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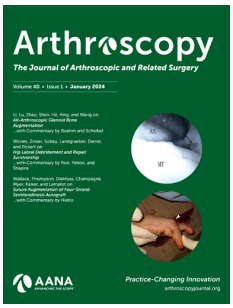

ACL Primary Repair Has Limited Indications and Outcomes Inferior to ACL Reconstruction

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Editorial Commentary on 24-284 Feldman: ACL Primary Repair Has Limited Indications and Outcomes Inferior to ACL Reconstruction

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Editorial Commentary on 24-284 Feldman:

Abstract:

ACL primary repair literature does not convincingly show non-inferiority to the gold-standard of ACL reconstruction using a graft. Primary repair has narrow indications, typically Sherman Type I tear pattern representing femoral avulsion good tissue quality. In addition, recent research shows greater post-operative laxity in repairs deemed successful in comparison to laxity in patients having reconstruction. Our primary point is worth repeating: In contrast to ACL primary repair, ACL reconstruction is the gold standard for ACL tears.

Is it time to abandon a proven technique in ACL reconstruction? ACL repair was performed frequently in the mid 1970s. However, Feagin et al.[1], in their landmark paper, showed that 30 of 32 patients (94%) described 'instability' and 24 of 32 patients (75%) described 'athletic impairment' 5 years post-ACL repair despite reporting good results at 2 years post-operatively. In total, 12 of the 32 patients reported recurrent injuries with 10 reporting medial meniscal tears. This led to the transition from ACL repair to reconstruction. Although our current anatomic knowledge and repair techniques are vastly improved from the 1970s, is there enough data to support a transition back to ACL repair? The current study by Simard, Greenfield and Khoury[2] present data with minimum two year follow-up that suggests favorable, or at least noninferior, results comparing ACL repair to reconstruction. But are we falling into the same trap as in the 1970s?

In the current study, only 96/679 (14%) patients who underwent surgical treatment for an ACL injury underwent repair. This seems to represent a select group of patients with a very specific tear pattern (Sherman 1), which they described as an "avulsion off the femur with good quality tissue." The definition of what is good quality tissue will continue to be an area for debate. Additionally, this study selected patients that were healthy and sustained a Sherman 1 ACL tear to be candidates for repair. What would happen if the same patient with a Sherman 1 injury underwent an ACL reconstruction? To truly determine whether repair is preferential (or at least noninferior) to reconstruction, it would be necessary to randomize Sherman 1 ACLs to repair vs. reconstruction.

Additionally, are the outcomes of repair and reconstruction in this study truly equivalent? In Table 3, the average post-operative KT 1000 laxity was measured and there was notably more laxity in those patients who underwent an ACL repair than in those who underwent early or late ACL reconstruction when comparing the operative side to the contralateral side. ACL repair patients had on average 1 mm of difference whereas the reconstructed groups had only 0.2 mm of side to side difference. Of the three groups of patients, acute ACL reconstructions had the lowest percentage of patients with >3mm of laxity with Lachman testing on KT-1000 at 3.8% versus 16% in the repair group and 12% in delayed reconstruction group (Table 4). Moreover, KT-1000 testing at 15- and 20-pounds showed a higher percentage of patients with >3mm of laxity in the repair group vs the acute and delayed reconstruction groups (12.9% vs 3.8%). Although

these findings were not statistically significant (p=0.36), the study is likely underpowered to compare this difference and a larger sample size may show statistical significance. It it notably concerning to see more post-operative laxity in the ACL repair group than in either the acute or delayed ACL reconstruction groups. A similar finding was identified in a recent meta analysis[3]. In that review, the authors found a much higher failure rate with ACL repair than reconstruction. Their conclusion was that ACL reconstruction should be recommended for primary ACL tears. ACL reconstruction demonstrated lower joint laxity and rate of failure compared with repair. In a 25 year ACL reconstruction study, increased laxity within the first 6 months was associated with much higher graft failure rate, higher risk of revision, reduced length of athletes career and an inferior Lysholm score[4].

Furthermore, the Sane score was also lower in the repair group ($p<0.002$). The Marx activity level was notably lower after surgery for the ACL repair vs. ACLR but not statistically significant ($3.1 + 1.64$, $p=0.06$). With a larger sample size, it may be statistically significant. Could the lower Marx score highlight a fear to return to sport or feelings of instability? Lower Sane scores in the repair group are also concerning and may highlight that patients who underwent repair feel they have a less functional knee.

At what age is ACL repair even a viable option? The average patient ages in this study were 43 years for the repair group, 36 years in the acute reconstruction group, and 39 years in the delayed reconstruction group. All three of these ages are much older than many of the athletes we treat with ACL tears. In addition, older patients typically function at a much lower demand and do not put the same stresses on their repair or reconstruction. Therefore, does this study translate to safely performing repairs in our younger, more demanding patients? What should we do for the 18-year-old soccer player? The MOON cohort in 2015 showed us that the risk factors for retear after reconstruction were younger age, higher activity level, and the use of allograft[5]. They also showed that younger age and higher activity level were associated with an increased risk for retear. Can good outcomes also be obtained in younger patients with ACL repair? Recent literature has shown that ACL repairs in adolescent patients have a high retear rate of 48.8%[6]. So where do we draw the line? In a 25-year-old is a repair a good option or would they be high risk for retear? At this point we do not have evidence either way.

Lastly, the current study does present a prospective, single surgeon comparison of ACL repair vs. acute reconstruction vs. delayed reconstruction with minimum 2-year follow-up. But, does the inherent selection bias emphasize the fact that it is underpowered to show the proper effect size? The authors did not report a fragility index but in a trial such as this one, it may only take a few patients with a different outcome to lead to very different clinical results. Thus, a larger cohort of patients is needed in order to definitively declare ACL repair noninferior to ACL reconstruction.

In conclusion, we commend the authors on presenting their results in this patient demographic; but in many ways, this study creates more questions about what to do moving forward. So back to our question: Is it time to leave behind ACL reconstruction?

In the high demand younger athlete, we do not have proof at this point that ACL repair is non inferior to ACL reconstruction. Although some studies show support for ACL repair, in our opinion, there is not enough hard evidence at this time to abandon ACL reconstruction. A high level randomized controlled trial is truly needed to determine whether ACL repair is equivalent to ACL reconstruction. Until then, careful patient selection and discussion is warranted regarding the risks and benefits of ACL repair.

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