

Management of the Anterior Cruciate Ligament–Injured Knee in the Skeletally Immature Athlete



Christian N. Anderson, MD, Allen F. Anderson, MD*

KEYWORDS

• ACL • Reconstruction • Skeletally immature • Physeal sparing • Knee • Pediatric

KEY POINTS

- Anterior cruciate ligament (ACL) injuries are being diagnosed with increasing frequency in the skeletally immature population.
- Treatment options for these injuries include nonoperative, early surgical reconstruction, or delayed surgical reconstruction.
- Growing evidence demonstrates that nonoperative/delayed reconstruction results in worse functional outcomes compared with reconstruction within 6 to 12 weeks from the time of injury.
- Clinical and basic science studies have demonstrated risk of limb length discrepancy and angular deformity with transphyseal ACL reconstruction.
- All-epiphyseal ACL reconstruction minimizes the risk of growth disturbance, prevents recurrent instability, restores normal function, and is biomechanically superior to extra-articular and modified physeal-sparing procedures.

INTRODUCTION

Intrasubstance anterior cruciate ligament (ACL) injuries are being reported with increasing frequency in the skeletally immature population. Epidemiologic data from a large integrated health care system demonstrated an overall incidence of 0.11 per 10,000 at 8 years of age that gradually increases to 2.42 per 10,000 by 14 years of age.¹ Although ACL injuries in children and adolescents are relatively rare, a recent

Disclosure Statement: C.N. Anderson has nothing to disclose. A.F. Anderson has the following financial disclosures: Orthopediatrics patent, royalties, and paid consultant. Depuy Mitek paid consultant.

Tennessee Orthopaedic Alliance, 4230 Harding Road, Suite 1000, Nashville, TN 37205, USA

* Corresponding author. Tennessee Orthopaedic Alliance, The Lipscomb Clinic, 4230 Harding Road, St. Thomas Medical Building, Suite 1000, Nashville, TN 37205.

E-mail address: andersonaf@toa.com

Clin Sports Med 36 (2017) 35–52

<http://dx.doi.org/10.1016/j.csm.2016.08.003>

0278-5919/17/© 2016 Elsevier Inc. All rights reserved.

sportsmed.theclinics.com

study demonstrated a 19% increase in reported ACL tears in patients 10 to 14 years old from 2007 to 2011.² The exact reason for the increase in ACL injuries is unclear, but may be attributed to an increase in sports participation combined with improved examination and diagnostic methods. An increased rate of ACL reconstructions in this population has also been observed over the last 20 years.^{2,3} This increase in pediatric ACL surgery is thought to be commensurate with increasing injury incidence; however, this phenomenon may also represent a change in management preferences from nonoperative to operative because of improved surgical techniques^{4–14} and awareness that increased meniscal and chondral pathology may be associated with nonoperative^{15–23} or delayed surgical treatment.^{23–31}

Pediatric ACL tears present significant concern because of the detrimental effects they can have on the health, function, and well-being of young athletes. Although the best management strategy is still the subject of significant debate, early ACL reconstruction in skeletally immature patients has been shown to be effective at restoring normal knee function and stability^{5,32} and reducing concomitant intraarticular injuries.^{23–30} Surgical reconstruction techniques can be categorized into 3 groups: transphyseal, physeal-sparing, and hybrid techniques. The surgical technique most appropriate for reconstruction should be based on the patient's skeletal age at the time of surgery. Appropriate treatment is paramount in avoiding iatrogenic growth disturbance and additional intraarticular injury, and for return to sports participation and overall quality of life.

PATIENT EVALUATION

History and Physical Examination

The evaluation of an ACL tear in skeletally immature patients should begin with a thorough history. Patients often report an audible pop at the time of injury, and up to 65% of individuals can present with an acute hemarthrosis.³³ ACL tears are most likely to occur while children are participating in various sports, with highest injury rates observed during soccer and basketball in females and football and lacrosse in males.³⁴ The mechanism of injury is comparable to what is observed in adults—a noncontact valgus or rotational force on a relatively extended knee.^{24,35} ACL avulsion fractures typically occur with a similar mechanism; however, biomechanical studies have shown intrasubstance ACL injuries are more likely to occur during faster loading rates.³⁶

The physical examination should consist of a complete neurologic and vascular evaluation of the lower extremity, as well as a thorough musculoskeletal examination of the knee. Several studies have shown an association between ACL tears and injury to the collateral ligaments, menisci, and articular cartilage.^{15,24,37} Surgeons should be cognizant of these associated injuries and treat them appropriately when encountered.

Radiographic Evaluation and Assessment of Skeletal Maturity

The radiographic evaluation begins with anteroposterior and lateral radiographs of the knee to rule out ACL avulsion fracture or other osseous trauma. MRI is the preferred imaging modality to confirm ACL injury and to evaluate associated knee pathology. MRI has a sensitivity of 95% and specificity of 88% for identifying ACL tears, with primary findings including abnormal Blumensaat angle, abnormal ACL signal intensity, and ligamentous discontinuity.³⁸ Secondary findings for ACL injury include bone bruise, anterior tibial displacement, uncovered posterior horn lateral meniscus, positive posterior cruciate line, and abnormal posterior cruciate angle.³⁸ Radiographic

Download English Version:

<https://daneshyari.com/en/article/5707095>

Download Persian Version:

<https://daneshyari.com/article/5707095>

[Daneshyari.com](https://daneshyari.com)