were of a high level of evidence, many problems were encountered by the reviewers in their attempt to evaluate the articles. Because the authors of the individual studies had not chosen similar study designs, outcome measures, and definitions of rehabilitation techniques (i.e., accelerated compared with standard rehabilitation procedures), the results of these investigations are difficult to compare or to use for meta-analysis. Weaknesses in the individual papers included failure to verify and measure compliance with rehabilitation protocols in the majority of cases, flawed randomization methods, lack of power analysis, and failure to address the safety and efficacy of the protocols used. The reviewers pointed out these deficiencies very appropriately.

Unfortunately, the methodology used in some of the studies did not allow the reader to ascertain which protocol resulted in a superior outcome. Little difference between the treatments was found during short-term follow-up in most cases, including studies concerning bracing, accelerated strengthening, home-based rehabilitation, neuromuscular training, continuous active motion, and two-month running retraining programs. In several cases, even when statistically significant differences were observed, the clinical relevance of these findings was at least questionable. On the other hand, hyaluronic acid injection at eight weeks postoperatively was associated with superior outcomes, but cost and insurance approval issues led the reviewers to conclude that its use was impractical.

Clinically relevant benefits were observed in two studies. An instructional video concerning anxiety, pain, and functional outcomes may be helpful in managing expectations of pain and self-efficacy following surgery. A one-legged cycling program using the uninjured leg may be beneficial during rehabilitation to maintain cardiovascular fitness; however, measurement and selection bias may have been present in the relevant study.

We do wish to raise one concern regarding the authors' statement in the Discussion that "accelerated rehabilitation has shown no deleterious effects, and it is likely safe for patients to begin immediate postoperative weight-bearing, move the knee from 0° to 90° of flexion, and perform closed-chain strengthening exercises." The investigations reviewed by the authors were limited in scope and could not possibly substantiate the above statement for all types of graft materials (autografts and allografts), all feasible modified rehabilitation protocols, all fixation techniques, and the effects of damage to articular cartilage or the menisci that is associated with many ACL injuries. Care must be taken when generalizing the findings currently available in the literature to untested hypotheses concerning rehabilitation following ACL injury and reconstruction.

The investigation of Level-I and II studies presented in this systematic review draws attention to the lack of standardized methodology, validated assessment methods and outcome measures, and careful and complete definitions of such terms as accelerated rehabilitation and standard rehabilitation. Also, the use of mutually agreed-on end points to assess the safety and efficacy of treatments is needed. The use of minimal clinically important differences and minimal detectable changes is required to help readers interpret the comparisons of the variables used to assess safety and efficacy<sup>1,2</sup>. These issues involving our literature have resulted in a series of studies that are not really comparable. The studies evaluated by the authors do not provide the patient or the orthopaedic surgeon with the information necessary to return the patient to a desired level of activity early and safely. It may be necessary to form study groups to standardize the methodology and, as mentioned above, to allow confirmation of which

rehabilitation methods are superior. An organization such as the ACL Study Group may serve as a model for the above proposal. It may well be that protocols will have to be modified depending on such factors as the age of the patient and whether or not concomitant injuries have occurred in association with the ACL injury. Ethical issues must be considered when the primary criterion for evaluating the success of an intervention is returning injured individuals to their previous level of activity as soon as practical. In such situations, continuously diminishing the time between surgery and return to full activity may lead to unnecessary injury and subtle failures of the ACL that result in an increased incidence of posttraumatic osteoarthritis, which is already common after apparently successful ACL reconstructions. These issues are of great concern to all who are involved in the treatment of patients with ACL injuries. Clearly, study methods must improve if the answers we are seeking concerning appropriate rehabilitation procedures are to be determined.

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