

All Soft Tissue Quadriceps Tendon Versus Quadriceps Tendon With Bone Block in Primary ACL Reconstruction

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Disclosures

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AAOS: Board or committee member

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Background

- All-soft tissue quadriceps tendon (sQT) and quadriceps tendon with bone block (bQT) are both popular choices for primary anterior cruciate ligament reconstruction (ACLR)^{1,2}
- Despite the increased popularity of QT autografts, direct comparisons of sQT and bQT preparations are lacking³

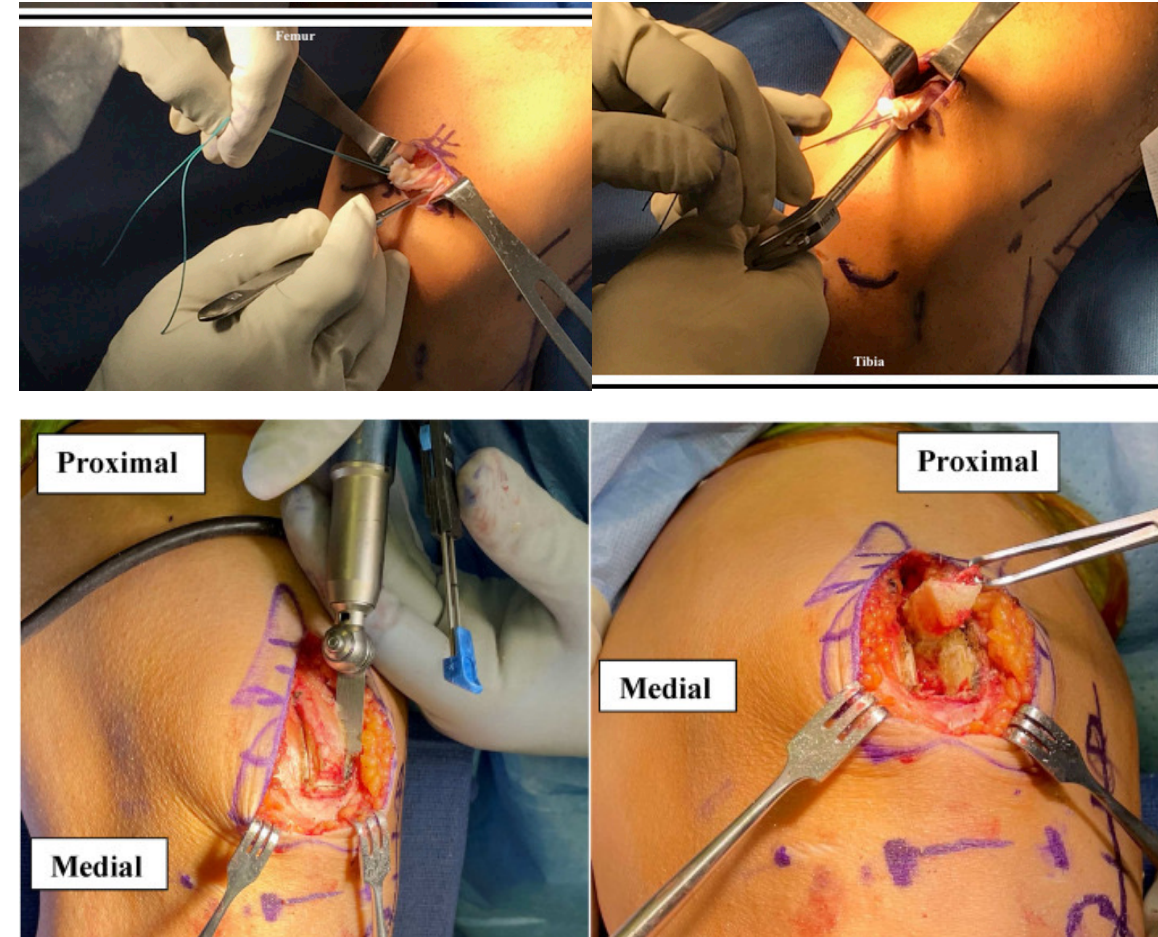


Figure 1. sQT⁴ (above) and bQT⁵ (below) graft harvest

Study Aim

- Evaluate whether there was a difference in clinical outcomes between patients who underwent primary ACLR with sQT versus bQT

Hypothesis

- No difference in clinical outcomes between sQT and bQT in primary ACLR

Methods

Inclusion Criteria

- Primary QT ACLR between 2010-2021
- ≥ 12 months of follow up

Exclusion Criteria

- Revision ACLR
- Multi-ligamentous injury
- Double-bundle ACLR or posterolateral bundle augmentation
- Concomitant procedures (e.g., osteotomy, cartilage restoration, lateral extra-articular tenodesis)

Methods (continued)

Data Collection and Analysis

- Mean pre- and post-op PROs
 - Number meeting minimum clinically important difference (MCID) was compared for IKDC
- Stability testing^{6,7} (Figure 2)
- Return to sport (RTS): number who fully resumed preinjury level of play and mean time to do so
- Rate of complications: retear, stiffness
 - Stiffness = loss of $>10^{\circ}$ flexion or $>5^{\circ}$ extension⁸

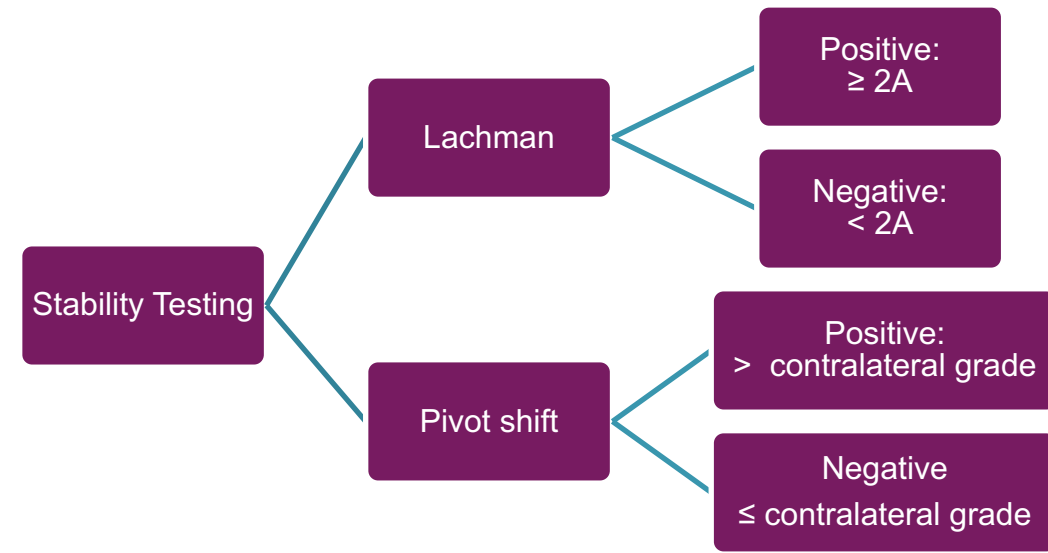


Figure 2. Lachman and pivot shift findings were dichotomized to positive and negative^{6,7}.

Results

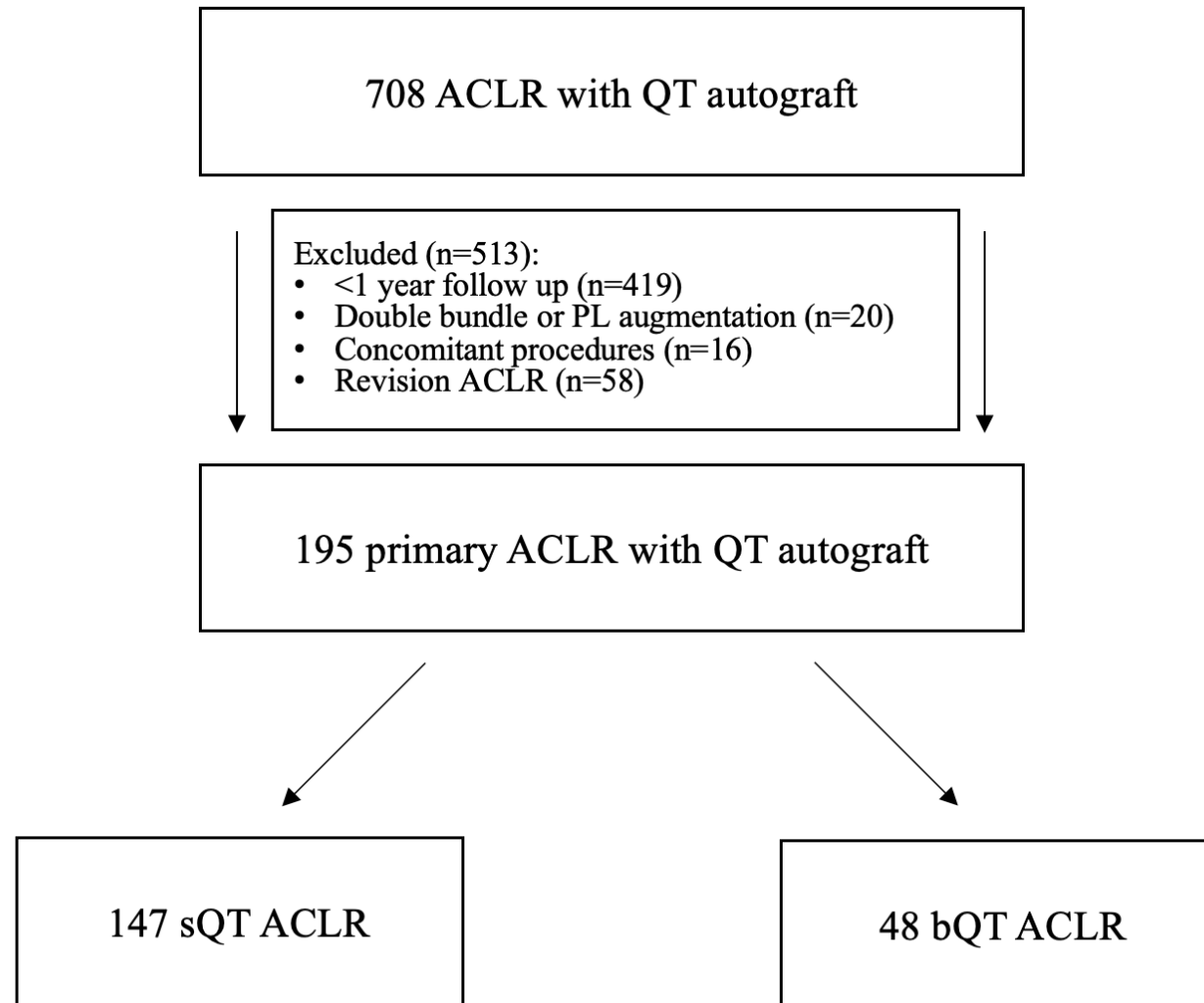


Figure 3. Patient recruitment flowchart. Of 708 QT ACLR patients identified, 195 met inclusion criteria.

Results (continued)

- No difference in IKDC measures (Figure 4) or other PROs at final follow up
- No difference in stability testing (Table 1)

Table 1. Postoperative Stability Testing

	<u>sQT</u> (147)	<u>bQT</u> (48)	<u>p-value</u>
Lachman (+) – n (%)	8 (6%) (n=144)	1 (2%) (n=48)	n.s.
Pivot shift (+) – n (%)	8 (13%) (n=64)	2 (5%) (n=39)	n.s.

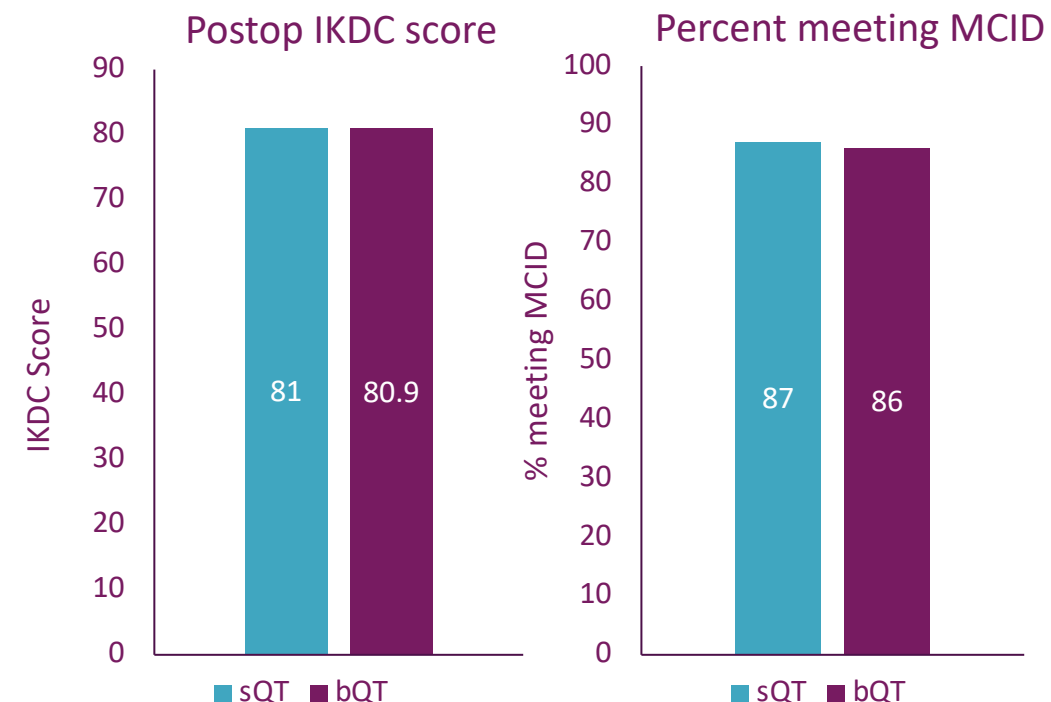


Figure 4. Mean postoperative IKDC score and percentage of patients in each cohort who met IKDC MCID

Results (continued)

- No difference in RTS (Figure 5)
- No difference in postoperative complications (Table 2)

Table 2. Postoperative Complications

	<u>sQT</u> (147)	<u>bQT</u> (48)	<u>p-value</u>
Graft retear – n (%)	7 (5%) (n=147)	3 (6%) (n=48)	n.s.
Stiffness – n (%)	21 (14%) (n=147)	5 (10%) (n=48)	n.s.

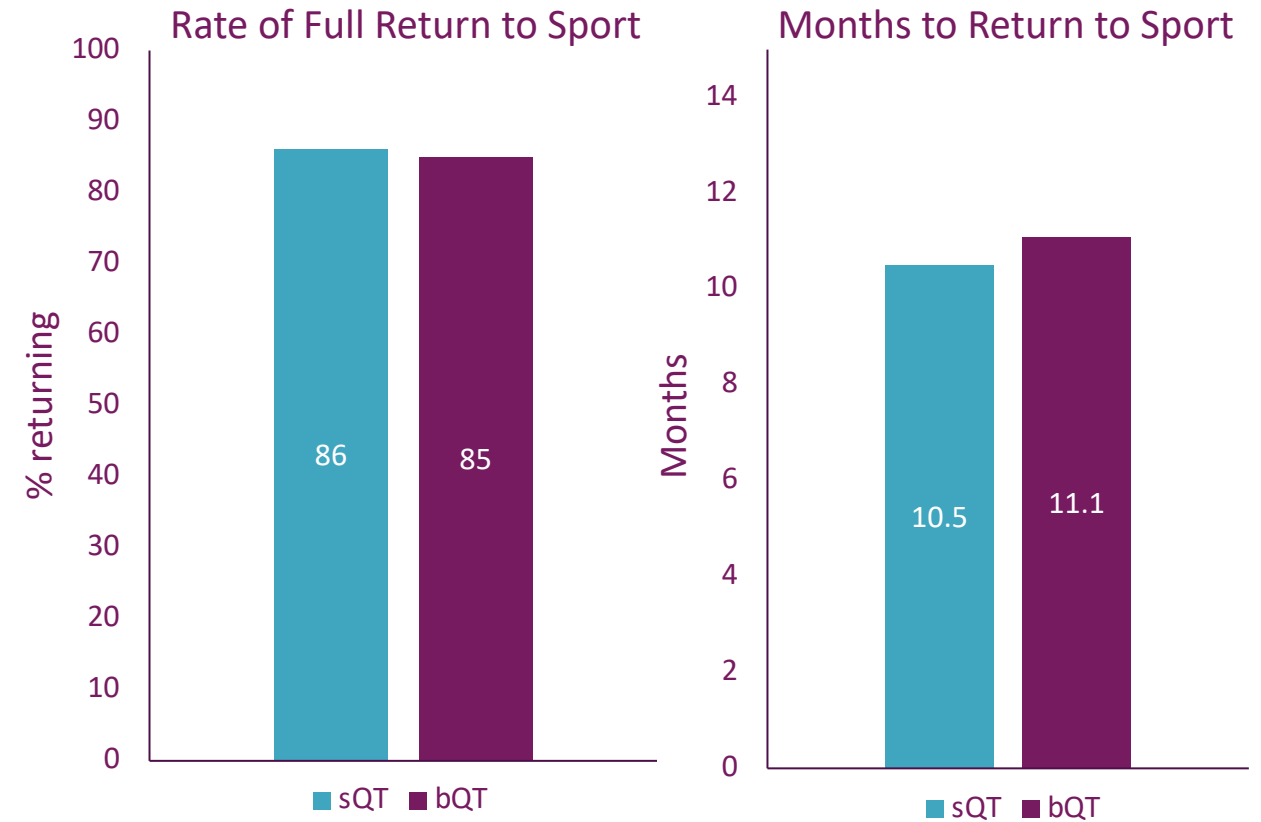


Figure 5. Percentage of patients in each cohort who were able to make a full return to sport and mean time for athletes to return

Conclusion

- No differences in clinical outcomes were detected between patients who underwent primary ACLR with sQT autograft versus bQT autograft
- Both sQT and bQT can be considered as first-line options for primary ACLR

Clinical Significance

Currently, use of sQT or bQT is largely determined by surgeon preference. This study demonstrates excellent outcomes with both preparations and supports the use of either graft type at surgeon discretion.

References

1. Perez JR, Emerson CP, Barrera CM, Greif DN, Cade WH 2nd, Kaplan LD, Baraga MG. Patient-Reported Knee Outcome Scores With Soft Tissue Quadriceps Tendon Autograft Are Similar to Bone-Patellar Tendon-Bone Autograft at Minimum 2-Year Follow-up: A Retrospective Single-Center Cohort Study in Primary Anterior Cruciate Ligament Reconstruction Surgery. *Orthop J Sports Med.* 2019;7(12).
2. Hogan DW, Burch MB, Rund JM, Geeslin DW, Ma R, Gray AF, Chu CR, Ray TE, Pullen WM, Sherman SL. No Difference in Complication Rates or Patient-Reported Outcomes Between Bone-Patella Tendon-Bone and Quadriceps Tendon Autograft for Anterior Cruciate Ligament Reconstruction. *Arthrosc Sports Med Rehabil.* 2021;4(2):e417-e424.
3. Crum RJ, Kay J, Lesniak BP, Getgood A, Musahl V, de Sa D. Bone Versus All Soft Tissue Quadriceps Tendon Autografts for Anterior Cruciate Ligament Reconstruction: A Systematic Review. *Arthroscopy.* 2021;37(3):1040-1052.
4. Sprowls GR, Robin BN [2018] The Quad Link Technique for an All-Soft-Tissue Quadriceps Graft in Minimally Invasive, All-Inside Anterior Cruciate Ligament Reconstruction. *Arthrosc Tech.* 2018;7(8):e845-e852.
5. Clinger B, Xerogeanes J, Feller J, et al. Quadriceps tendon autograft for anterior cruciate ligament reconstruction: state of the art. *J ISAKOS.* 2022;7(6):162-172.
6. Lind M, Nielsen TG, Soerensen OG, Mygind-Klavsen B, Faunø P. Quadriceps tendon grafts does not cause patients to have inferior subjective outcome after anterior cruciate ligament (ACL) reconstruction than do hamstring grafts: a 2-year prospective randomised controlled trial. *Br J Sports Med.* 2022;54(3):183-187.
7. Mayr HO, Bruder S, Hube R, Bernstein A, Suedkamp NP, Stoehr A. Single-Bundle Versus Double-Bundle Anterior Cruciate Ligament Reconstruction-5-Year Results. *Arthroscopy.* 2018;34(9):2647-2653.
8. Hughes JD, Lynch AD, Smith CN, Musahl V, Irrgang JJ. External fixation increases complications following surgical treatment of multiple ligament knee injuries. *Knee Surg Sports Traumatol Arthrosc.* 2022;30(1):161-166.