

ANTERIOR CRUCIATE LIGAMENT REPAIR

Kevin R. Stone, M.D.
Ann W. Walgenbach, RNNP
Michael J. Mullin, ATC, PTA

INDICATIONS - Once a tear of the ACL has been confirmed through clinical evaluation and MRI (magnetic resonance imaging), *image 1*, the unstable knee can now be repaired vs. reconstructed. This is only possible if the ACL is of good quality and if the ligament can be passed posterior to the PCL, both of which are determined in surgery, *image 2*. Acutely (recently) torn ligaments are typically of better quality and therefore have a greater chance of being repaired as opposed to the chronically torn ligaments.



image 1: MRI



image 2: Surgical diagnosis



image 3: Posterior Intercondylar Notchplasty

PROCEDURE - Once the ligament is deemed repairable, sutures are then passed through the proximal aspect of the ligament. A posterior intercondylar notchplasty is performed between the two femoral condyles of the thigh bone, *image 3*. The area is then microfractured with a series of small punctures deep into the posterior notch to create a bleeding bed, *image 4*. The anatomic insertion site in this notch where the ACL tore from is identified and a hole placed, *image 5*. A suture anchor is then loaded into the sutures, passed into the hole, and the sutures then tied with a fisherman's slip knot, *image 6a, 6b & 6c*, in order to pull or secure the ACL back into the anatomic insertion site, *image 7*. Autogenous blood clot (performed with the patients own blood) is then harvested and mixed into a fibrous clot, then packed into the proximal site to improve the healing bed, *image 8*. Sutures are then tied over the fibrous clot to hold it into place.



image 4: Bleeding Bed



image 5: Suturing Torn ACL



image 6a: Suture Anchor



image 6b: Anchor Placement



image 6c: Slip Knot



image 7: ACL Locked In

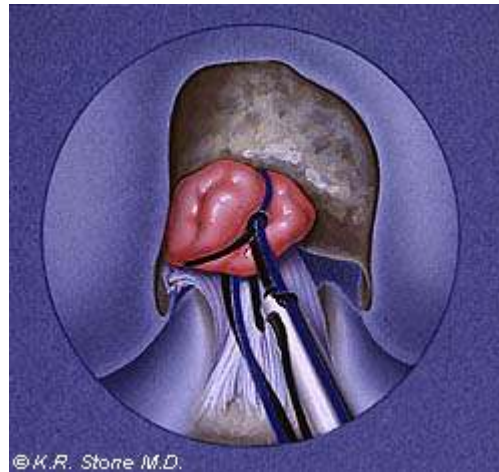


image 8: Fibrous Clot

SPECIAL INSTRUCTIONS - Patients are able to fully weight bear as soon as tolerated. They are restricted in their range of motion through the use of a rehab brace locked between 30 and 70 degrees of motion for the first four weeks. Any rehab and/or exercise in this range of motion that are not twisting activities are allowed. Special attention with soft tissue massage to the arthroscopic portals should be taken to decrease the incidence of fibrosis.

ACL REPAIR: NEW TECHNIQUE, REHABILITATION AND INITIAL RESULTS

**STONE K.R.,
WALGENBACH A.W.,
RICHNAK J.,
MICHELOTTI M., HO C.**

Introduction

ACL repair is out of favor due to reported poor results. However, the techniques reported do not reflect the current understanding of ACL isometry, anatomy, or rehabilitation methods.

Materials and Methods

In light of this, forty-one patients with ACL tears primarily in the proximal third of the ligament underwent anatomic suture anchor repair into a microfractured posterior intercondylar notch followed by a modern rehabilitation program emphasizing immediate weight bearing, mobilization and closed chain exercises. All patients were permitted to return to full sports after three months. All patients underwent pre and post operative clinical examinations, KT 1000, radiographs and 29 underwent both MRI examinations. The only criteria for selection of repairable ligaments was the ability of the surgeon to lay the ligament fibers posterior to the PCL or to the tibial attachment, and the willingness of the patient to undergo reconstruction if the new repair technique failed.

Results

Thirty ligament ruptures were found to be grade III, 10 grade II, and 1 grade I at the time of surgery. 95% patient follow up was obtained at an average length of 13 months (range 6-44 months). Average age of the patients was 38.6 years (range 10-62 years old). Thirty-three knees had acute tears of the ACL defined as less than 8 weeks from injury to surgery and 8 were chronic tears. Average pre-op KT manual max. difference test improved from 4.6 pre-op (range 0 for locked knees to 10 mm) to 2.4 mm post-op (range 0-6 mm) ($p < 0.05$). The average KT change for acute knees changed from 4.5 pre-op to 2.2 post-op and for chronic knees changed from 4.7 pre-op to 3.3 post-op. By clinical exam the Lachman's test changed from an average of 2.5 to 0.6 (scale 0-3) ($p < 0.05$). The pivot shift changed from pre-op average of 2.1 to 0.2 post-op ($p < 0.05$) with three patients having a pivot shift, one undergoing repeat repair and one undergoing reconstruction. All pre-op MRIs demonstrated a torn ACL, average grade 2.5 (scale 0-3) as read by an independent radiologist. Of the 30 post-op MRI's obtained, 17 showed a vertical orientation of the ACL with only 2 knees having anterior translation, and 9 having residual signal within the ACL fibers. 24 knees had a meniscal lesions of which 7 were repaired. 16 chondral lesions were found of which 12 were repaired with chondroplasty, 5 had microfracture, and 1 with both chondroplasty and microfracture with articular cartilage grafting. Four patients underwent a second procedure, 3 for sports related traumatic ruptures of the repair, and one for arthrofibrosis.

Discussion

All patients regained full extension, four patients lost more than 6 degrees of flexion. Patient satisfaction level by questionnaire demonstrated that pain average decreased from 2.3 to 0.6 (scale 0-3), swelling decreased from 1.3 to 0.6 (scale 0-3) ($p < 0.05$). Instability symptoms were noted in 2 patients, locking in 3 patients, difficulty with stairs

Instability symptoms were noted in 2 patients, locking in 3 patients, difficulty with stairs noted in 6 patients. Current activity level post-op is 2.2 (scale 1-4, 1=strenuous activity, 4=sedentary activity)($p < 0.05$). This study demonstrates that repair of selected cruciate ligament tears can lead to stable knees during this time frame as demonstrated by physical exam, KT 1000 and to healed ligaments as confirmed.

The Stone Foundation at The Stone Clinic

3727 Buchanan Street • San Francisco CA 94123 • info@stoneclinic.com • (415) 563-3110