Favorable Outcomes Following Quadriceps Tendon ACL-R in Adolescent Athletes at Mean Follow-Up of 4 Years

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Disclosures

None relevant to this presentation.

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Jonathan D. Hughes is on the Editorial Board of Knee Surgery, Sports Traumatology, Arthroscopy (KSSTA).

Introduction

- ACL-R failure rate high in adolescent patients (up to 20-30%)
- QT autograft increasingly used in ACL-R
- Limited data on outcomes following QT ACL-R in adolescent patients
  - 1-3% failure rate previously reported
  - May underestimate for high-risk athletes

- *Diermeier, Musahl, KSSTA 2020*
- *Winkler, Musahl, KSSTA 2022*
- *Rizvanovic, KSSTA 2022*
- *Dai, AJSM 2022*
- *Nyland, KSSTA 2020*
- *Gagliardi, AJSM 2020*
- *Borchers, AJSM 2009*
- *Webster, AJSM 2016*

Purpose/Hypothesis

Purpose #1:

- Examine outcomes of QT ACL-R in adolescent athletes (age 14-17 y.o.)

Hypothesis #1:

- Low revision ACL-R rate, improved post-op PROs, high RTS

Purpose/Hypothesis

Purpose #2:

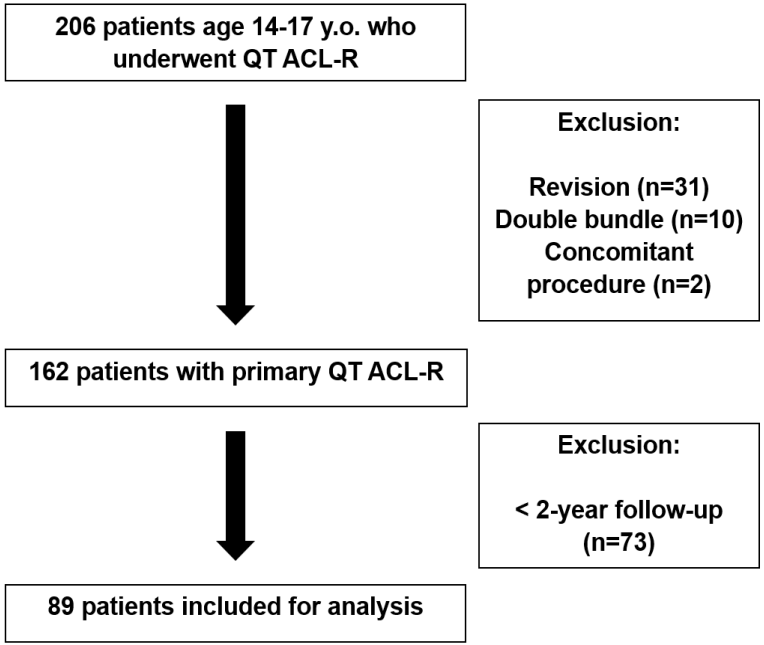
- Identify demographic and surgical factors associated with revision ACL-R in adolescent athletes

Hypothesis #2:

- Revision ACL-R more common with younger age and female sex

Methods

- All patients aged 14-17 y.o. who underwent **primary, anatomic, transphyseal QT ACL-R** from 2010-2021
- **Minimum 2-year follow-up**
- Exclusion: revision ACL-R, double-bundle, MLKI, and open physes

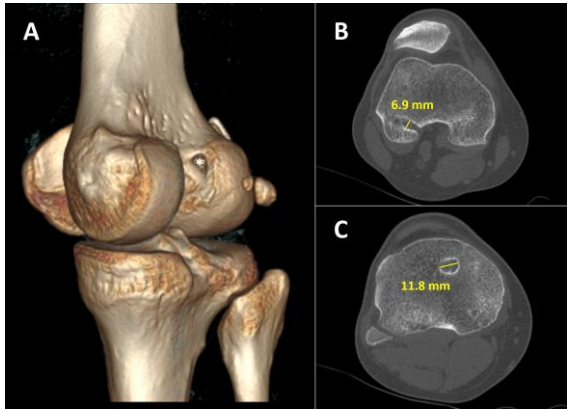


Variables of Interest

- Demographics (age, sex, BMI)
- Pre-operative IKDC and Marx
- Sport type and level of sport
- QT characteristics (diameter, thickness, bone block)
- Concomitant procedures (ex. meniscus, cartilage, LET)
- Notch width

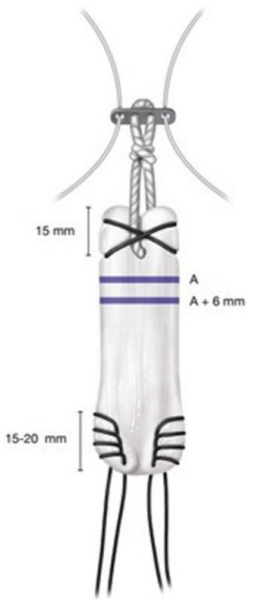
Outcomes of Interest

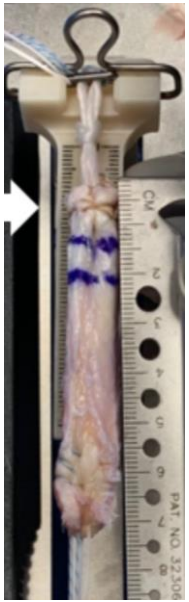
- Revision ACL-R rate
- Future ipsilateral knee surgery (ex. meniscus, chondral, cyclops)
- Lachman test at final follow up
- Post-operative PROs (IKDC, Marx)
- Return to sport



Results-Demographics

- 89 pts (57 female) included at **mean f/u of 4 y**
  - Mean age 16 years
  - 87% organized sports, 85% pivoting sports
- 45 (43%) patients with meniscus tears
- Graft properties:
    - Majority full-thickness (73%)
    - Mean diameter of 9.4 mm





Results

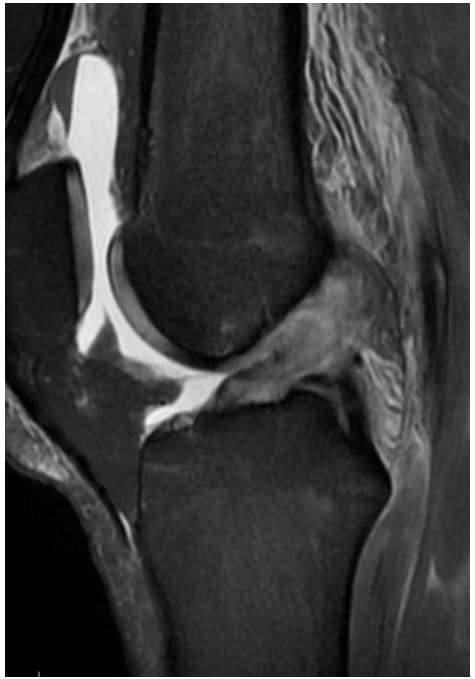
- 10% revision ACL-R rate
- 14% contralateral ACL tear rate
- Improvement in IKDC:
  - Pre-op: 37.2 ± 17.1
  - Post-op: 87.5 ± 12.6
- Reduction in Marx activity scale:
  - Pre-op: 14.3 ± 3.1
  - Post-op: 12.2 ± 4.6

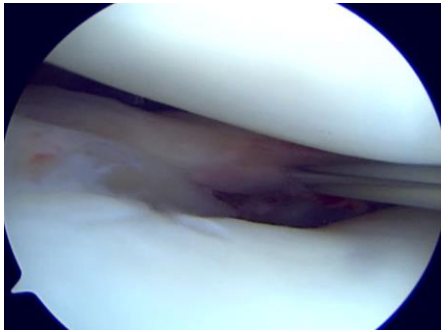
Results

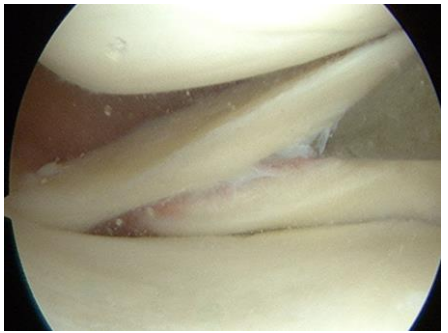
- 80% RTS rate
- 85% return to same/higher level
- Mean time to RTS = 9.7 months
- Most common reasons for lack of RTS:
  - Lack of interest/time (n=7, 70%)
  - Fear of re-injury (n=5, 50%)

Results

- 22.5% re-operation rate
- Most common reasons:
  - Loss of ROM (n=8, 9%)
    - 6 (7%) with cyclops
  - Meniscus tear (n=8, 9%)
- 83 (93%) patients with negative Lachman







Results

- **No identifiable demographic or surgical factors associated with revision ACL-R**

Discussion-Main Findings

- Favorable outcomes following QT ACL-R in adolescent athletes
- 10% revision ACL-R rate, 14% contralateral ACL tear
- Improved PROs
- 80% RTS rate, 85% same/higher level
    - Failure to RTS most often due to lack of time or fear of re-injury

Discussion-Why I like quad tendon

- Reliable and robust
- Versatile and reproducible
- Early healing and maturation on MRI
- Quad weakness temporary and reversible
    - Focus on early quad strengthening/engagement

Editorial Commentary

Editorial Commentary: Quadriceps Tendon Is a Better Graft Than Hamstring for Anterior Cruciate Ligament Reconstruction

John Xerogeanes M.D. (Editorial Board)

Quadriceps tendon autograft for arthroscopic knee ligament reconstruction: use it now, use it often

Andrew J Sheean [1], Volker Musahl [1], Harris S Slone [2], John W Xerogeanes [3], Danko Milinkovic [4], Christian Fink [5], Christian Hoser [5] International Quadriceps Tendon Interest Group

Shani et al Arthroscopy 2016
Yamamashi et al Arthroscopy 2024

Conclusion

- QT is a viable graft choice for ACL-R in adolescent athletes
- Low revision ACL-R rate, improved PROs, and high rate of RTS
- Surgeons may consider findings when choosing graft for primary ACL-R in adolescent athletes

Thank You!