Analysis of Patient Reported Outcomes and Subsequent Surgery Rate Following Quadriceps Tendon Anterior Cruciate Ligament Reconstruction and Lateral extra-articular Tenodesis in Skeletally Immature Patients: Two Year Follow-Up

Sofia Hidalgo Perea, BS

Danielle E. Chipman, BS

Frank A. Cordasco, MD, MS

Daniel W. Green, MD, MD

Hospital for Special Surgery,

New York, NY, USA

Disclosures

NO RELEVANT DISCLOSURES

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Background

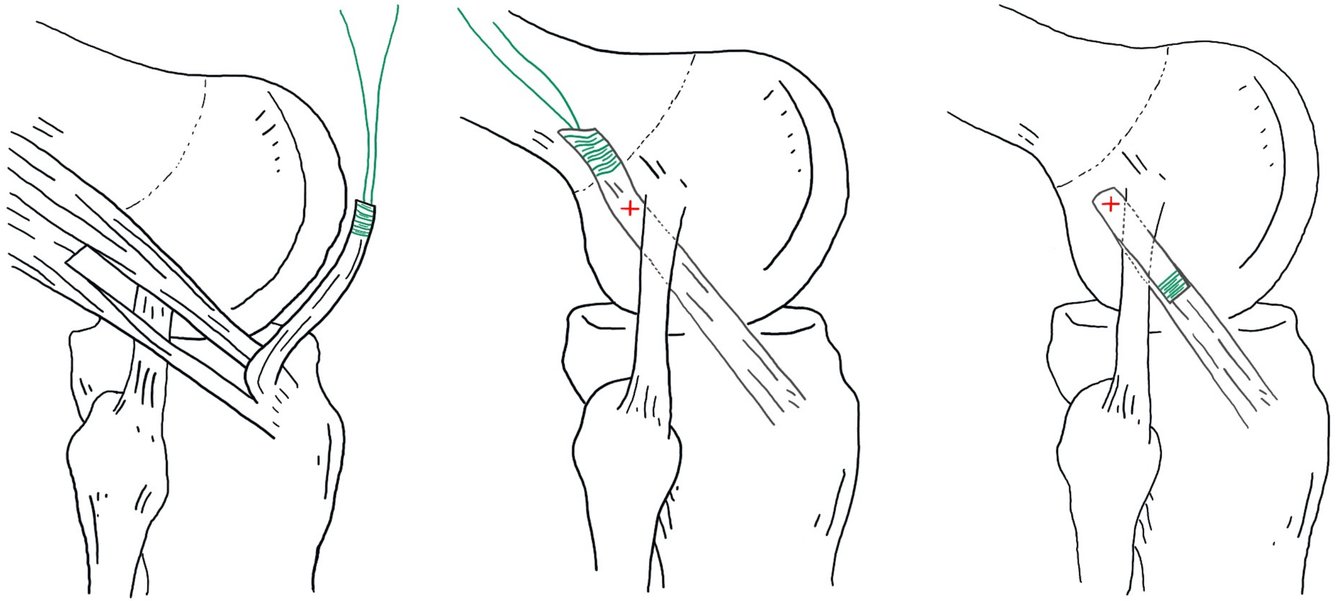
- Incidence of anterior cruciate ligament reconstruction (ACLR) in pediatric and adolescent patients is increasing significantly
- Many patients possess risk factors that predispose to ACL re-tear
- Lateral extra-articular tenodesis (LET) may be performed in conjunction with ACLR to reduce the risk of ACL re-tear

Our Indications for LET

- Physical Exam
  - Recurvatum 10° or more
  - Beighton 6 or more
  - Grade 3 pivot
- Radiological Assessment
  - Increased posterior tibial slope
  - Decreased notch width index
- Surgical History
  - Contralateral ACLR
  - Revision ACLR
- Demographics (relative)
  - High risk sports participation
  - 8th and 9th grade

Purpose

- Evaluate 2-year clinical outcomes of ACLR with soft tissue quadriceps tendon (QUAD) autograft and a LET using a modified Lemaire technique in skeletally immature patients



Methods

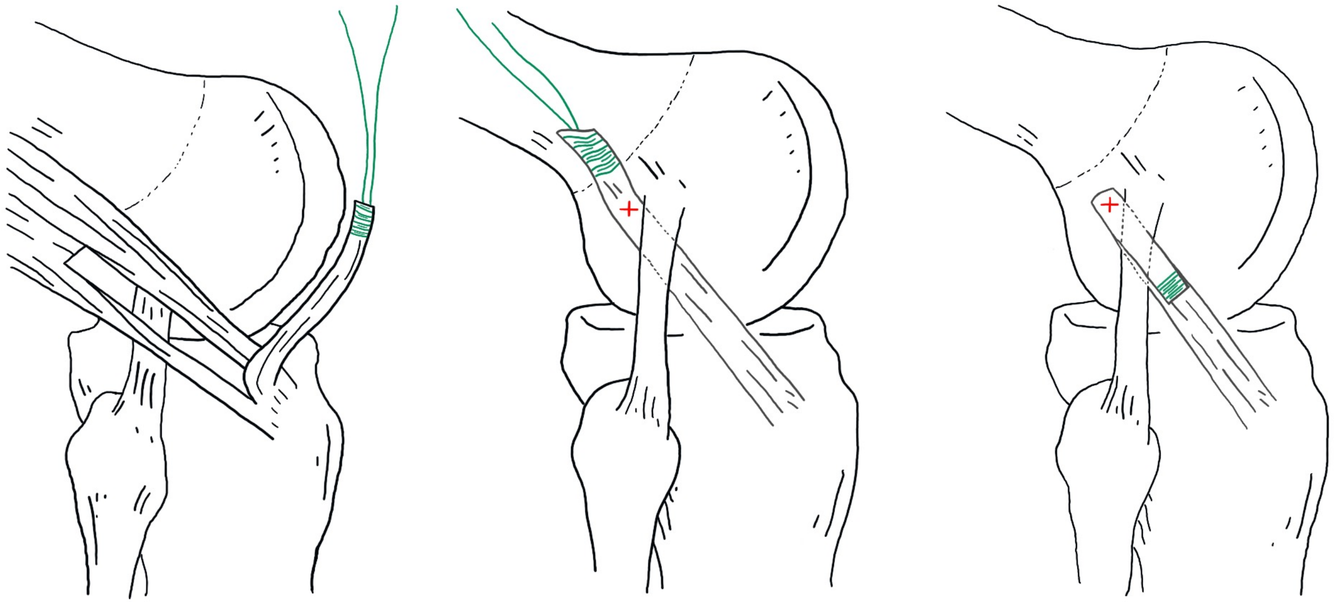
- Retrospective chart review
- Consecutive series of patients who underwent QUAD tendon autograft ACLR and LET with a minimum of 2-year follow-up data
- All-epiphyseal (AE) ACLR and complete transphyseal (CT) ACLR were indicated based on skeletal age
- Outcome measures included return to sports (RTS), concomitant or subsequent surgical procedures and patient-reported outcomes (PROs)
- PROs included:
  - Single Assessment Numeric Evaluation (SANE)
  - Pediatric International Knee Documentation Committee (Pedi-IKDC)
  - HSS Functional Activity Brief Scale (HSS Pedi-FABS)

Results

- Final cohort = 50 consecutive adolescent patient
  - Mean age = 14.2 ± 1 years (range = 11 to 16 years)
  - Minimum follow-up of 2 years
  - Two patients were lost to follow-up.
- 48 patients included
  - 98% participated in high-risk competitive sports
  - 2 (4%) patients were revision ACLR
  - 10 (21%) patients underwent AE and 38 (79%) underwent CT ACLR
- 16 (33%) patients had subsequent surgical procedures
  - 5 contralateral ACLR
  - 4 meniscus surgeries
  - 4 QUAD autograft scar revision
  - 4 irrigation and debridement
    - 2 patients, 2 each
  - 3 hardware removal procedures
    - 2 for hemi-epiphysiodesis
    - 1 tibial socket button removal

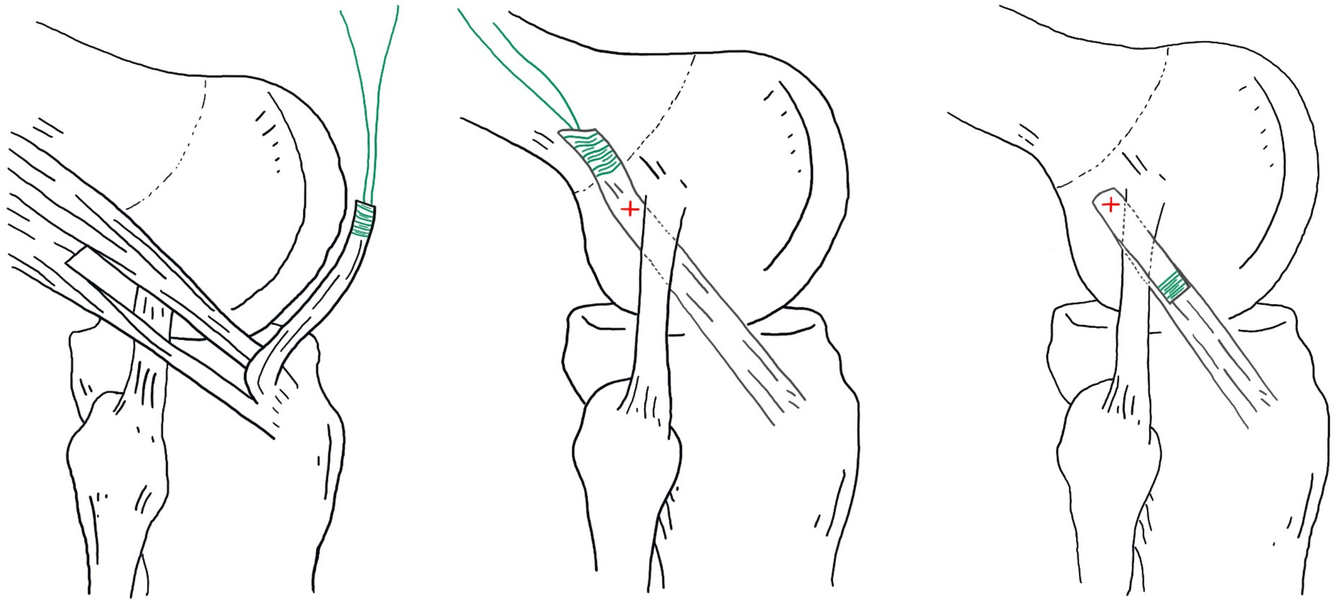
Results

- **Rate of graft failure was 0%**
- At 2-year follow-up:
  - Mean SANE score = 93
  - Mean Pedi-IKDC score = 90
  - Mean HSS-Pedi-FABS score = 23
  - RTS rate = 100%



Conclusion

- The addition of a LET when performing an ACLR is safe and should be considered as a concomitant procedure for adolescent patients that are at high risk of re-tear



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A Modified Lemaire Lateral Extra-articular Tenodesis in High-Risk Adolescents Undergoing Anterior Cruciate Ligament Reconstruction With Quadriceps Tendon Autograft

2-Year Clinical Outcomes

Daniel W. Green,*† MD, MS, Sofia Hidalgo Perea,* BS, Christopher M. Brusalis,† MD, Danielle E. Chipman,* BS, Lori A. Asaro,‡ PA-C, MS, and Frank A. Cordasco,†‡§ MD, MS

HSS

Lerner Children's Pavilion

Thank you!

Contact Information: Daniel W. Green, greendw@hss.edu

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References

- Getgood, A., Brown, C., Lording, T., Amis, A., Claes, S., Geeslin, A., Musahl, V., Amis, A., Brown, C., Cavaignac, E., Claes, S., Daggett, M., Dejour, D., Engebretsen, L., Feng, H., Fleming, B., Fu, F., Geeslin, A., Getgood, A., … Zaffagnini, S. (2019). The anterolateral complex of the knee: Results from the International ALC Consensus Group Meeting. Knee Surgery, Sports Traumatology, Arthroscopy, 27(1), 166–176. https://doi.org/10.1007/S00167-018-5072-6
- Getgood, A. M. J., Bryant, D. M., Litchfield, R., Heard, M., McCormack, R. G., Rezansoff, A., Peterson, D., Bardana, D., MacDonald, P. B., Verdonk, P. C. M., Spalding, T., Group, the S. S., Willits, K., Birmingham, T., Hewison, C., Wanlin, S., Firth, A., Pinto, R., Martindale, A., … Haver, M. V. (2020). Lateral Extra-articular Tenodesis Reduces Failure of Hamstring Tendon Autograft Anterior Cruciate Ligament Reconstruction: 2-Year Outcomes From the STABILITY Study Randomized Clinical Trial: Https://Doi.Org/10.1177/0363546519896333, 48(2), 285–297. https://doi.org/10.1177/0363546519896333
- Marom, N., Ouanezar, H., Jahandar, H., Zayyad, Z. A., Fraychineaud, T., Hurwit, D., Imhauser, C. W., Wickiewicz, T. L., Pearle, A. D., & Nawabi, D. H. (2020). Lateral Extra-articular Tenodesis Reduces Anterior Cruciate Ligament Graft Force and Anterior Tibial Translation in Response to Applied Pivoting and Anterior Drawer Loads: Https://Doi.Org/10.1177/0363546520959322, 48(13), 3183–3193. https://doi.org/10.1177/0363546520959322
- Noyes, F. R., Huser, L. E., & Levy, M. S. (2017). Rotational knee instability in ACL-Deficient Knees: Role of the anterolateral ligament and iliotibial band as defined by tibiofemoral compartment translations and rotations. Journal of Bone and Joint Surgery - American Volume, 99(4), 305–314. https://doi.org/10.2106/JBJS.16.00199
- Popkin, C. A., Wright, M. L., Pennock, A. T., Vogel, L. A., Padaki, A., Redler, L. H., & Ahmad, C. S. (2018). Trends in Management and Complications of Anterior Cruciate Ligament Injuries in Pediatric Patients: A Survey of the PRiSM Society. Journal of Pediatric Orthopaedics, 38(2), e61–e65. https://doi.org/10.1097/BPO.0000000000001098
- Price, M. J., Tuca, M., Cordasco, F. A., & Green, D. W. (2017). Nonmodifiable risk factors for anterior cruciate ligament injury. Current Opinion in Pediatrics, 29(1), 55–64. https://doi.org/10.1097/MOP.0000000000000444
- Schlichte, L. M., Aitchison, A. H., Green, D. W., & Cordasco, F. A. (2020). Modified Lemaire Lateral Extra-articular Tenodesis in the Pediatric Patient: An Adjunct to Anterior Cruciate Ligament Reconstruction. Arthroscopy Techniques, 9(1), e111. https://doi.org/10.1016/J.EATS.2019.09.010
- Wiggins, A. J., Grandhi, R.K., Schneider, D. K., Stanfield, D., Webster, K. E., & Myer, G.D. (2016). Risk of Secondary Injury in Younger Athletes After Anterior Cruciate Ligament Reconstruction: A Systematic Review and Meta-analysis. The American Journal of Sports Medicine, 44(7), 1861–1876. https://doi.org/10.1177/0363546515621554