Both Six And Eight-Strand Hamstring Tendon Autografts Produce Adequate Graft Dimensions And Functional Outcomes Following Anterior Cruciate Ligament Reconstruction: A Systematic Review

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Introduction

- Hamstring tendon (HT) autografts are a popular choice for primary anterior cruciate ligament reconstruction (ACLR)[1]
- However, traditional four-strand HT autografts have been associated with unpredictable graft diameters (<8 mm) which can reduce tensile strength and increase failure risk[1]
- Increasing the number of autograft strands to either six or eight (6SHG or 8SHG) has been explored as method to reliably enlarge the intraoperative graft diameter[2]
- To date, no systematic reviews have been conducted assess the graft diameters and post-operative outcomes for 6SHG and 8SHG ACLR

Objectives

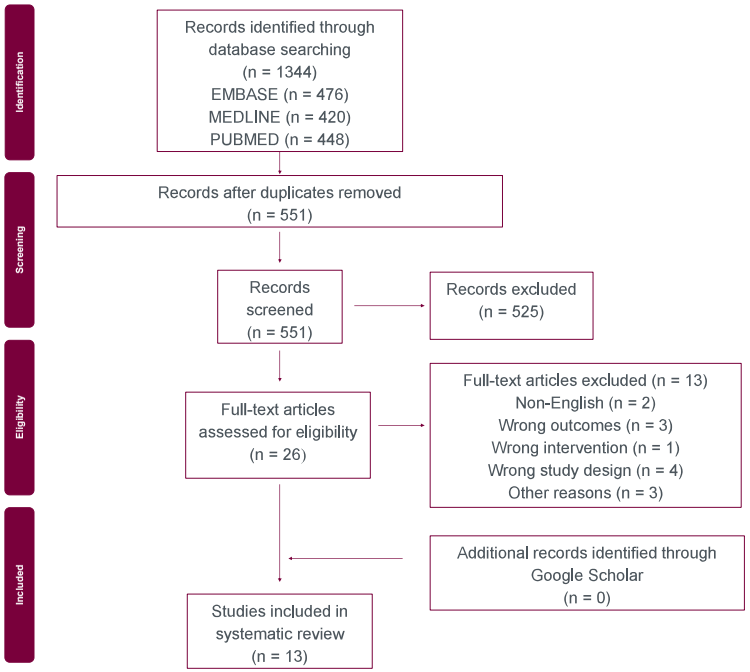
- To summarize graft dimensions, failure and return-to-sport (RTS) rates, and patient-reported outcome measures (PROMs) following ACLR with 6SHG and 8SHG

Methods

- Three online databases (MEDLINE, PubMed, and Embase) were searched from inception to February 12th, 2024
- Inclusion criteria: English studies, human studies, level of evidence I to IV, patients undergoing ACLR with 6SHG or 8SHG
- Data on demographics, objective clinical outcomes, and PROMs (International Knee Documentation Committee (IKDC), Lysholm, and Tegner) were extracted

Results

- Following abstract/title and full-text screening, 13 studies were identified to meet the inclusion criteria (1103 patients)
- Included studies constituted two case series (level IV evidence), five retrospective cohort studies (level III evidence), one case-control study (level III evidence), one lesser-quality randomized controlled trials (RCTs) (level III evidence), and three higher-quality RCTs (level I evidence)
- Agreement was considerable during title/abstract screening ($k = 0.884$) and near-perfect during full-text screening ($k = 0.920$)



Results Continued

- 512 patients received 6SHG: 424 tripled semitendinosus + gracilis (3ST + 3GT), 65 doubled semitendinosus + gracilis with allograft supplementation (6STGAllo), and 23 quadrupled semitendinosus + doubled gracilis (4ST + 2GT)
- 507 patients received 8SHG: quadrupled semitendinosus + gracilis (4ST + 4GT)
- Graft diameter: 3ST + 3GT (range: 7.5-9.0 mm), 6STGAllo (mean: 9.2 mm), 4ST + 2GT (mean: 8.0 mm), 4ST + 4GT (range: 9.1-9.9 mm)
- Graft length: 6SHG (mean: 60.0-83.3 mm)
- Failure rate: 6SHG (7.1%, mean follow-up 39.8 months), 8SHG (3.9%, mean follow-up 99.7 months), overall (4.8%, mean follow-up 78.0 months)
- RTS: 6SHG (84.8%, mean follow-up 36.4 months), 8SHG (37.3% preinjury level, mean follow-up 99.7 months), overall (75.9%, mean follow-up 90.5 months)
- PROMs: IKDC (pooled mean for 6SHG + 8SHG: 88.4, mean follow-up 90.0 months), Lysholm (pooled mean for 6SHG + 8SHG: 91.7, mean follow-up 90.0 months), Tegner (pooled mean for 6SHG + 8SHG: 6.9m mean follow-up 66.7 months)

Discussion & Conclusion

- The most important finding of this systematic review was that mean intraoperative graft diameters for both 6SHG and 8SHG exceeded 8 mm, an established threshold for reducing graft failure
- Overall graft failure rate was 4.1%, which is comparable if not superior to previously published failure rates for traditional HT ACLR[3]
- Post-ACLR IKDC and Lysholm scores for both 6SHG and 8SHG exceeded published thresholds for the patient-acceptable symptom state, suggesting adequate patient satisfaction[4,5]
- Limitations of this review were a limited number of included studies (13), limited study quality (only four studies were level I/II evidence), lack of prospective studies, and significant lack of data on vulnerable populations such as skeletally-immature patients
- This review advocates for the consideration of long-term, prospective cohort studies or RCTs comparing 6SHG and 8SHG with other graft constructs across a variety of patient populations

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Relevant Disclosures

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