Ligamentous Tears

ACL Repair

Surgical Considerations

Surgical repair of this common knee injury is the most common course of treatment, although some patients can achieve good recovery with non-operative management. Surgical of ACL ruptures is most commonly performed in young, active individuals with high demands for knee function. The repairs are conducted using either a semitendonosis/gracillis graft or a patellar tendon autograft or allograft. The issue of which type of graft is one that is multi-factorial, and the superiority of one graft type versus another is largely unresolved. During the healing phases after surgery, the grafts lose strength and at times can fall as low as 11% of original ACL stiffness. It is not uncommon for surgeons to perform an ACL repair in conjunction with repair of either menisci or articular cartilage defects.

Rehabilitation Considerations

Rehabilitation following ACL repair is marked by early mobilization and strength activities. In contrast to historical approached to ACL rehab, modern protocols are accelerated and the careful application of forces, namely open vs. closed chain exercises becomes an important construct.

- Motion loss is the most common complication after ACL repair. Early emphasis on range of motion, especially extension is utilized with the most pressing goal to obtain full knee extension.
- Bracing is used to protect the knee, often with an extension lock during early ambulation, but prophylactic bracing to protect from re-injury is not supported in the literature.
- Open vs. closed chain exercises are used, with the theory that closed-chain activities provide more stimulus for muscular stabilization around the knee. This theory has not been consistently supported.
- Proprioceptive training, including jump training, especially in females is important.

Anterior Cruciate Ligament Repair Evidence Summary

Investigation into the nuances of injury and repair of the anterior cruciate ligament (ACL) is a rather popular endeavor with a large amount of literature available from rehab protocols to surgical considerations. A summary of surgical techniques and outcomes is beyond the scope of this summary, and in fact, this residency. As such, this review will focus on the rehabilitation of ACL injuries and repairs. Rehabilitation programs after ACL repairs are well described, though not nearly all in agreement. Evidence has supported positive outcomes in the absence of surgical repair, though perhaps at a cost of reduced functional activities. Likewise, evidence supports the surgical repair of the ACL in terms of improved stability, increased function, and reduced need for additional surgical procedures. When surgical repair does occur, there are differing opinions regarding post-operative protocols. Some protocols require intensive, comprehensive programs, and others use as few as seven visits, or even a home
supervised program to achieve good outcomes; though there is a limited amount of research comparing supervised exercise to home programs.4, 5, 6 In short, despite the popularity of ACL research, strong support for one type of exercise versus another has not been fully established.7, 8

In the acute management of patients with ACL repair evidence supports early active exercise.9 Studies have demonstrated the safe application of isometric quadriceps exercise as well as early active extension.9,10 This early focus on knee extension might be one strategy to decrease the nearly two year time period required for pre-injury quadriceps function that has been reported.11 Another method of early quadriceps activation may be to include neuromuscular electric stimulation as part of early knee extension strength training.12 The use of high frequency, high amplitude electrical stimulation in the 1st–6th postoperative week has been demonstrated to significantly improve quadriceps torque and gait parameters compared to exercise alone.12, 13, 14 Patients undergoing ACL repair will often be placed in a brace post-operatively. It is important to note that while some arguments have been made supporting the proprioceptive value of some forms of bracing, a 2007 systematic review by Wright and Fetzer found no objective functional improvements with the use of knee bracing following ACL repair.15, 16

The consensus on open vs. closed chain exercises after anterior cruciate ligament repairs has not yet been reached.17 Support exists for the use of open kinetic chain as well as closed kinetic chain exercises, with greater gains in quadriceps torque reported with a program biased towards open chain activities.17,18 In one randomized controlled trial examining early versus late introduction of open chain exercises, the investigators concluded that perhaps the choice of graft has more to do with outcomes than does the choice of exercise program.19 Ultimately, a combination of open and closed kinetic chain exercises adapted for the patient and the phase of rehabilitation in important in achieving a well-balanced return to pre-operative function.20

More recent protocols have stressed the importance of a neuromuscular component in ACL rehabilitation.21 Injury to the ACL results in a measurable decrease in proprioceptive control.22 Just as neuromuscular training can have important effects in preventing ACL injuries, especially in female athletes, regaining a measure of neuromuscular control after surgical repair can improve outcomes.23, 24, 25 Perturbation training has been demonstrated as an important part of non-operative rehabilitation in a group of patients identified as “copers,” or those able to function despite an ACL deficiency.26, 27, 28, 29 In one interesting study, Risberg et al, compared a rehabilitation program of simple strength training with one characterized as neuromuscular rehab. At 6 months, the group receiving neuromuscular rehab has significantly improved measures of function (Cincinnati Knee Scale and Visual Analog Scales).30 One recent study found no changes in proprioception after a reconstructed knee and 11 months of rehabilitation and a systematic review found that proprioceptive training is important in regaining good neuromuscular control.31, 32 Despite the reported improvement in proprioception in these studies, it is important to note, that some studies have not reported functional changes as a result of neuromuscular rehabilitation programs33, which may be reflective of the fact that the exact dosage and protocol of neuromuscular rehabilitation has not yet been determined.

Oxford Evidence Level: A/B
References:


