Physeal sparing ACL reconstruction has equivalent survivorship and functional outcomes as transphyseal reconstruction but does not prevent growth disturbance: a systematic review of clinical and radiological outcomes

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ISAKOS CONGRESS 2025 | MUNICH GERMANY June 8–11

Disclosures / COI

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- Speaker for Medacta, Smith & Nephew, Arthrex
- Paid Consultant for Smith & Nephew
- Support received from Smith & Nephew, Arthrex
- Board of Directors member for Australian Orthopaedic Association

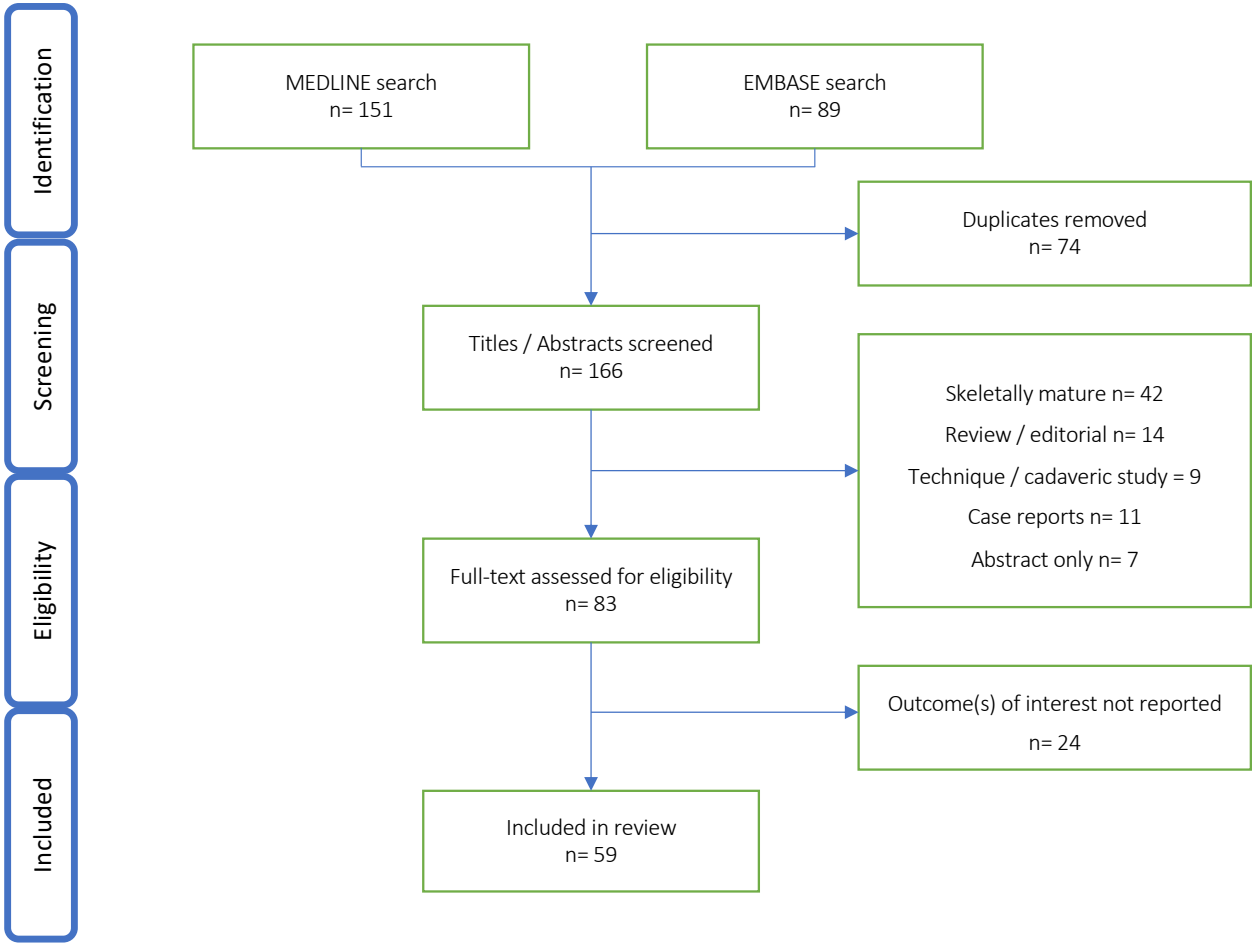
Background

- Surgical management of ACL deficiency in children is complex due to risk of physis injury and growth disturbance.
- Transphyseal and physis-sparing techniques have good outcomes but there are very few comparative studies.
- This review aimed to compare functional and radiological outcomes of transphyseal (TP) and physis-sparing (PS) techniques.

Methods

- Online databases MEDLINE and Embase were reviewed on 3rd September 2024 according to PRISMA guidelines.
- Clinical studies reporting functional outcomes and/or growth disturbance were included. Studies reporting on combined or hybrid/partial TP techniques were excluded.
- Leg length discrepancy (LLD) was defined as >10mm and angular deformity (AD) as >5° difference.
- P-value < 0.05 was considered statistically significant.

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram



Results

Fig 1a: All-epiphyseal

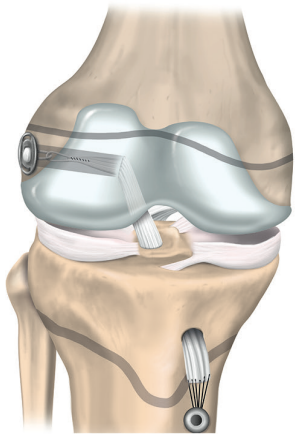


Fig 1b: Extra-physeal

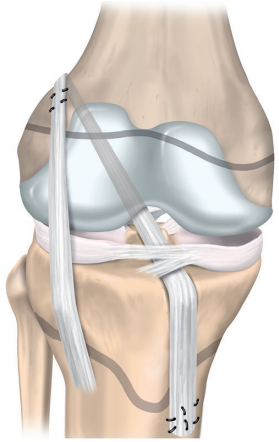


Fig 2: Trans-physeal

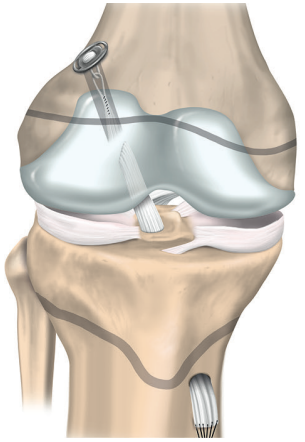
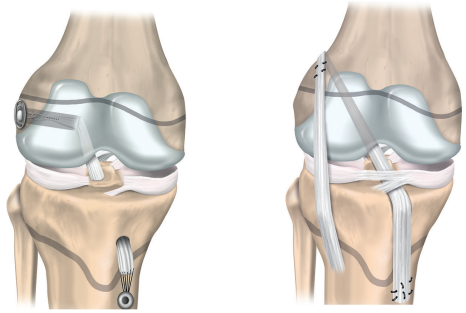
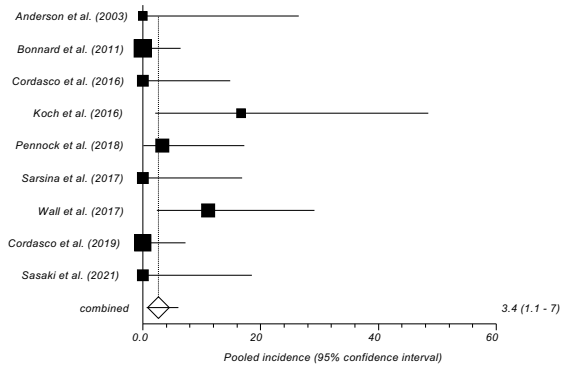


	Fig 1a: All-epiphyseal + Fig 1b: Extra-physeal	Fig 2: Trans-physeal
Number of studies identified (case series + comparative studies)	11 + 5	37 + 5
Total number of patients (n=)	1312	3057
Mean follow-up	3 years	4.4 years
Mean age	12 years	13.4 years *
Leg length discrepancy	3.4%	1.3%*
Angular deformity	1.8%	1.5%
Mean Lysholm scores	93 - 100	84.6 - 98.8
Mean IKDC scores	94 - 96.5	83.3 - 95.4
Graft rupture rate	8.1%	6%

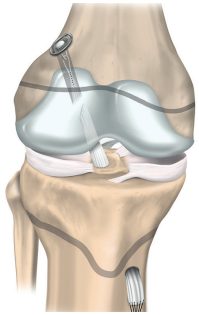
*Significant difference

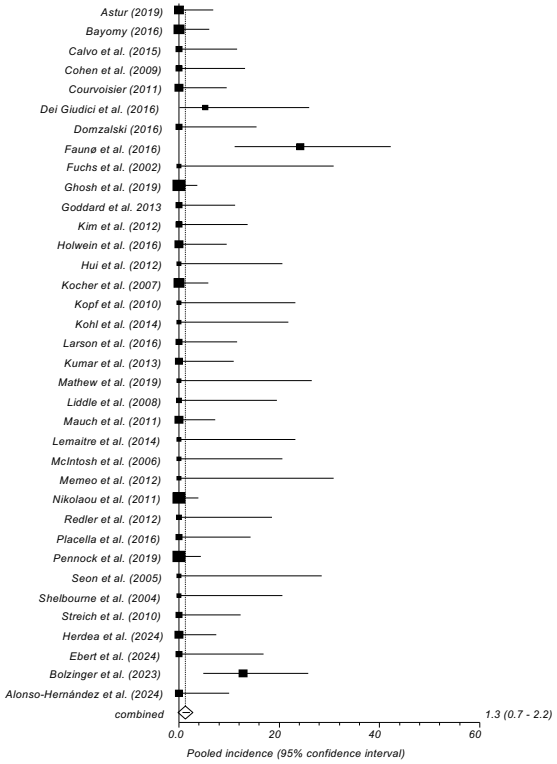
Physeal-sparing reconstruction





Transphyseal reconstruction

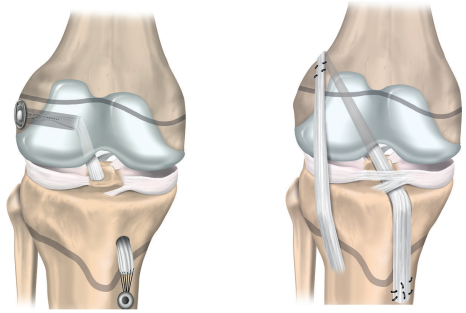


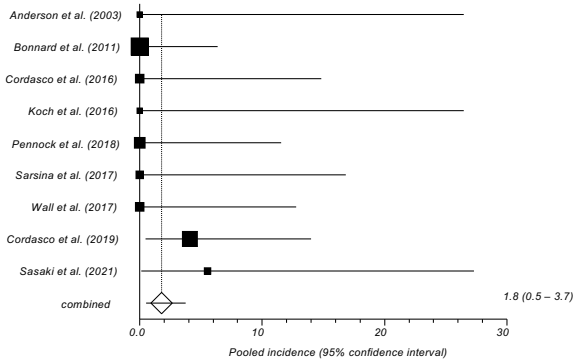


Incidence of Leg Length Discrepancy (>1cm)

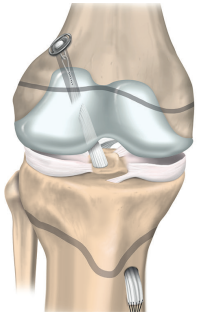
3.4% vs 1.3%

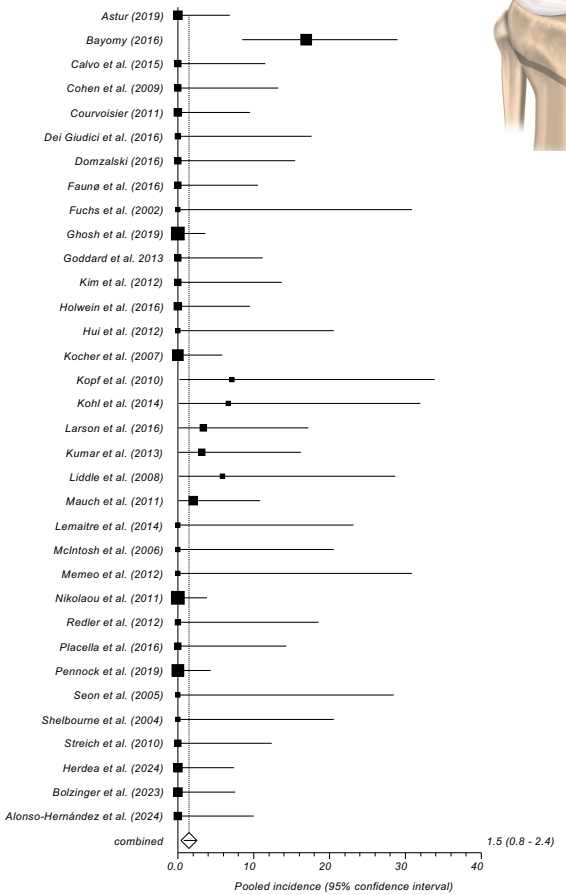
Physeal-sparing reconstruction





Transphyseal reconstruction

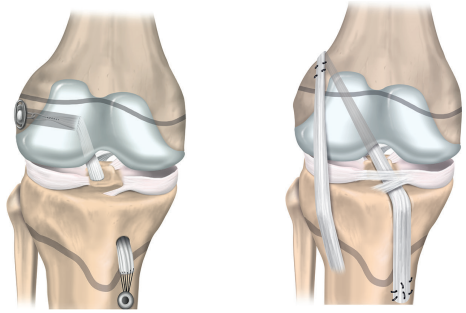


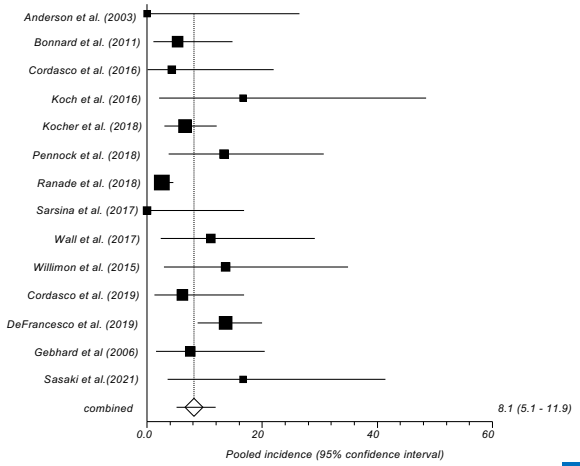


Incidence of Angular Deformities

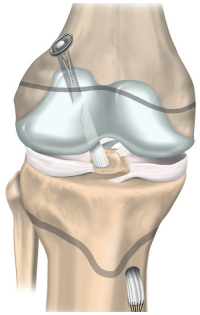
1.8 % vs 1.5%

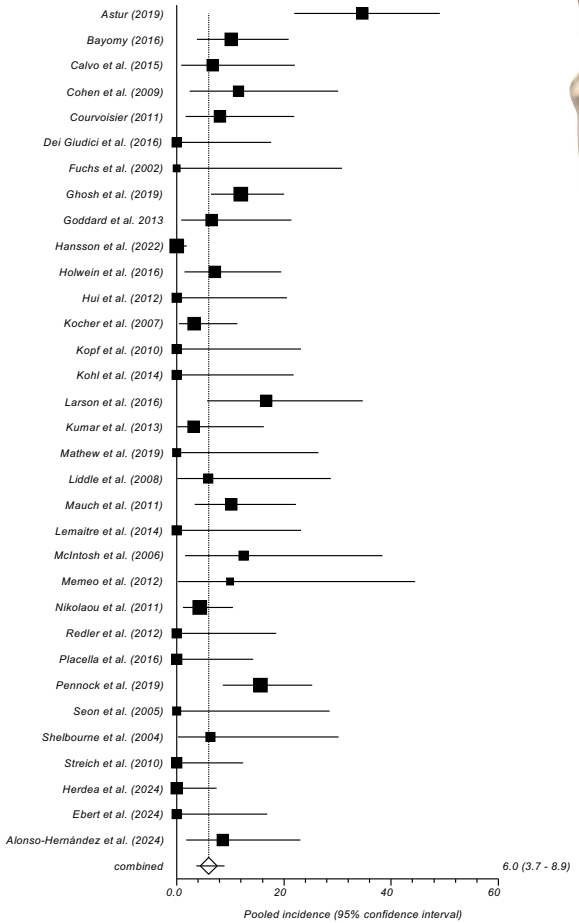
Physeal-sparing reconstruction





Transphyseal reconstruction





Incidence of graft rupture

8.1 % vs 6%

Conclusions

- Both transphyseal and physeal-sparing reconstruction techniques result in similar patient reported outcomes
- No significant differences in risk of limb-length discrepancy, angular deformity, or graft rupture rates.
- Patients who undergo physeal-sparing reconstruction are generally younger, thus more susceptible to growth-related complications post-surgery.
- Larger comparative studies with age-matched cohorts are required to investigate further.