Low Revision Rate in Primary Allograft ACL Reconstruction Regardless of Allograft Type, Bone Block, and Sterilization Technique in the Masters Athlete

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Disclosures

Author	Organization
Jonathan D. Hughes	Mid-Atlantic Surgical Systems - education Smith & Nephew - education Arthrex – grant SI-BONE - travel and lodging Pylant Medical – education
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Introduction

- High failure rates in allograft ACLR in previous literature
- Allograft is used in up to 42% of primary and 80% of revision ACL reconstructions performed in the community
- Due to a better understanding of anatomic ACL reconstruction and proper patient selection in the past decade, an updated failure rate for allograft ACL reconstruction with modern indications is warranted

Purpose

- Purpose:
    - Assess the revision rate of primary allograft ACL reconstruction
    - Compare revision rate based on allograft tissue type and characteristics

- Hypothesis:
    - Lower revision rate compared to previous literature
    - No differences in revision rate based on the allograft type or graft characteristics

Methods

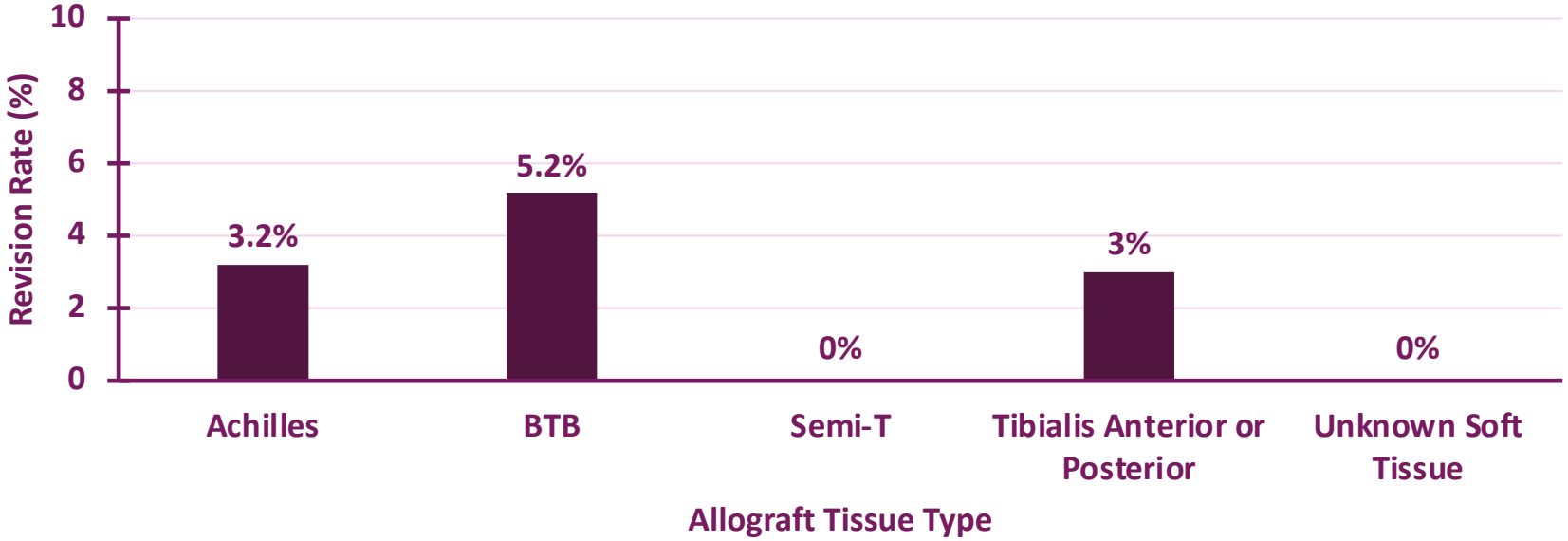
- Retrospective cohort study:
    - Primary allograft ACL reconstructions from an academic institution between 2015-2019 with minimum two-year follow-up
    - High volume surgeon practice only
    - Exclusion criteria: absent surgical or allograft type data

- **Primary outcome: revision**
- Other variables collected: demographics, operative details, subsequent surgical procedures, allograft details (tissue type, bone block, donor age, irradiation, duration/intensity, chemical cleaning process)

Results

Variable	Achilles (n=95)	BTB (n=58)	Semitendinosus (n=46)	Tibialis Anterior or Posterior (n=162)	Unspecified Soft Tissue (n=57)	P-value
Females, n (%)	40 (42)	20 (34)	23 (50)	80 (49)	30 (53)	0.22
Age (years)	38 ± 13	40 ± 11	42 ± 10	38 ± 11	39 ±12	0.22
BMI (kg/m^2)	30 ± 8	29 ± 5	29 ± 5	30 ± 6	33 ± 17	0.20
Graft Donor Age (years)	**42 ± 19 (n=39)**	**33 ± 14 (n=31)**	**55 ± 11 (n=38)**	**47 ± 16 (n=96)**	**45 ± 11 (n=11)**	**<0.001**
Revision, n (%)	3 (3)	3 (5)	0 (0)	5 (3)	0 (0)	0.35

Results

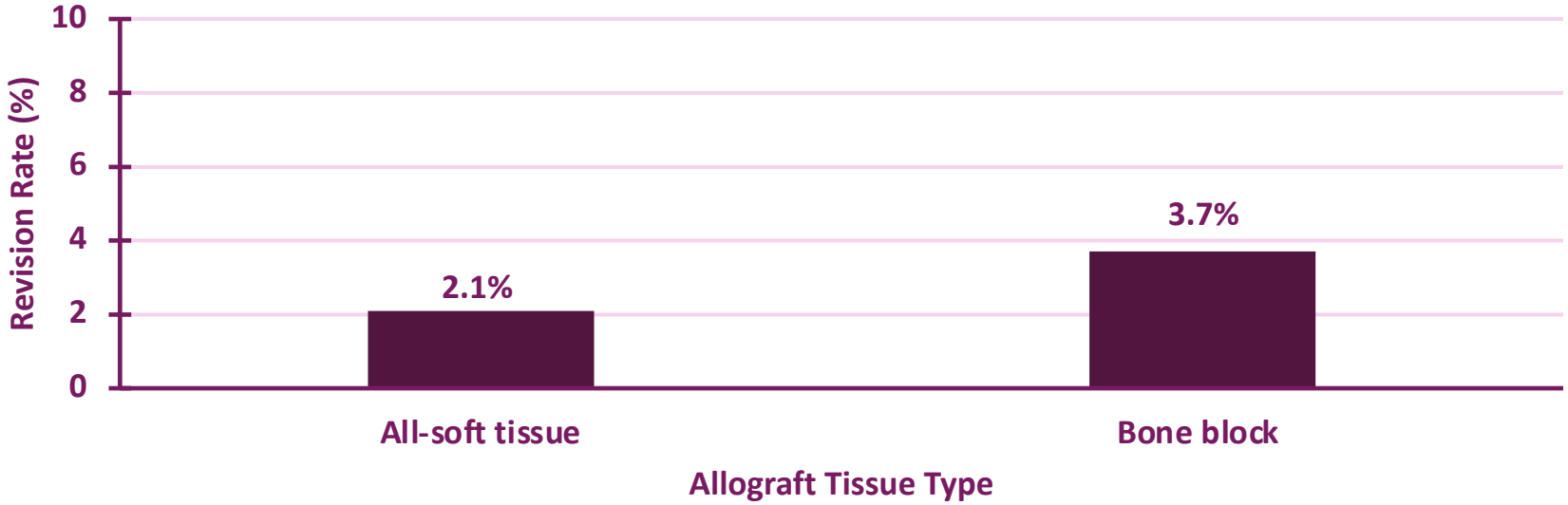


Overall revision rate was 3%.
No difference in revision rate by allograft type (p=0.38).

Results *(Cont'd)*

Variable	Bone Block (n=135)	All-Soft Tissue (n=283)	P-value
Females, n (%)	49 (36)	144 (51)	0.01
Age (years)	39 ± 12	39 ± 11	0.74
BMI (kg/m²)	30 ± 7	30 ± 9	0.44
Graft Donor Age (years)	**38 ± 17 (n=64)**	**48 ± 15 (n=151)**	**<0.001**
Revision, n (%)	5 (4)	6 (2)	0.34

Results *(Cont'd)*



No difference in revision rate by all-soft tissue vs bone block (p=0.34).

Results *(Cont'd)*

Variable	Bone block (Revised, n=2)	Bone block (Non-revised, n=29)	*P*
Donor age	22	33	0.23
Irradiation time	96	92	1.00
Irradiation intensity	33%	35% (n=28)	1.00

Among bone block, no association between revision rate and patient age, graft donor age, or irradiation time.

Conclusion

- Allograft tissue type, bone block versus all-soft tissue allograft, and sterilization technique had similar low (0-6%) revision rates for primary ACL reconstruction

- Low revision rate suggests specific graft tissue type is not critical factor in graft failure
    - Encouraging for the use of allograft with modern indications, tissue processing, and surgical techniques

- Surgeons may consider appropriately processed allograft tissue with or without bone block when indicating ACL reconstruction in the masters athlete
    - Masters athlete defined as patients aged 35-40 and above

References

1. Condello V, Zdanowicz U, Di Matteo B, et al. Allograft tendons are a safe and effective option for revision ACL reconstruction: a clinical review. Knee Surg Sports Traumatol Arthrosc. 2019;27(6):1771-1781.
2. Noh JH, Yang BG, Yi SR, Roh YH, Lee JS. Single-bundle anterior cruciate ligament reconstruction in active young men using bone-tendon achilles allograft versus free tendon achilles allograft. Arthroscopy. 2013;29(3):507-513
3. Tisherman R, Wilson K, Horvath A, Byrne K, De Groot J, Musahl V. Allograft for knee ligament surgery: an American perspective. Knee Surg Sports Traumatol Arthrosc. 2019;27(6):1882-1890.
4. Kaeding CC, Aros B, Pedroza A, et al. Allograft versus autograft anterior cruciate ligament reconstruction: predictors of failure from a MOON prospective longitudinal cohort. Sports Health. 2011;3(1):73-81.
5. Kraeutler MJ, Bravman JT, McCarty EC. Bone–patellar tendon–bone autograft versus allograft in outcomes of anterior cruciate ligament reconstruction: a meta-analysis of 5182 patients. Am J Sports Med. 2013;41(10):2439-2448.
6. Ellis HB, Matheny LM, Briggs KK, Pennock AT, Steadman JR. Outcomes and revision rate after bone–patellar tendon–bone allograft versus autograft anterior cruciate ligament reconstruction in patients aged 18 years or younger with closed physes. Arthroscopy. 2012;28(12):1819-1825
7. Hulet C, Sonnery-Cottet B, Stevenson C, et al. The use of allograft tendons in primary ACL reconstruction. Knee Surg Sports Traumatol Arthrosc. 2019;27(6):1754-1770