

Management of Anterior Cruciate Ligament Injuries: Evidence-Based Guideline

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This clinical practice guideline was approved by the American Academy of Orthopaedic Surgeons on September 5, 2014.

J Am Acad Orthop Surg 2015;23:e1-e5

<http://dx.doi.org/10.5435/JAAOS-D-15-00094>

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Abstract

Management of Anterior Cruciate Ligament Injuries: Evidence-Based Guideline is based on a systematic review of the current scientific and clinical research. This guideline has been endorsed by the National Academy of Sports Medicine, the American Orthopaedic Society for Sports Medicine, the National Athletic Trainers' Association, and the American Academy of Physical Medicine and Rehabilitation. The guideline contains 20 recommendations, including both diagnosis and treatment. In addition, the work group highlighted the need for better research in the treatment of anterior cruciate ligament injuries.

Overview and Rationale

The American Academy of Orthopaedic Surgeons (AAOS), with input from representatives from the National Athletic Trainer's Association, American Academy of Physical Medicine and Rehabilitation, American College of Sports Medicine, American Medical Society for Sports Medicine, American Orthopaedic Society for Sports Medicine, and the National Academy of Sports Medicine, recently published their clinical practice guideline (CPG), *Management of Anterior Cruciate Ligament Injuries: Evidence-Based Guideline*.¹ This CPG was approved by the AAOS Board of Directors in September 2014, and it has been endorsed by the National Academy of Sports Medicine, the American Orthopaedic Society for Sports Medicine, the National Athletic Trainers' Association, and the American Academy of Physical Medicine and Rehabilitation. The purpose of this CPG is to help improve treatment and management based on the current evidence.

The recommendations in this guideline are not intended to be a fixed protocol; and, as with all evidence-based recommendations, practitioners must also rely on their clinical judgment as well as their patients' preferences and values when making treatment decisions.

Anterior cruciate ligament (ACL) injury is a common sports injury and has a significant effect on knee function. These injuries affect many age groups, including young, active athletes, as well as older patients. Optimal treatment of these injuries can have a major effect on joint function, sports activity, work, and activities of daily living.

More than 10,000 separate pieces of literature were reviewed during the evidence analysis phase of this guideline. The AAOS uses a "best-evidence synthesis" form of evidence analysis, meaning that, although all studies that meet the inclusion criteria are examined, only the highest levels of available evidence are used in the meta-analysis and network meta-analysis.

When completed, the ACL CPG was subjected to extensive peer review. Nine peer reviewers, representing multiple specialty societies, submitted formal peer reviews. Each reviewer dissected the final recommendations of the document, and important changes were made to the final document based on the work group's consideration of the well-informed and insightful comments from the peer reviewers. Peer review responses resulted in approximately twenty revisions to the final guideline. One of the major changes that resulted from peer review was the dropping of a recommendation because of varying interpretations regarding relevance of the included literature. The recommendation addressed ACL fixation techniques, but the peer reviewer expressed concerns that the literature was focusing more on "graft type and technique of insertion rather than fixation technique." The work group agreed and removed the recommendation due to a lack of relevant literature.

The AAOS CPG process has used the minimum clinically important improvement (MCII) concept to elucidate clinical significance since the inception of the guidelines; it represents the best validated measure of minimum clinically important improvement when trying to determine whether a treatment truly has efficacy rather than providing just slight improvements that register as statistically significant.¹

The AAOS CPG process benefitted from the extensive involvement of the peer reviewers and specialty societies and will continue to do so. The process improves with the thoughtful criticism

of our guidelines and the evidence synthesis process. Insurance payers, governmental bodies, and health-policy decision makers may also find this guideline to be useful as an evolving standard of evidence regarding treatment of ACL injuries. The AAOS also remains committed to ensuring that the guidelines are interpreted and used properly and will advocate vigorously on behalf of patients and members.

Although a CPG delineates whether a procedure, intervention, or diagnostic test "works," the AAOS also will follow this CPG with an Appropriate Use Criteria document (AUC). The AUC further defines when an intervention, procedure, or diagnostic test is appropriate and in which patients. Work on the accompanying AUC for this CPG is currently underway and should further define clinical scenarios for patients with ACL injury.

The work group highlighted the need for better research in the treatment of ACL injury, including longer-term outcomes and neuromuscular training. Although outcomes following ACL reconstruction using autograft tissue and using nonirradiated allograft tissue are similar overall, these results may not be generalizable to specific subsets of patients with ACL rupture, such as elite athletes and very young patients. Specifically, further research is needed to assess the outcomes following ACL reconstruction using autograft tissue and using nonirradiated allograft tissue in patients with specific activity levels (including elite athletes), of certain ages (including the young and very young), and with associated injuries.

Evidence, whether strong or inconclusive, is never sufficient to make important clinical decisions in isolation. Individual values and preferences must balance this evidence to achieve optimal shared decision making and highlight that the practice of evidence-based medicine is not a "one size fits all" approach. Again, it is important to note that evidence-based practice incorporates three components: scientific evidence, the clinician's experience, and the patient's values. No single component of patient care can stand alone.

Recommendations

This summary of recommendations of the AAOS *Management of Anterior Cruciate Ligament Injuries: Evidence-Based Guideline* contains a list of the evidence-based diagnosis and treatment recommendations. Discussion of how each recommendation was developed and the complete evidence report are contained in the full guideline at www.aaos.org/guidelines. Readers are urged to consult the full guideline for the comprehensive evaluation of the available scientific studies. The recommendations were established using methods of evidence-based medicine that rigorously control for bias, enhance transparency, and promote reproducibility.

This summary of recommendations is not intended to stand alone. Medical care should be based on evidence, a physician's expert judgment, and the patient's circumstances, values, preferences, and rights. For treatment procedures to provide benefit,

The complete evidence-based guideline, *Management of Anterior Cruciate Ligament Injuries: Evidence-Based Guideline*, includes all tables, figures, and appendices, and is available at <http://www.aaos.org/guidelines>.

Treatment of Anterior Cruciate Ligament Injuries: Evidence-Based Guideline Work Group: Kevin G. Shea, MD (Chair), James L. Carey, MD, MPH (Co-chair), John Richmond, MD, Robert H. Sandmeier, MD, Ryan T. Pitts, MD, John D. Polousky, MD, Constance Chu, MD, Sandra J. Shultz PhD, ATC, FACSM, FNATA, Mark Ellen, MD, Cynthia R. LaBella, MD, Allen F. Anderson, MD, Volker Musahl, MD, Gregory D. Myer, PhD, David S. Jevsevar, MD, MBA (Chair, Committee on Evidence Based Quality and Value), and Kevin Bozic, MD, MBA (Chair, Council on Research and Quality). *Staff of the American Academy of Orthopaedic Surgeons:* William O. Shaffer, MD, Deborah S. Cummins, PhD, Jayson N. Murray, MA, Nilay Patel, MA, Anne Woznica, MLS, Peter Shores, MPH, Yasseline Martinez, Kaitlyn Sevarino.

mutual collaboration with shared decision-making between patient and physician/allied healthcare provider is essential.

A Strong recommendation means that the quality of the supporting evidence is high. A Moderate recommendation means that the benefits exceed the potential harm (or that the potential harm clearly exceeds the benefits in the case of a negative recommendation), but the quality/applicability of the supporting evidence is not as strong. A Consensus recommendation means that expert opinion supports the guideline recommendation even though there is no available empirical evidence that meets the inclusion criteria of the guideline's systematic review. A Limited recommendation means that there is a lack of compelling evidence that has resulted in an unclear balance between benefits and potential harm.

ACL History and Physical

Strong evidence supports that the practitioner should obtain a relevant history and perform a musculoskeletal examination of the lower extremities because these are effective diagnostic tools for ACL injury.

Strength of recommendation: Strong.

Implication: Practitioners should follow a Strong recommendation unless a clear and compelling rationale for an alternative approach is present.

ACL Radiographs

In the absence of reliable evidence, it is the opinion of the work group that in the initial evaluation of a person with a knee injury and associated symptoms (giving way, pain, locking, catching) and signs (effusion, inability to bear weight, bone tenderness, loss of motion, and/or pathological laxity) that the practitioner obtain AP and lateral knee radiographs to identify fractures or dislocations requiring emergent care.

Strength of recommendation: Consensus.

Implication: Practitioners should be flexible in deciding whether to follow a recommendation classified as Consensus, although they may give it preference over alternatives. Patient preference should have a substantial influencing role.

ACL Magnetic Resonance Imaging

Strong evidence supports that MRI can provide confirmation of ACL injury and assist in identifying concomitant knee pathology, such as other ligament, meniscal, or articular cartilage injury.

Strength of recommendation: Strong.

Implication: Practitioners should follow a Strong recommendation unless a clear and compelling rationale for an alternative approach is present.

ACL Pediatric

There is limited evidence in skeletally immature patients with torn ACLs, but it supports that the practitioner might perform surgical reconstruction because it reduces activity-related disability and recurrent instability, which may lead to additional injury.

Strength of recommendation: Limited.

Implication: Practitioners should feel little constraint in following a recommendation labeled Limited, exercise clinical judgment, and be alert for emerging evidence that clarifies or helps to determine the balance between benefits and potential harm. Patient preference should have a substantial influencing role.

ACL Young Active Adult

Moderate evidence supports surgical reconstruction in active young adult (aged 18 to 35 years) patients with an ACL tear.

Strength of recommendation: Moderate.

Implication: Practitioners should generally follow a Moderate recommendation but remain alert to new information and be sensitive to patient preferences.

ACL Meniscal Repair

There is limited evidence in patients with combined ACL tears and repairable meniscus tears, but it supports that the practitioner might repair these meniscus tears when combined with ACL reconstruction because it improves patient outcomes.

Strength of recommendation: Limited.

Implication: Practitioners should feel little constraint in following a recommendation labeled Limited, exercise clinical judgment, and be alert for emerging evidence that clarifies or helps to determine the balance between benefits and potential harm. Patient preference should have a substantial influencing role.

ACL Recurrent Instability

There is limited evidence comparing nonsurgical treatment to ACL reconstruction in patients with recurrent instability, but it supports that the practitioner might perform ACL reconstruction because this procedure reduces pathologic laxity.

Strength of recommendation: Limited.

Implication: Practitioners should feel little constraint in following a recommendation labeled Limited, exercise clinical judgment, and be alert for emerging evidence that clarifies or helps to determine the balance between benefits and potential harm. Patient preference should have a substantial influencing role.

ACL Conservative Treatment

There is limited evidence to support nonsurgical management for less active patients with less laxity.

Strength of recommendation: Limited.

Implication: Practitioners should feel little constraint in following a recommendation labeled Limited, exercise clinical judgment, and be alert for emerging evidence that clarifies or helps to determine the balance between benefits and potential harm. Patient preference should have a substantial influencing role.

ACL Surgery Timing

When ACL reconstruction is indicated, moderate evidence supports reconstruction within 5 months of injury to protect the articular cartilage and menisci.

Strength of recommendation: Moderate.

Implication: Practitioners should generally follow a Moderate recommendation but remain alert to new information and be sensitive to patient preferences.

ACL Combined With Medial Cruciate Ligament

There is limited evidence in patients with acute ACL tear and medial cruciate ligament (MCL) tear to support that the practitioner might perform reconstruction of the ACL and non-surgical treatment of the MCL tear.

Strength of recommendation: Limited.

Implication: Practitioners should feel little constraint in following a recommendation labeled Limited, exercise clinical judgment, and be alert for emerging evidence that clarifies or helps to determine the balance between benefits and potential harm. Patient preference should have a substantial influencing role.

ACL Locked Knee

In the absence of reliable evidence, it is the opinion of the work group that patients with an ACL tear and a locked knee secondary to a dis-

placed meniscal tear have prompt treatment to unlock the knee in order to avoid a fixed flexion contracture.

Strength of recommendation: Consensus.

Implication: Practitioners should be flexible in deciding whether to follow a recommendation classified as Consensus, although they may give it preference over alternatives. Patient preference should have a substantial influencing role.

ACL Single or Double Bundle Reconstruction

Strong evidence supports that in patients undergoing intra-articular ACL reconstruction, the practitioner should use either single-bundle or double-bundle technique because the measured outcomes are similar.

Strength of recommendation: Strong.

Implication: Practitioners should follow a Strong recommendation unless a clear and compelling rationale for an alternative approach is present.

ACL Autograft Source

Strong evidence supports that, in patients undergoing intra-articular ACL reconstruction using autograft tissue, the practitioner should use bone-patellar tendon-bone or hamstring-tendon grafts because the measured outcomes are similar.

Strength of recommendation: Strong.

Implication: Practitioners should follow a Strong recommendation unless a clear and compelling rationale for an alternative approach is present.

ACL Autograft Versus Allograft

Strong evidence supports that in patients undergoing ACL reconstructions, the practitioner should use either autograft or appropriately processed allograft tissue because the measured outcomes are similar, although these

results may not be generalizable to all allografts or all patients, such as young patients or highly active patients.

Strength of recommendation: Strong.

Implication: Practitioners should follow a Strong recommendation unless a clear and compelling rationale for an alternative approach is present.

ACL Femoral Tunnel Technique

Moderate evidence supports that in patients undergoing intra-articular ACL reconstruction, the practitioner could use either a tibial independent approach or transtibial approach for the femoral tunnel because the measured outcomes are similar.

Strength of recommendation: Moderate.

Implication: Practitioners should generally follow a Moderate recommendation but remain alert to new information and be sensitive to patient preferences.

ACL Postoperative Functional Bracing

Moderate evidence does not support the routine use of functional knee bracing after isolated ACL reconstruction because there is no demonstrated efficacy.

Strength of recommendation: Moderate.

Implication: Practitioners should generally follow a Moderate recommendation but remain alert to new information and be sensitive to patient preferences.

ACL Prophylactic Braces

Limited evidence supports that the practitioner might not prescribe prophylactic knee braces to prevent ACL injury because they do not reduce the risk for ACL injury.

Strength of Recommendation: Limited.

Implication: Practitioners should exercise clinical judgment when following a recommendation classified Limited and should be alert to emerging evidence that might counter the current findings. Patient preference should have a substantial influencing role.

ACL Neuromuscular Training Programs

Moderate strength evidence from pooled analyses with a small effect size (ie, number needed to treat = 109) supports that neuromuscular training programs could reduce ACL injuries.

Strength of Recommendation: Moderate.

Implication: Practitioners should generally follow a Moderate recommendation but remain alert to new

information and be sensitive to patient preferences.

ACL Postoperative Physical Therapy

For those undergoing postoperative rehabilitation after ACL reconstruction, moderate evidence supports early, accelerated, and nonaccelerated protocols because they have similar outcomes.

Strength of Recommendation: Moderate.

Implication: Practitioners should generally follow a Moderate recommendation but remain alert to new information and be sensitive to patient preferences.

ACL Return to Sports

Limited strength evidence does not support waiting a specific time from

surgery/injury or achieving a specific functional goal prior to return to sports participation after ACL injury or reconstruction.

Strength of Recommendation: Limited.

Implication: Practitioners should exercise clinical judgment when following a recommendation classified Limited and should be alert to emerging evidence that might counter the current findings. Patient preference should have a substantial influencing role.

Reference

1. American Academy of Orthopaedic Surgeons: *Management of Anterior Cruciate Ligament Injuries*. Available at: <http://www.aaos.org/research/guidelines/ACLGuidelineFINAL.pdf>. Accessed January 14, 2015.