

Physeal-sparing ACL Reconstruction Provides Better Initial Joint Stability and Function than Complete Transphyseal ACL Reconstruction in an Early Adolescent Porcine Model

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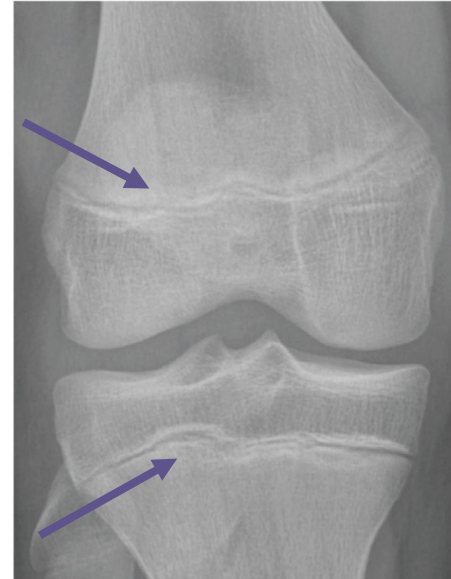
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Faculty Disclosure Information

- Nothing to disclose

Pediatric ACL injuries

- Pediatric anterior cruciate ligament (ACL) injuries increasing^{1,2,3}
- Operative ACL reconstruction now favored for pediatric injury²
- Growth disturbance due to surgery^{4,5}
 - Angular deformity
 - Limb-length discrepancy
 - Early closure of physis



Open physis⁶



Valgus deformity⁴

Surgical techniques

[7]



**Modified
MacIntosh**



**Physeal-
sparing**



**Partial
transphyseal**



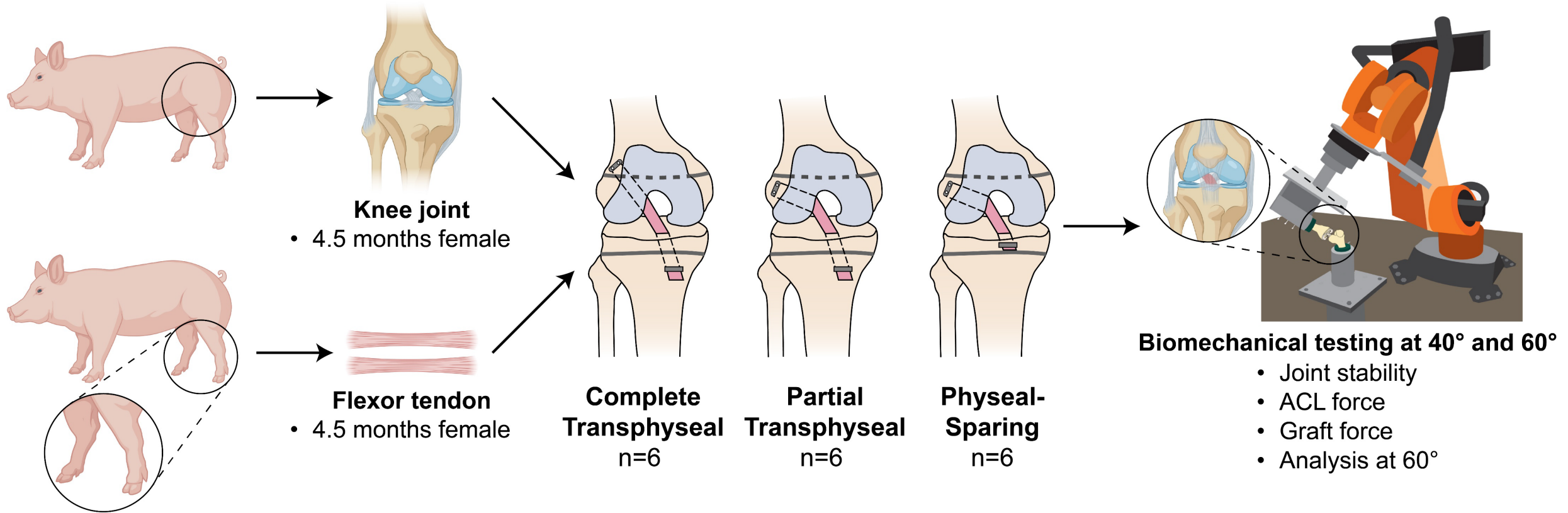
**Complete
transphyseal**

- All techniques have been widely used among patients 10 to 14 years old
- Preference associated with surgeon's fellowship training

Objective

Investigate and compare the initial joint **stability and function** following **complete transphyseal, partial transphyseal, and physeal-sparing** ACL reconstruction in the early adolescent (4.5 months) porcine model

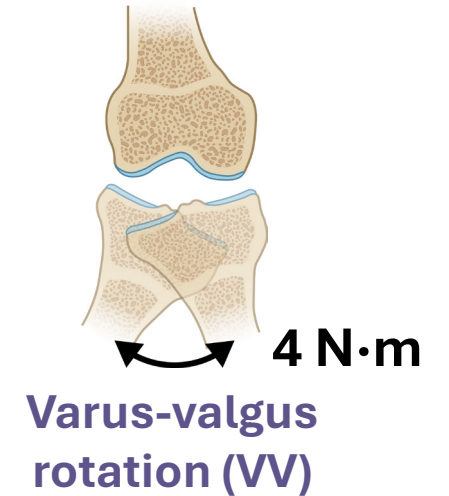
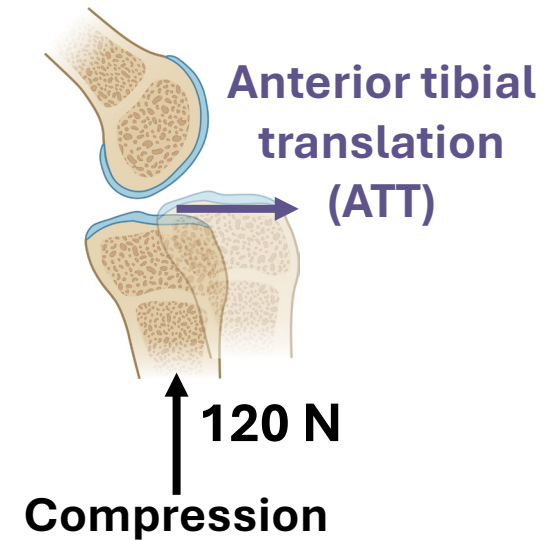
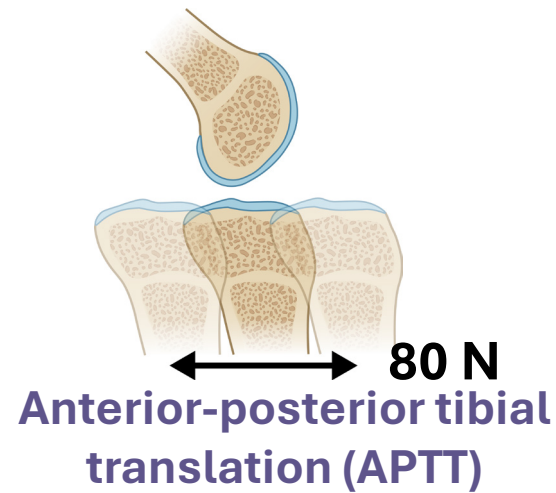
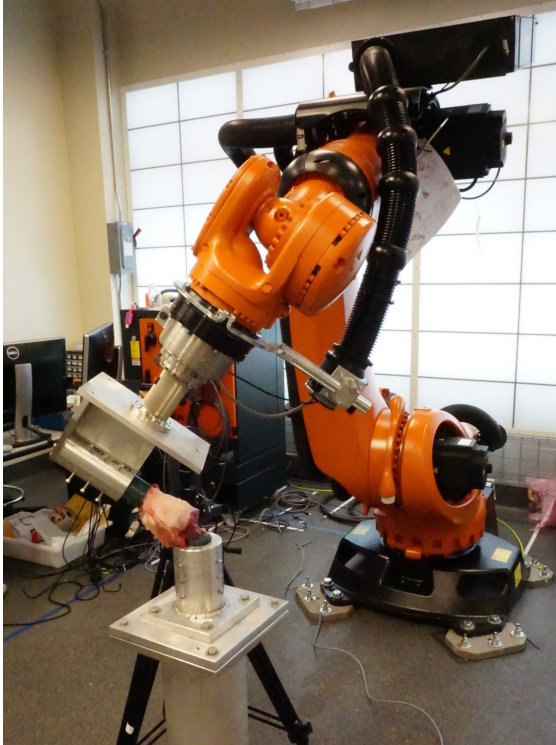
Methods



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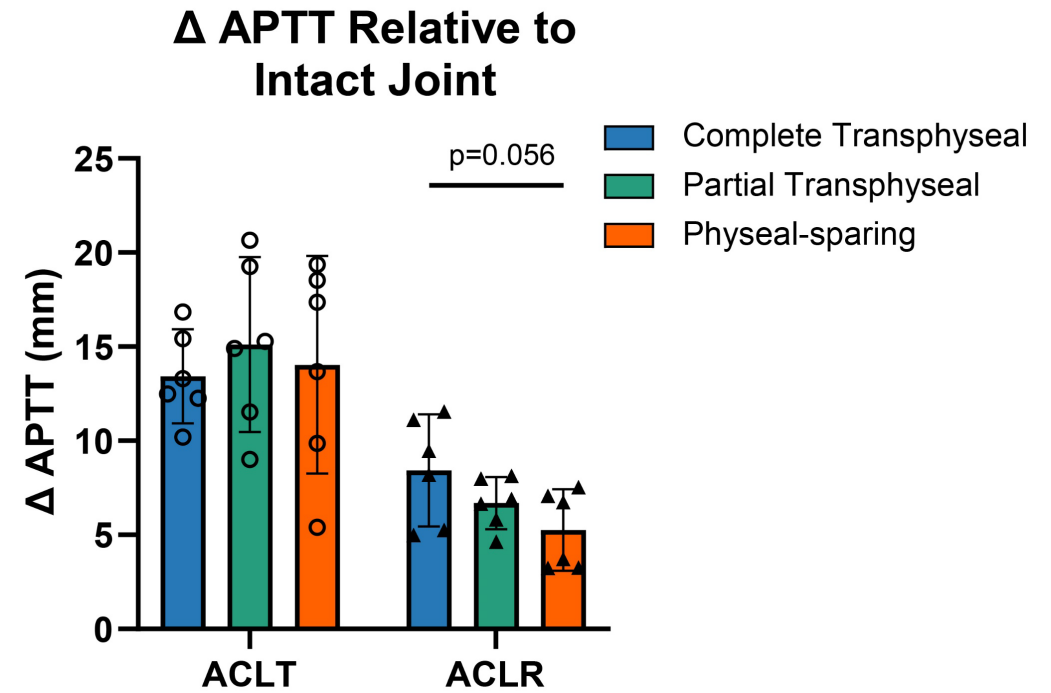
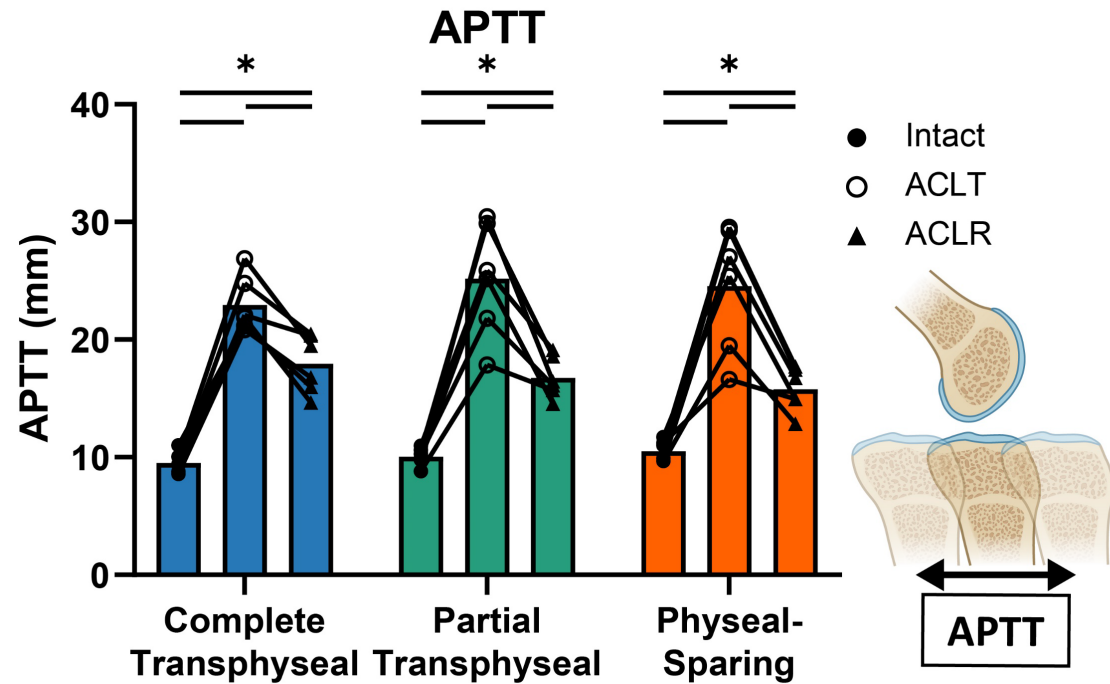
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Robotic testing to measure joint biomechanics



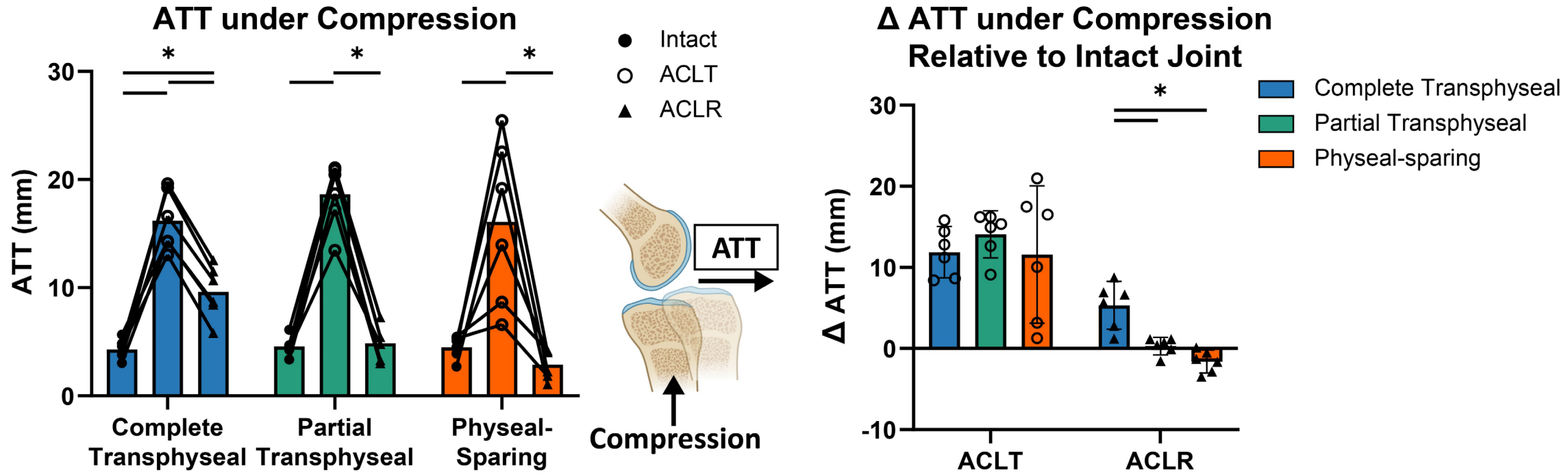
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Slightly better anterior stability following physeal-sparing



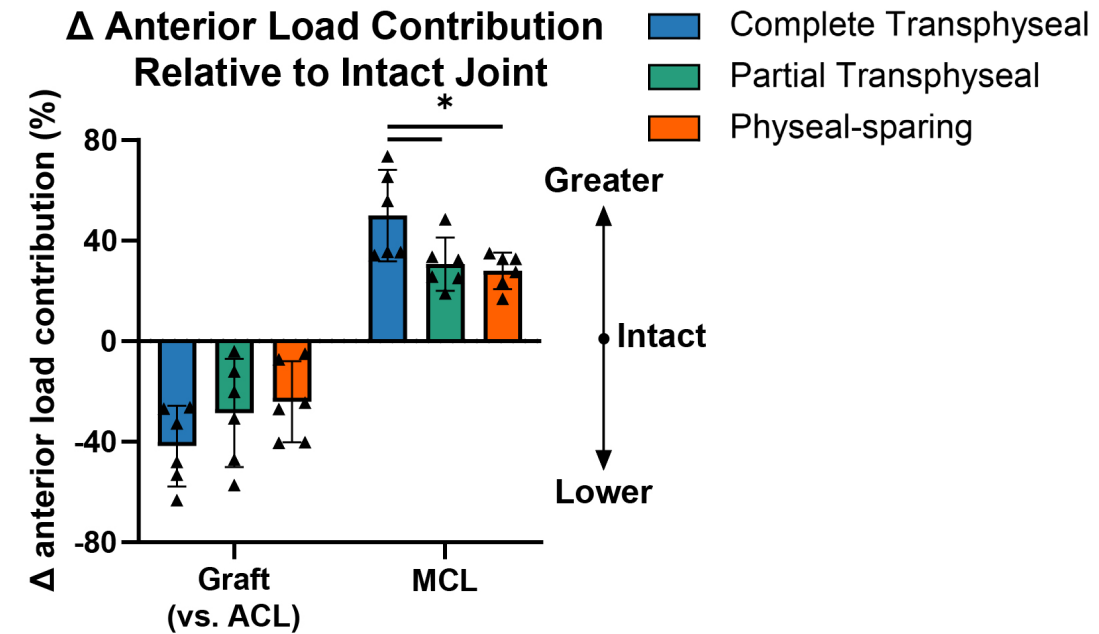
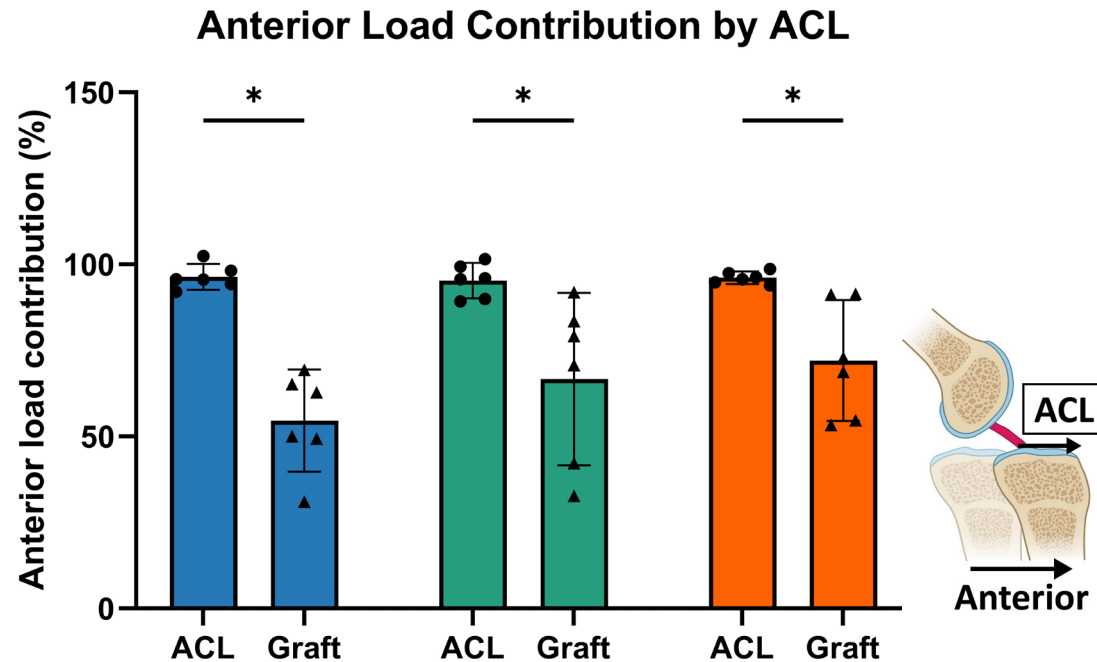
* p<0.05

Better anterior stability under compression following partial transphyseal and physeal-sparing



* $p < 0.05$

Higher anterior contribution in MCL following complete transphyseal technique



* $p < 0.05$



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Conclusion

- Partial transphyseal and physeal-sparing showed better ability to restore initial joint stability in early adolescent porcine joints
- Greater shift in anterior force to MCL rather than reconstructed ACL graft following complete transphyseal technique

Discussion

- Better anterior stability for less vertical femoral tunnel^{8,9}
 - Partial transphyseal and physeal-sparing
- Limitations
 - IT band techniques not included: hard access from porcine hindlimbs
 - A larger sample size may reveal additional statistical differences
- Future directions
 - Compare techniques in juvenile (1.5 months) porcine joints
 - In vivo work to compare the long-term degenerative outcomes

References

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