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Primary ACL Reconstruction with Quadriceps Tendon Graft in Females has Good Functional Outcomes and Similar Re-tear Rates as Males: A Systematic Review and Meta-Analysis

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Faculty Disclosure Information

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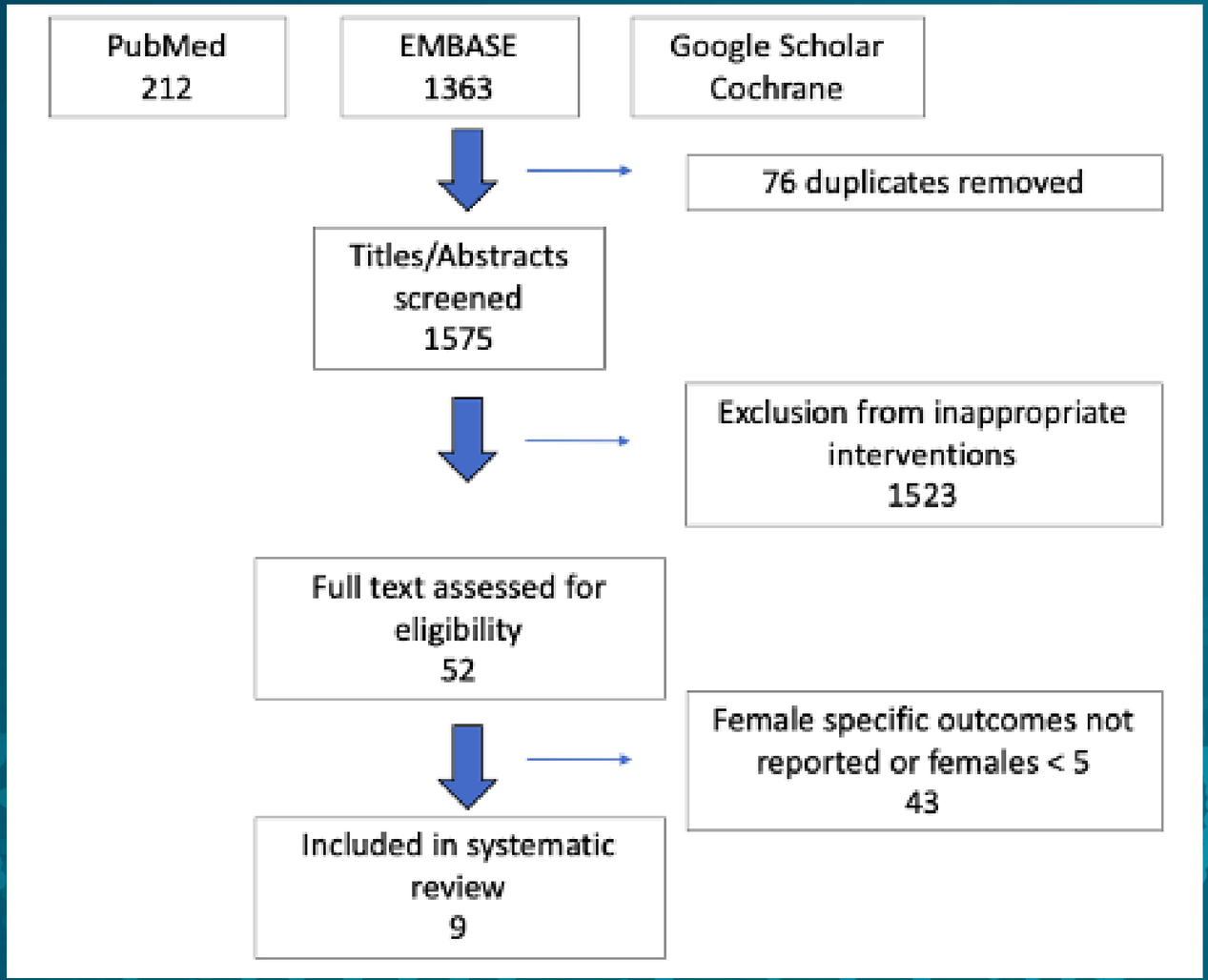
Introduction

- Females are at a higher risk of ACL injury, and poorer outcomes after ACL reconstruction compared to males
- Following recognition of sex-specific differences, there is recent emphasis on improving ACL outcomes in female patients
- Current evidence based on data from hamstring and BPTB grafts
- Quadriceps tendon ACL reconstruction gaining popularity – ‘graft of the future’ but limited data reporting in females

Methods

- Literature search undertaken as per PRISMA guidelines on PubMed, EMBASE, Cochrane and Google Scholar
- Studies reporting gender specific outcomes with primary quadriceps ACL reconstruction in females (age > 14 years) included
- Revision ACL data, non gender-specific data excluded
- Data collected:
  - PROMS – Lysholm, Tegner score, IKDC score, ACL-RSI scale
  - Objective functional outcomes – instrumented laxity, extension loss, quadriceps strength LSI, return to sport
  - Complications – Graft failures/retears, contralateral ACL tears
- Meta-analysis performed to compare outcomes with males where data available

PRISMA flowchart



Results

- 1523 abstracts screened, 52 full-text studies analysed, 9 studies included in the review
- A total of 714 primary QT ACLRs in females with a mean age of 22.9 (14-58) years
- Mean follow-up 38.9 months (6-139 months)
- Cumulative graft failure rate 7.4% (n – 379)
- Contralateral ACL tear rate 9.1% (n -283)

Outcomes in females

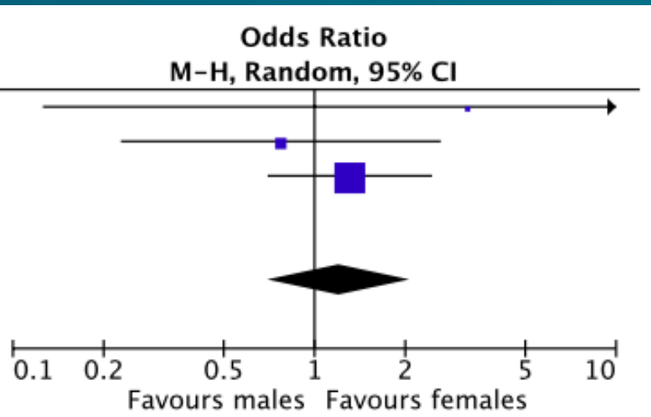
Parameter (n)	Follow-up range (months)	Pooled Mean (range)
IKDC (58)	24-53	89.5 (88.8-91.6)
Lysholm (134)	24	85.4 (82-92.9)
Tegner (129)	24-53	6.09 (5.7-8.2)
ACL-RSI (98)	9-24	67.1 (65.3-69.5)
Extension loss (193)	24-58.3	0.07 (-0.22-0.58)
Quadriceps Strength LSI (266)	6-24	6m - 63.9% 24m – 88.3%
Instrumented laxity (201)	6-24	6m – 0.96mm (0-5) 24m – 1mm (0-3.5)
Return to Sport (229)	24-139	82% (71.4-82.7%)

Meta-analysis of Retear Rates – Males vs Females

Study or Subgroup	Males Events	Males Total	Females Events	Females Total	Weight	Odds Ratio M-H, Random, 95% CI
Ebert et al	1	28	0	29	2.9%	3.22 [0.13, 82.38]
Geib et al	5	102	6	96	20.3%	0.77 [0.23, 2.62]
Petit et al	22	174	22	221	76.8%	1.31 [0.70, 2.45]
Renfree et al	0	13	0	19		Not estimable
Total (95% CI)		**317**		**365**	**100.0%**	**1.21 [0.70, 2.09]**
Total events	28		28			

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 0.93$, df = 2 (P = 0.63); $I^2 = 0\%$

Test for overall effect: Z = 0.67 (P = 0.50)



Comparison of Outcomes with Males

- No difference in failure rates, return to sport or instrumented laxity testing
- 24-month Tegner activity score lower in females (p = 0.0007) but IKDC and Lysholm similar
- 6-month Quadriceps strength LSI lower in females (p – 0.0001)

Conclusions

- Primary QT ACLR in females shows retear and return to sport rates as males
- However, suggestion of lower functional scores and slower quadriceps strength recovery
- Lack of gender-specific data reporting
- Future studies should report female-specific data with different graft types

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