Optimizing Postoperative Outcomes: The Effect of Preoperative Rehabilitation on Quadriceps Strength and Gait mechanics after ACL Reconstruction

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BACKGROUND

- Quadriceps weakness and gait impairments develop quickly after ACL injury[1]
- Immediate ACL reconstruction (ACLR) is associated with higher rates of post-operative complications[2]
- Preoperative rehabilitation provides opportunity to:
  - ↓ Joint effusion
  - ↑ Range of Motion
  - ↑ Quadriceps strength
  - ↑ Functional mobility
- **The effect of preoperative rehabilitation on quadriceps strength and gait mechanics is not well understood**

PURPOSE

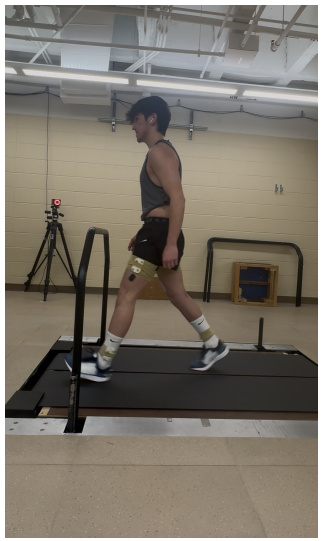
Evaluate if preoperative rehabilitation improves quadriceps strength and knee flexion excursion during gait and identify if quadriceps strength and knee flexion excursion at the time of surgery predict their respective recovery 4 months following ACL reconstruction

METHODS

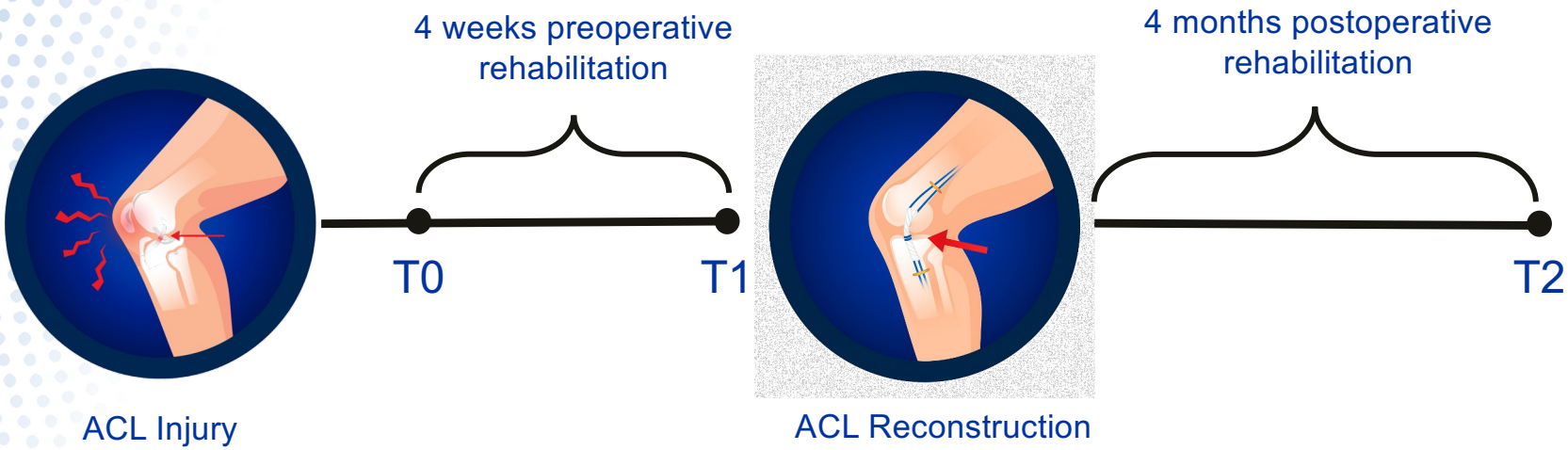
- **Participant demographics (n=51):**
  - Sex: 21F, 30M
  - Age: 21.0 ± 5.6 years old
  - Graft type: 48 bone patellar tendon bone, 3 hamstring
- **Testing timepoints:**
  - Initial evaluation (T0): 22.6 ± 16.6 days post injury
  - Post prehab (T1): 4 weeks after initial evaluation
  - Early postoperative (T2): 4 months following ACLR

METHODS

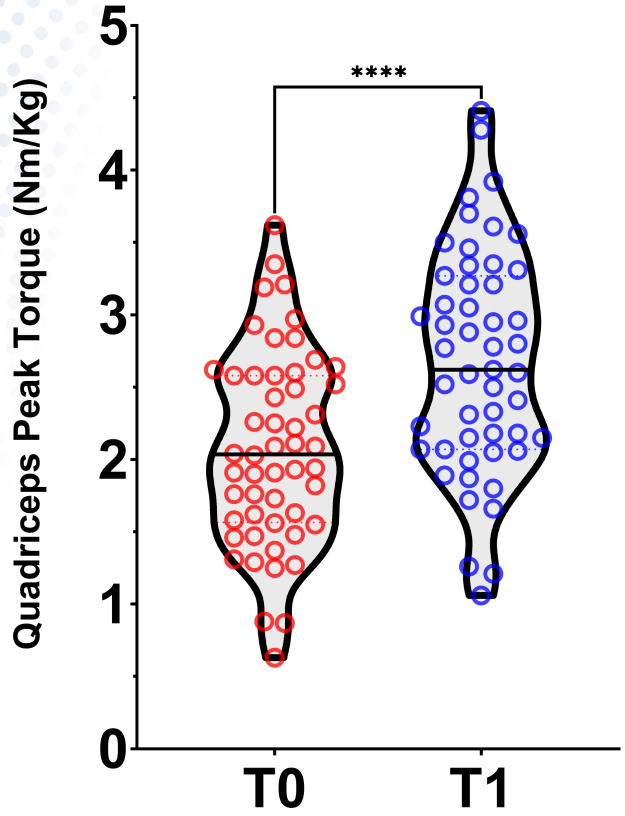
- **Assessments:**
  - Isometric quadriceps strength at 90 deg knee flexion
  - 3D gait analysis at self-selected speed

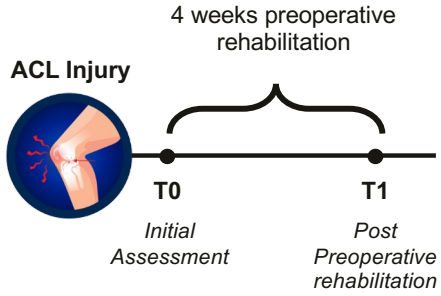


STUDY DESIGN



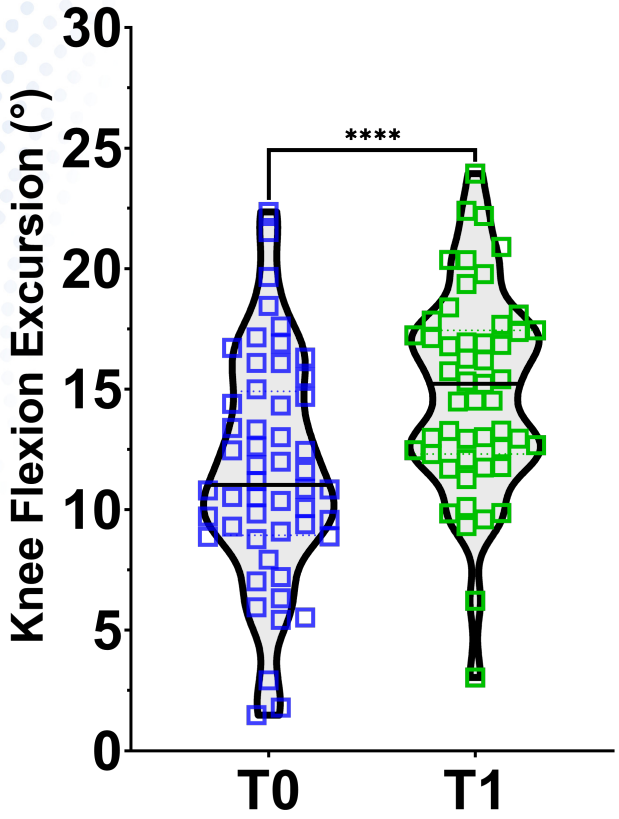
RESULTS: T0 TO T1 QUADRICEPS STRENGTH

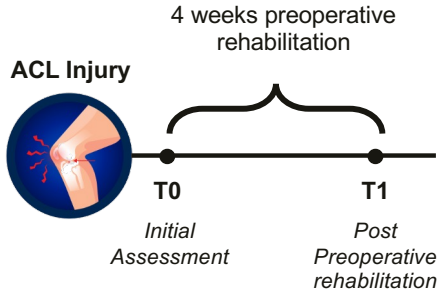




	T0	T1	Mean Difference	P
Quadriceps Strength (Nm/Kg)	2.1 ± 0.7	2.7 ± 0.8	0.6 ± 0.5	< .001

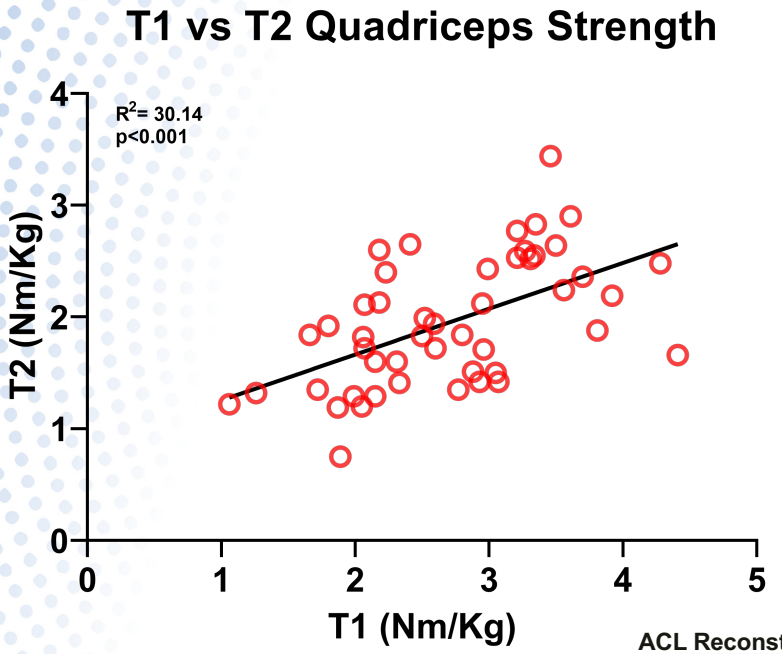
RESULTS: T0 TO T1 GAIT MECHANICS

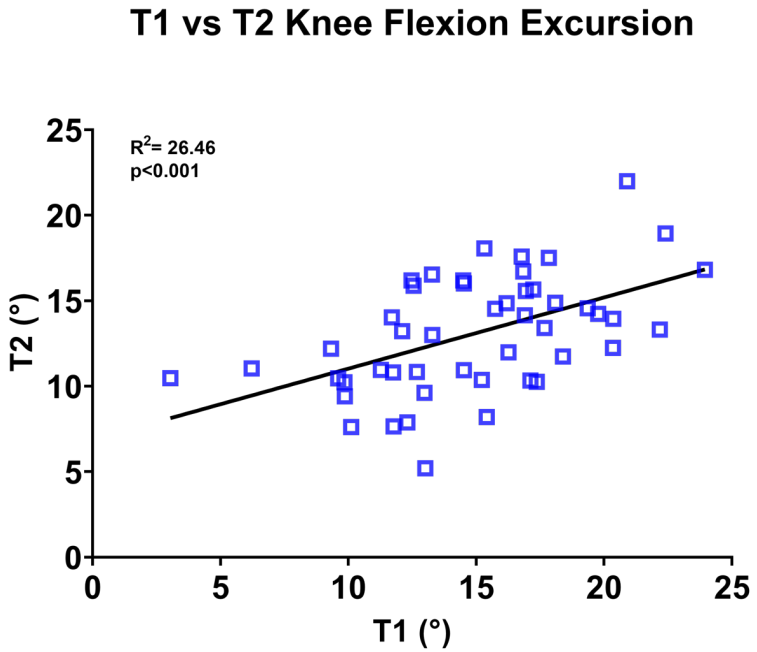


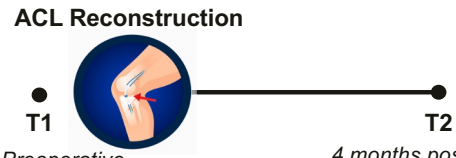


	T0	T1	Mean Difference	P
Knee flexion excursion (°)	11.6 ± 4.6	14.9 ± 4.1	3.3 ± 3.7	< .001

RESULTS: T1 TO T2







DISCUSSION

- A 4-week preoperative rehabilitation program resulted in significant improvements in quadriceps strength and knee flexion excursion during gait
- Improvements in preoperative physical function were significant predictors of their respective measures 4 months following ACLR
- Preoperative rehabilitation provides a unique window to intervene prior to ACLR to positively influence postoperative recovery[3-5]
- Increased knee flexion excursion suggests more dynamic knee joint loading during gait potentially reducing secondary complications associated with aberrant biomechanics[6]

Preoperative rehabilitation lays the foundation for a successful postoperative recovery by improving quadriceps strength and gait mechanics prior to ACLR

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