A Flat Posterior Cruciate Ligament Reconstruction with a Rectangular Femoral Tunnel Restores Native Knee Kinematics - A Biomechanical Robotic Study

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Conflicts of interest

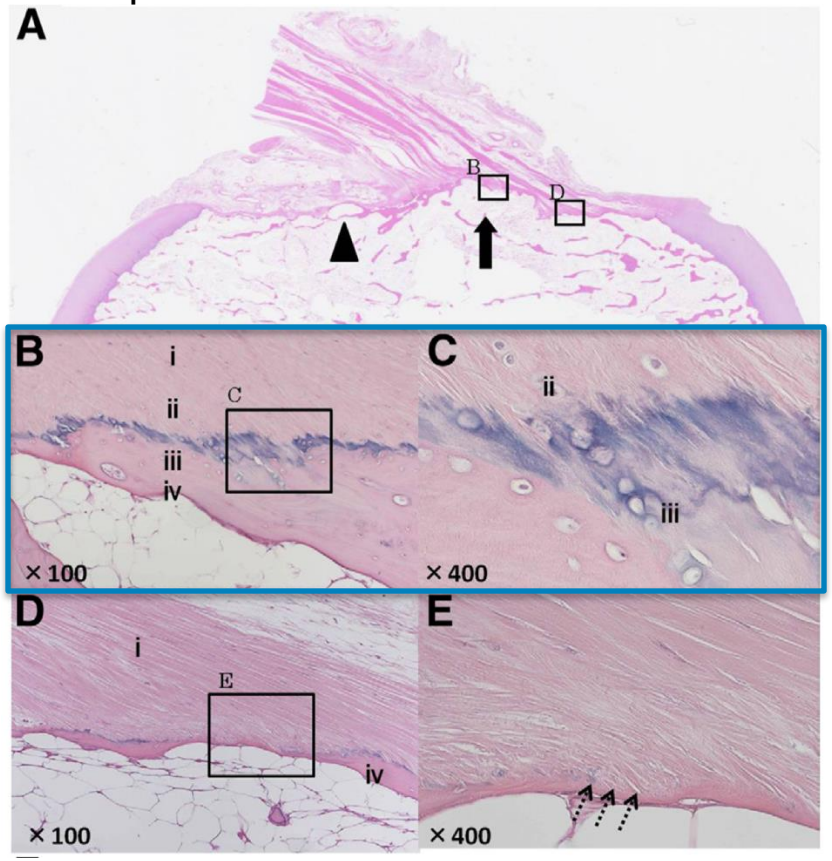
The authors declare no conflict of interest.

Introduction – The ACL is flat – Maybee also the PCL

Flat ACL anatomy

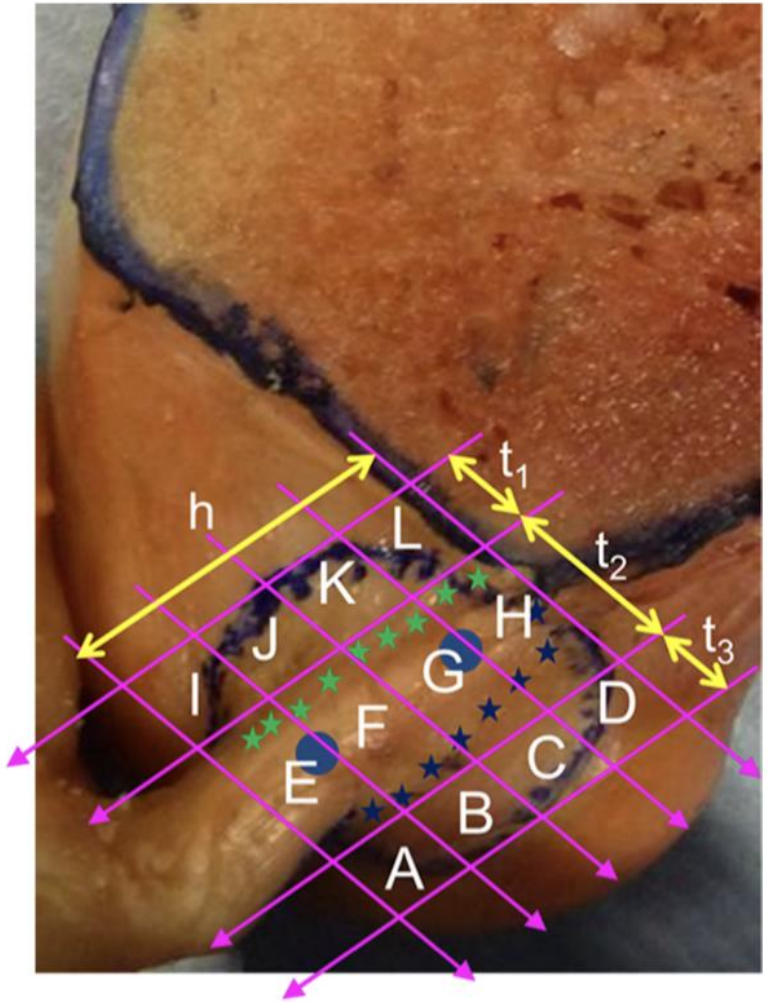
Smigielski et al. BJJ 2016

Corresponds to **“direct fiber”** insertions



Sasaki et al. Arthroscopy 2012

Biomechanically most important

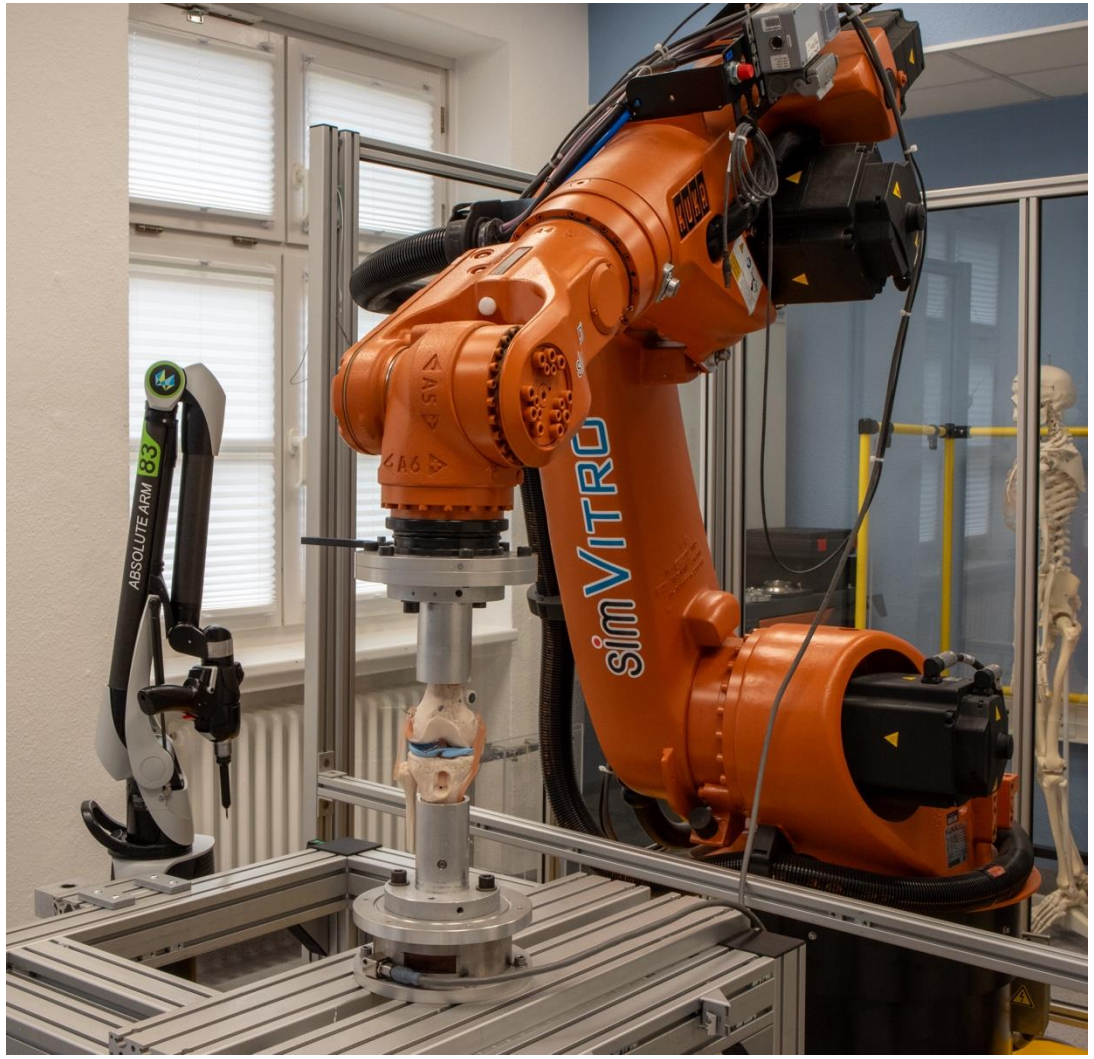


Kawaguchi et al. Arthroscopy 2015

The purpose of this study was to evaluate a flat single-bundle PCL reconstruction utilizing rectangular femoral bone tunnels

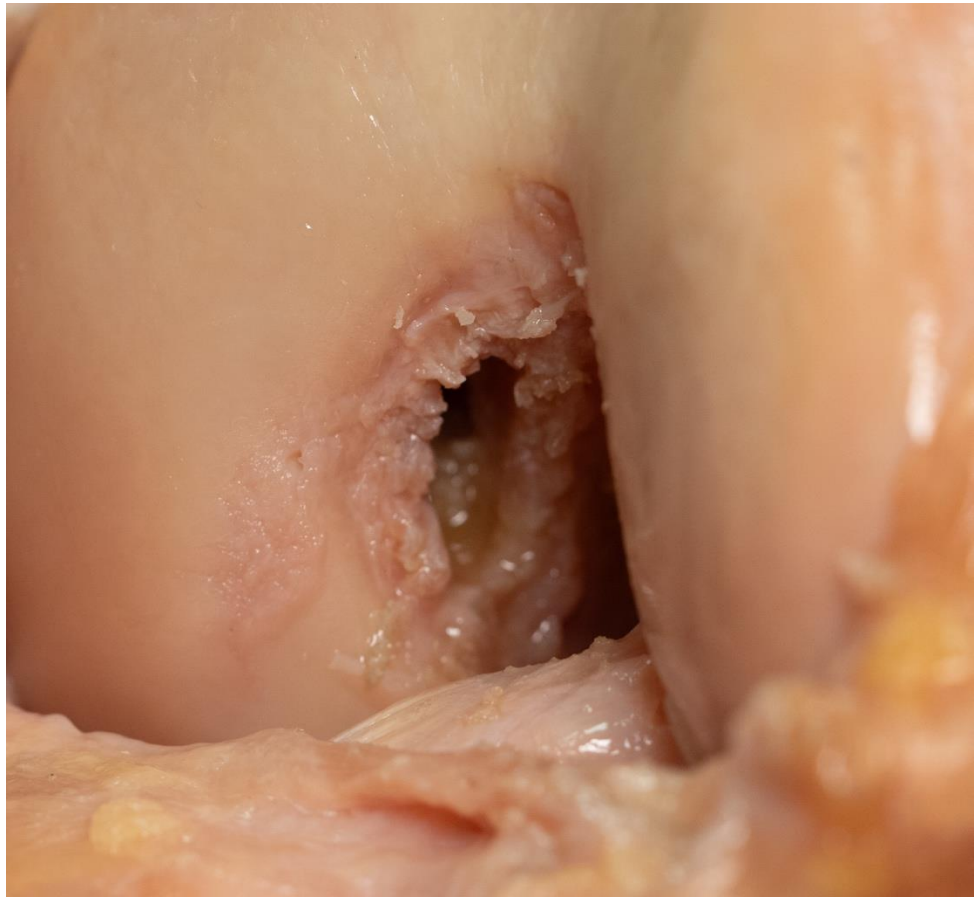
Methods – Robotic Test Setup

Under 200 N of axial compression, the specimens (n = 8) were subjected to 89 N posterior tibial translation (PTT), from 0 to 90° of flexion.



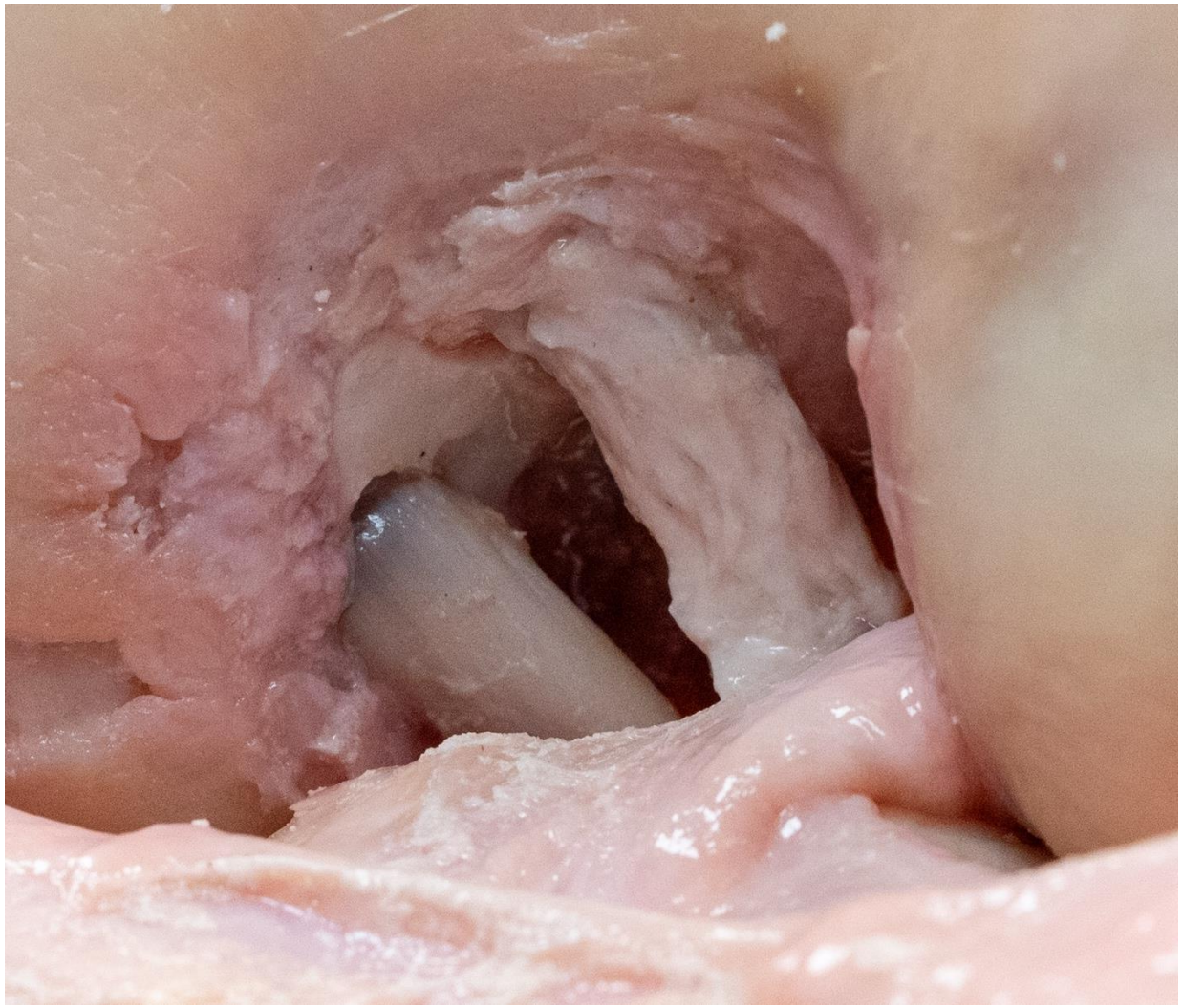
Methods – New Flat PCL Reconstruction

Autologous quadriceps graft with patellar bone block

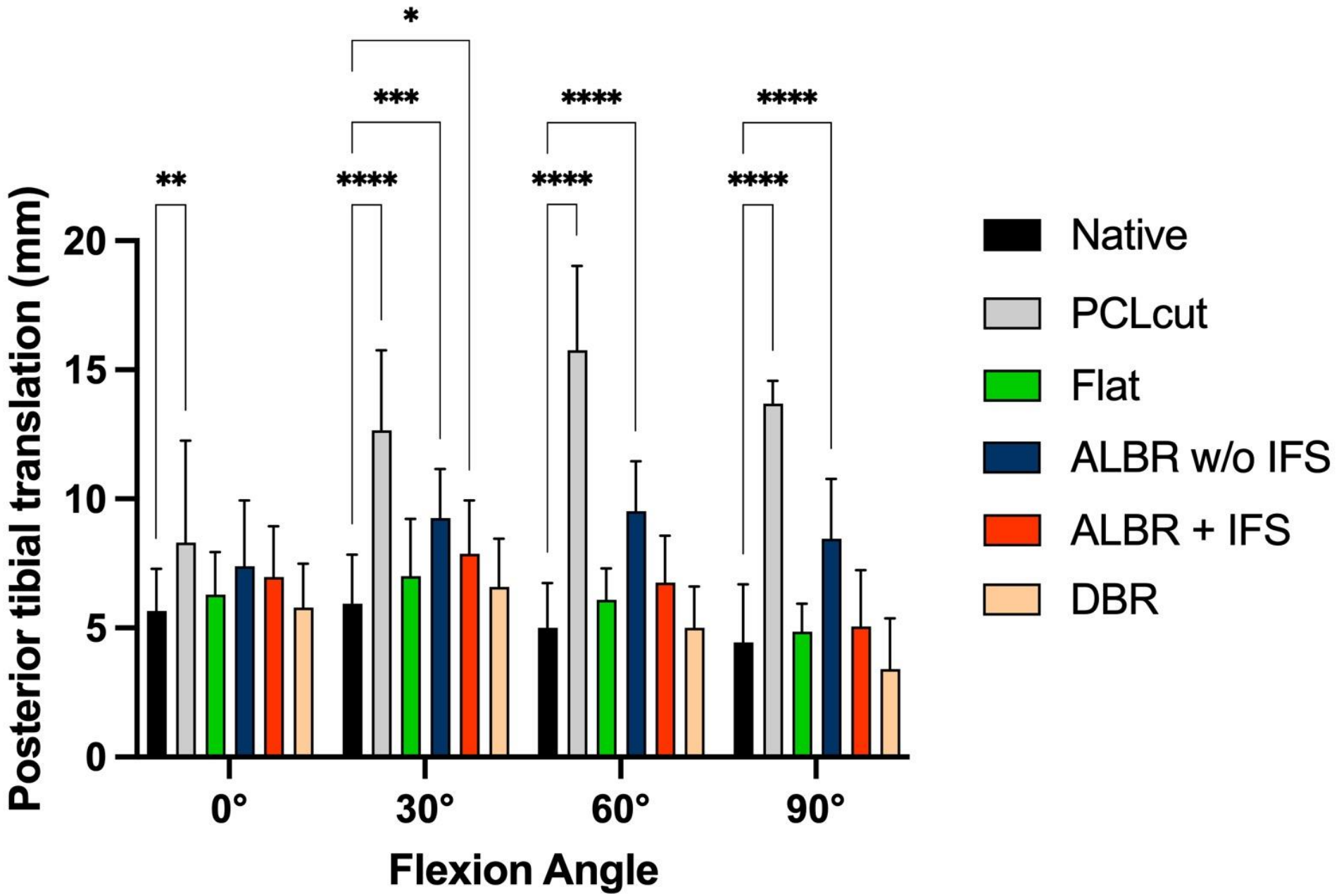


Methods – Cutting / Reconstruction Sequence

1. PCL cut
2. Flat Reconstruction
3. Single-bundle reconstruction in AL position (same quadriceps graft, without bone block)
    1. With cortical button fixation
    2. With interference screq fixation
4. Double bundle reconstruction (PM bundle with semitendinosus tendon)



Results – Posterior Tibial Translation



A flat PCL reconstruction with rectangular femoral tunnel as well as a double-bundle PCL reconstruction, were able to restore the native knee kinematics in all tested flexion angles.

A single-bundle anterolateral reconstruction was not able to fully restore the native knee kinematics

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Thank you!

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