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Factors Contributing to Graft Tendon Maturity in Anatomic Double Bundle ACL Reconstruction of the Knee

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Faculty Disclosure Information

- Nothing to disclosure



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Purpose

- To evaluate factors influencing graft maturation using MRI after anatomic double-bundle ACL reconstruction.



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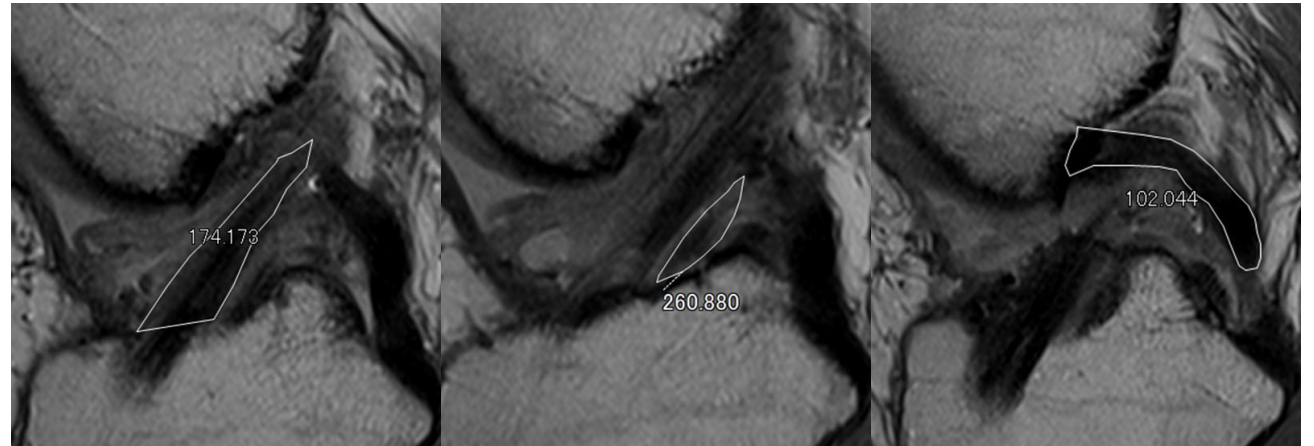


Subjects

- • **Period: Jan 2016 – Dec 2022**
- • **Total: 83 knees (46 male, 37 female)**
- • **Average age: 28.1 years (range 14–59)**
- • **Mean BMI: 23.1 (range 19.8–29.4)**
- • **MRI performed at 12 months post-op**

Methods

- • **Signal Intensity Ratio (SIR) measured on proton-weighted MRI for AMB and PLB**
- • **ROI analysis for SI of graft vs PCL**



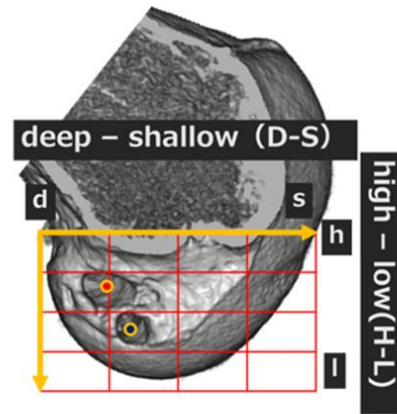
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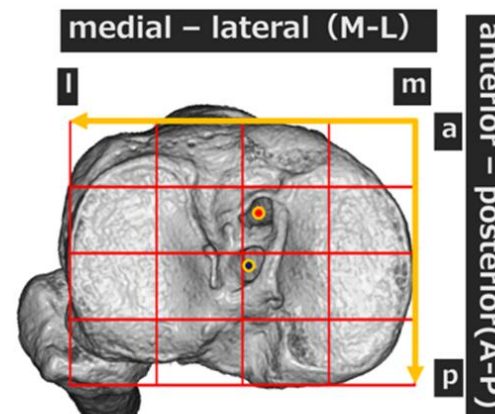
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Methods

- CT at 2 weeks post-op for tunnel position:
- - Femoral: Bernard method
- - Tibial: Forsythe method



(Bernard M, et al. J. Knee Surg. 1997)



(Forsythe B, et al. JBJS.2010)

- Additional: Gender, Age, KneeLax3 anterior laxity



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Results – Laxity

- No significant correlation with age, gender, or anterior laxity ($\geq 3\text{mm}$ vs $< 3\text{mm}$)

	$\geq 3\text{mm}$	$< 3\text{mm}$	p
AMB	1.37 ± 0.46	1.45 ± 0.63	0.70
PLB	1.69 ± 0.46	1.63 ± 0.36	0.74

*p < 0.05
Student's t test



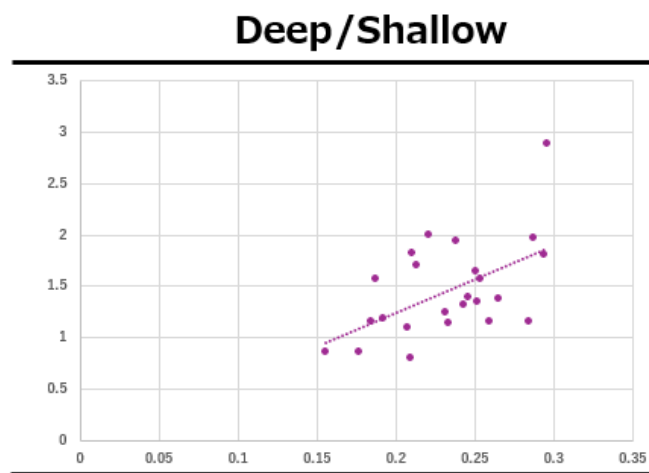
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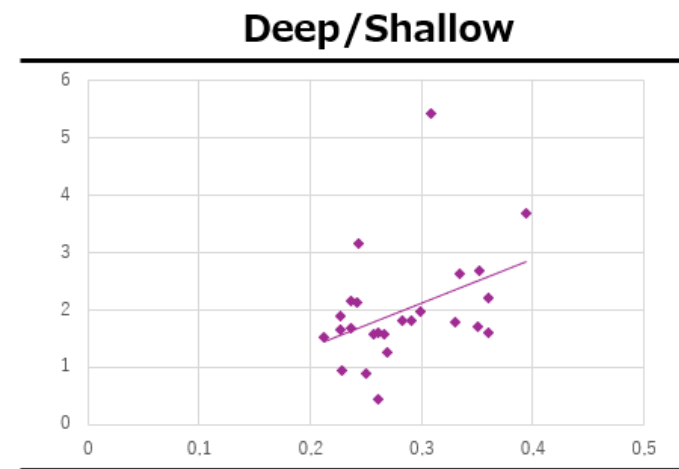
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Results – Femoral Tunnel

- **Shallow tunnel placement correlated with higher SIR**
- - AMB: $R = 0.472$, $p = 0.024$
- - PLB: $R = 0.401$, $p = 0.049$



$R=0.472$
 $p=0.024$



$R=0.401$
 $p=0.049$



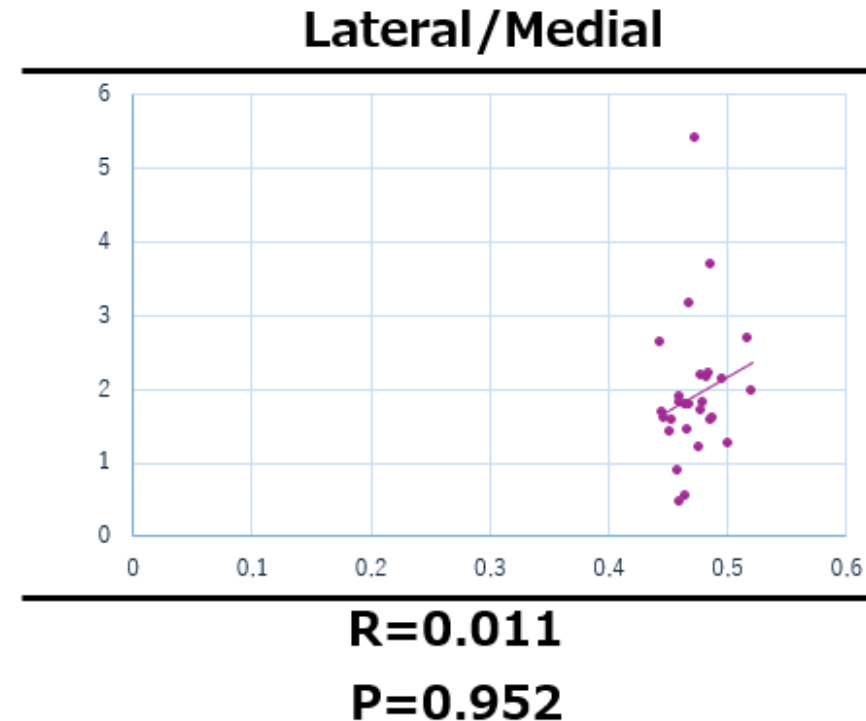
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Results – Tibial Tunnel

- • No significant correlation between tibial tunnel position and SIR
- • Trend: Higher SIR when PLB placed laterally



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Discussion – Femoral Side

- • Shallow AMB/PLB → Higher SIR, delayed maturation
- • Excessively low AMB may not replicate normal ACL

Chiba et al. KSSTA 2021

Laxity

- • No correlation between MRI signal intensity and anterior laxity

Yamaura et al. Knee 2008



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Conclusion

- • Anterior femoral tunnel placement → Lower graft maturity
- • Tibial tunnel: No clear association
- • No correlation with postoperative laxity
- • Femoral tunnel should avoid shallow/anterior locations



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