Best Practice Recommendations

A series of evidenced-based guidelines to improve your patient care, provided by the developers of ATGenius.com.

Anterior Cruciate Ligament Injuries

Each Best Practice Recommendation includes key elements to evaluating or treating the condition, a Strength of Recommendation (SOR) grade based on research quality, and supporting evidence.

Best Practice Recommendation #1: INCIDENCE

Anterior Cruciate Ligament (ACL) injuries are common injuries, with higher rates during competition and among females. SOR: A (high level evidence, consistent results)

- Approximately 130,000 ACL reconstructions occur in the United States annually.[1]
- The injury rate among high school athletes is 6.5 per 100,000 athlete exposures; injury rates are 7 times higher in competition than practices.[2]
- Female athletes are 2-8 times more likely to sustain an ACL tear; in sex-comparable sports, females have 9 times the injury rate than males.[2-4]
- Among high school athletes, girls soccer has the highest ACL injury rate, followed by football, and girls basketball. Boys basketball and boys baseball have the lowest rates.[2]

Best Practice Recommendation #2: DIAGNOSIS

Appropriate history, physical exam and MRI can accurately diagnose an ACL tear; meniscal injuries are the most frequent concomitant injury. SOR:B (references include studies with high or unclear risk of bias)

- Taking an appropriate history via the 'LIMP Index' aids in ACL injury recognition and appropriate follow-up, reducing inappropriate discharge by 22%. **LIMP** is an acronym for **L**eg giving way at the time of injury, **I**nability to continue activity immediately after injury, **M**arked effusion within 6 hours of injury, and **P**op either felt or heard at the time of injury.[5]
- The Lachman test has a pooled 85-86% sensitivity and 91% -94% specificity for ACL injury diagnosis. The anterior drawer test is less accurate with a pooled 20% sensitivity and 88% specificity and shows improved accuracy (92% sensitivity, 91% sensitivity) with chronic ACL deficiency. The pivot shift test has 22% sensitivity and 98% specificity.[6,7]
- MRI has an 87-99% sensitivity and 83-93% specificity for ACL injury diagnosis, and an overall 93% accuracy.[8,9]
- The most common concurrent injury with an ACL tear is a medial meniscal tear, followed by a lateral meniscal tear.[1]

Best Practice Recommendation #3: TREATMENT & REHABILITATION

Pre-operative rehabilitation, modalities, early post-operative motion and early post-operative weight bearing improve patient outcomes SOR:B (bias, lower quality with rehab articles, some inconsistent results)

- Pre-operative rehabilitation improves outcomes among ACL-injured patients, including knee-related function and muscle strength.[10]
- The use of a combined cryotherapy and compression device provides greater short-term pain relief and independence from narcotic use than cryotherapy alone following ACL reconstructon.[11]
- Post-operative early weight bearing and motion* decreases patellofemoral pain, facilitates earlier VMO recruitment, with no negative effects on knee function or stability. Accelerated rehabilitation does not have negative effects on post-operative outcomes as compared to non-accelerated rehabilitation.[12]
- Open chain exercises may begin post-operatively at 6 weeks#, but more research is needed. Early open chain exercises result in increased knee joint laxity, greater incidence of patellofemoral pain and delayed return to ADLs.[13,14]
- Neuromuscular electrical stimulation (NMES) increases quadriceps strength but is not a requirement for successful post-operative rehabilitation; the inclusion of NMES with strength training for post-operative ACL patients significantly improves quadriceps strength gains compared to strength training alone.[13,15]
- Electromyographic biofeedback improves quadriceps strength and reduces time to achieve full extension.[13]

**Post-operative weight bearing, ROM and squatting progression delayed in cases with a meniscal repair. Check with surgeon on protocol.*

#The initiation of open chain exercises recommendations varies from 6 weeks to 6 months. Check with surgeon on protocol.

Best Practice Recommendation #4: BRACING

Post-operative functional bracing is recommended for 6-12 months after return to sport. SOR:B (limited evidence, inconsistent results, bias)

- Post-operative functional bracing during activity may improve knee kinematics (decreased tibial translation and rotation), increase graft protection without negatively affecting function, range of motion or proprioception.[16]
- Prolonged brace wear (1-2 years) decreases quadriceps strength.[17]
- Biomechanical and clinical evidence indicates functional bracing does not protect the reconstructed ACL during high tibial loads during athletic activities, or improve long-term patient outcomes. Bracing prevents subsequent knee injury during skiing.[18]

Best Practice Recommendation #5: PROGNOSIS

Patients should be educated on realistic expectations upon return to sport and subsequent ipsilateral or contralateral ACL injury risk, and continue prevention efforts once cleared for activity. SOR: A (high level evidence, consistent results)

- 77-80% of children and adolescents return to their sport; 15% report a poor outcome.[19]
- Most athletes (79-91%) return to their sport after ACL reconstruction but not necessarily at their previous performance level.[20]
- Among children and adolescent patients, re-tears occur in 3-9% and a contralateral tear occurs in 5-6%.[19]
- Overall, the risk of a same-side re-injury is 7% and a contralateral injury is 8%. Athletes younger than 25 years old who return to sport have an overall 23% secondary ACL injury risk (ipsi and contralateral combined).[21]

Best Practice Recommendation #6: PREVENTION

Neuromuscular training programs are recommended to prevent ACL injuries. SOR: B (inconsistent results, references include Level III evidence, RCTs with inconsistent findings)

- Among female soccer players, ACL prevention programs provide a statistically-significant reduction of knee injury risk and a non-statistically-significant reduction in ACL injury risk.[22]
- The risk of ACL rupture is 1.83 times higher among females who do not participate in neuromuscular ACL-prevention programs; in studies among soccer athletes specifically, the risk is 2.62 times higher.[23]
- ACL prevention programs are more effective among middle school and high school athletes than college-aged or professional athletes.[24]

Information researched and provided by Casey Christy, DAT, ATC, CSCS, Co-Developer, ATGenius.com. Treatment decisions should be made based on the best available evidence, patient preference, and clinician expertise, in consultation with, and at the direction of a physician.

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