

ACL Primary Repair Scientific Update

A Review of Modern Techniques

There has been a renewed interest in primary repair as the treatment for certain patterns of ACL rupture. Primary ACL repair was largely abandoned by the mid-1990s due to inconsistent clinical outcomes. However, careful analysis of the older data reveals that certain subgroups, especially proximal tears with good tissue quality, had better clinical outcomes than the group as a whole.

In light of advances in diagnostic imaging, arthroscopic surgical technology, and rehabilitation approaches in recent decades, primary ACL repair is a concept that is ripe for reevaluation. Using modern MRI imaging, we have the ability to preoperatively identify tears that might be amenable to repair.¹

Clinical Studies

Arthroscopic primary repair of proximal anterior cruciate ligament tears: outcomes of the first 56 consecutive patients and the role of additional internal bracing. *Knee Surg Sports Traumatol Arthrosc.* 2019;27(1):21-28. doi.org/10.1007/s00167-018-5338-z.

- Clinical study to assess outcomes of 56 patients who underwent arthroscopic ACL repair at a minimum 2-year follow-up. Twenty-seven of these patients also received additional internal bracing with the repair.
- Improvements were seen on subjective IKDC, Modified Cincinnati, SANE, Tegner and objective IKDC scores. There was a 13.8% failure rate without InternalBrace and a 7.4% failure rate with InternalBrace
- Primary repair has resulted in good outcomes at 3 year follow up in a carefully selected patient population. The role of internal bracing is possibly beneficial

Anterior cruciate ligament repair with independent suture tape reinforcement: a case series with 2-year follow-up. *Knee Surg Sports Traumatol Arthrosc.* 2019;27(1):60-67. doi:10.1007/s00167-018-5239-1.

- This is the first case series that described the 2-year follow-up results of patients with an acute, proximal ACL rupture, who were treated with the independent suture tape reinforcement repair technique.
- “A meaningful KOOS sport and recreation change and significant improvements in the KOOS, VAS-pain and VR-12 physical scores as well as a significant decrease of the Marx activity scale in comparison to preoperative scores are demonstrated.”
- “Two of the 42 patients (4.8%) reported an ACL rerupture” and were treated with ACL reconstruction without complications.

Anterior cruciate ligament preservation: early results of a novel arthroscopic technique for suture anchor primary anterior cruciate ligament repair. *Arthroscopy.* 2015;31(11):2162-2171. doi:10.1016/j.arthro.2015.08.010.

- “Ten of eleven patients had good subjective and clinical outcomes after ACL preservation surgery at a minimum of 2 years’ and a mean of 3.5 years’ follow-up.”
- “Preservation of the native ACL using the described arthroscopic primary repair technique can achieve short-term clinical success in a carefully selected subset of patients with proximal avulsion-type tears and excellent tissue quality.”
- The surgical technique is described using a Bunnell-type stitch to secure the ACL and anchor it to the femur wall using SwiveLock® anchors.

Jonkergouw A,
van der List JP,
DiFelice GS

Heusdens CHW,
Hopper GP,
Dossche L,
Roelant E,
Mackay GM

DiFelice GS,
Villegas C,
Taylor S



Achtnich A,
Herbst E,
Forkel P,
et al

[Acute proximal anterior cruciate ligament tears: outcomes after arthroscopic suture anchor repair versus anatomic single-bundle reconstruction.](#) *Arthroscopy*. 2016;32(12):2562-2569. doi:10.1016/j.arthro.2016.04.031.

- The purpose of this study was “to compare clinical and radiologic results of primary ACL suture anchor repair and microfracturing with anatomic ACL single-bundle reconstruction in patients with acute proximal ACL avulsion tears.”
- “Proximal refixation of the ACL using knotless suture anchors and microfracturing restores knee stability and results in comparable functional outcomes to a control group treated with single-bundle ACL reconstruction. The results suggest that refixation of the ACL is a feasible treatment option in selected patients.”
- “The independent suture tape reinforcement technique reinforces the ligament as a secondary stabilizer, encouraging natural healing of the ligament by protecting it during the healing phase and supporting early mobilization.”

van der List JP,
DiFelice GS

[Successful arthroscopic primary repair of a chronic anterior cruciate ligament tear 11 years following injury.](#) *HSS*. 2017;13(1):90-95. doi:10.1007/s11420-016-9530-8.

- Case reported on a successful arthroscopic primary repair of a proximal ACL tear 11 years following injury.
- “The conditions, such as proximal tear location, sufficient tissue length, and excellent tissue quality, could potentially be more important for successful outcomes of arthroscopic primary ACL repair than acuity of the surgery.”

Mackay G,
Anthony IC,
Jenkins PJ,
Blyth M

[Anterior cruciate ligament repair revisited. Preliminary results of primary repair with internal brace ligament augmentation: a case series.](#) *Orthop Muscul Syst*. 2015;4(2):1-5. doi:10.4172/2161-0533.1000188.

- Sixty-eight consecutive patients who underwent ACL repair with internal brace ligament augmentation were followed for a minimum of 1 year following surgery.
- “Improvement was seen over the study period in all KOOS and WOMAC domains with the majority of improvement seen in the first three months.”
- “The results were comparable to the literature on ACL reconstruction.”
- “This audit provides early functional outcome and failure data that demonstrates the technique of ACL repair with IBLA is comparable with early results from ACL reconstruction, with the greatest improvements seen in return to sporting activity.”

van der List JP,
DiFelice GS

[Clinical outcomes of arthroscopic primary repair of proximal anterior cruciate ligament tears are maintained at mid-term follow-up.](#) *Arthroscopy*. 2018;34(4):1085-1093. doi:10.1016/j.arthro.2017.10.028.

- “The clinical outcomes of arthroscopic primary repair of proximal ACL tears with suture anchors are excellent and are maintained at mid-term follow-up in a carefully selected subset of patients with proximal tears and excellent tissue quality.”

Biomechanical Study

van der List JP,
DiFelice GS

[Gap formation following primary repair of the anterior cruciate ligament: a biomechanical evaluation.](#) *Knee*. 2017;24(2):243-249. doi:10.1016/j.knee.2016.10.009.

- Following proximal ACL repair, gap formation of approximately one millimeter was measured after repetitious knee cycling with mean maximum failure load of 243 N.
- These findings are likely to be sufficient for careful early active range of motion (ROM) when extrapolating from other available studies.



Technique Papers

van der List JP,
DiFelice GS

[Preservation of the anterior cruciate ligament: a treatment algorithm based on tear location and tissue quality.](#) *Am J Orthop.* 2016;45(7):E393-E405.

- Proposed modification of the Sherman classification of the different tear types.
- Discusses the surgical techniques and variations that can be used to treat these different tear types.

Heusdens CHW,
Hopper GP,
Dossche L,
Mackay GM

[Anterior cruciate ligament repair using independent suture tape reinforcement.](#) *Arthrosc Tech.* 2018;18;7(7):e747-e753. doi:10.1016/j.eats.2018.03.007.

- “Repair of the acute proximal ruptured ACL can be achieved with the independent suture tape reinforcement ACL repair technique.”
- “The independent suture tape reinforcement technique reinforces the ligament as a secondary stabilizer, encouraging natural healing of the ligament by protecting it during the healing phase and supporting early mobilization.”

Systematic Reviews

van der List JP,
DiFelice GS

[Preservation of the anterior cruciate ligament: surgical techniques.](#) *Am J Orthop.* 2016;45(7):E406-E414.

- “Discussed the history of ACL preservation.”
- “Discussed how modern advances altered the risk-benefit ratio for ACL preservation.”
- “Proposed our treatment algorithm for ACL injuries, which is based on tear location and tissue quality.”

van der List JP,
DiFelice GS

[Role of tear location on outcomes of open primary repair of the anterior cruciate ligament: a systematic review of historical studies.](#) *Knee.* 2017;24(5):898-908. doi:10.1016/j.knee.2017.05.009.

- “All studies reporting outcomes of open primary ACL repair published between the inception of PubMed, Embase and Cochrane and 2000 were identified.”
- “Good outcomes were noted in the total cohort, and excellent outcomes were noted following repair of proximal tears. Positive correlation was found between the percentage proximal tears in the studies and percentage satisfied patients (p=0.010).”