

The Bottom Line

The Bottom Line is a translation of study findings for application to clinical practice. It is not intended to substitute for a critical reading of the research article. Summaries are written by invitation of the Editor in Chief.

[Gerber JP, Marcus RL, Dibble LE, et al. Effects of early progressive eccentric exercise on muscle size and function after anterior cruciate ligament reconstruction: a 1-year follow-up study of a randomized clinical trial. *Phys Ther.* 2009;89:51–59.]

What problems did the researchers set out to study, and why?

A previous study reported the effects of an early progressive eccentric exercise program for anterior cruciate ligament reconstruction (ACL-R) during the first 15 weeks following surgery. Typical ACL-R rehabilitation programs often exceed 1 year in duration, so a need exists to examine the effects of the protocol at the 1-year mark.

Who participated in the study?

The study sample was made up of the same subjects as the initial reported study: 40 adults who underwent ACL-R with either a semitendinosus-gracilis tendon or bone-patellar tendon-bone autograft.

What new information does this study offer?

A 12-week focused eccentric resistance training program—implemented 3 weeks after ACL-R—increased quadriceps femoris and gluteus maximus muscle volume, quadriceps femoris muscle strength, and function compared with a standard rehabilitation program.

How did the researchers go about this study?

Subjects were randomized into 2 groups: standard rehabilitation or a progressive, focused eccentric training group. Initially, both groups performed phase 1 exercises. At 3 weeks after surgery, the eccentric training group began a 12-week progressive “negative” work program using 2 eccentric exercise ergometers. Following the 15 weeks of rehabilitation, both groups were instructed in a traditional home exercise program of progressive resistance exercise. The researchers examined quadriceps femoris and gluteus maximus muscle volume (using MRI), quadriceps femoris and hamstring muscle strength (using an isokinetic dynamometer), single-leg hopping distance, and knee laxity (using the KT-1000 arthrometer device). Subjects also completed several functional outcome measures.

How might the results of this study apply to physical therapist practice?

Although the optimal rehabilitation program following ACL-R is not yet clearly delineated, inclusion of a progressive, eccentric resistance program early in rehabilitation following ACL-R might improve outcomes at 1 year following surgery.

What are the limitations of the study, and what further research is needed?

The differences between groups observed at 1 year cannot be attributed solely to the eccentric training program due to several factors. Follow-up rate was 80% over the course of the trial, there was no control group, and a detailed description of the actual home program performed following rehabilitation was lacking. Further research is warranted to best determine exercise protocols that normalize the hip/knee relationship as well as to examine differences in muscle volume observed with different ACL graft types.

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