ISAKOS CONGRESS 2025 | MUNICH GERMANY June 8–11

Biomechanical Effect of Allograft Compression in ACL Reconstruction: A Cadaveric Study

Rafael Calvo R., **Jorge Isla**, Minerva Itriago

Clínica Alemana de Santiago, CAS-UDD Faculty of Medicine – Hospital Salvador

Conflict of Interest

- Nothing to disclosure

Introduction

- Minimum graft diameter: ≥8 mm for hamstring grafts

→

- Larger grafts offer more resistance

→

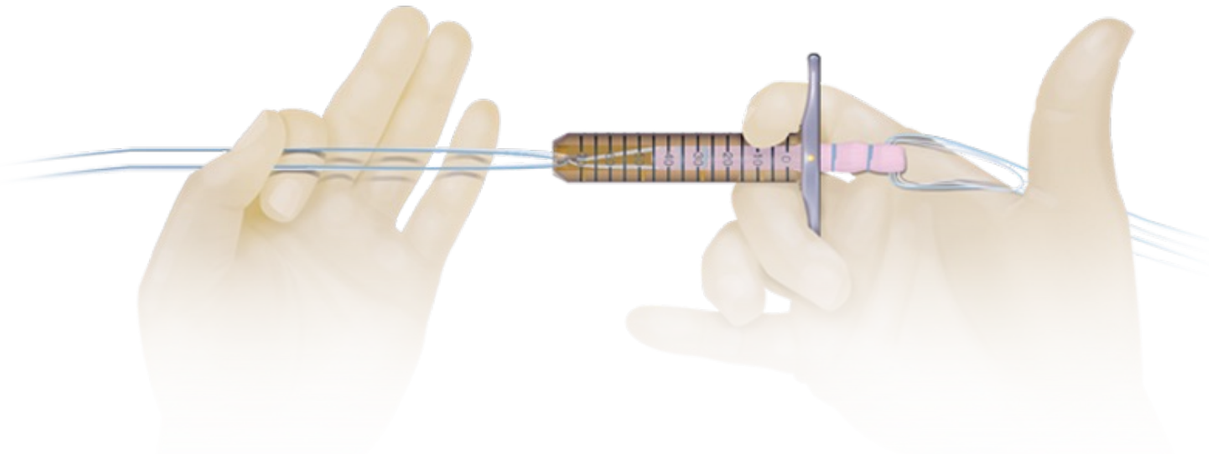
Clinical challenge: small patients (e.g., women, children) may have limited space

→

Unknown impact of compressing larger grafts to smaller diameters

→

Hypothesis: Compressed grafts retain similar biomechanical resistance



Objetives

Primary Objective

- To evaluate if compressed allografts maintain biomechanical resistance despite reduced diameter

Secondary Objective

- To explore compression techniques for use in smaller patients

Materials and Methods

Cadaveric, biomechanical, case-control study

- 30 peroneus longus allografts
- 20 grafts (9 mm diameter)
- 10 grafts (8 mm diameter)

- Group A: Native 9 mm grafts

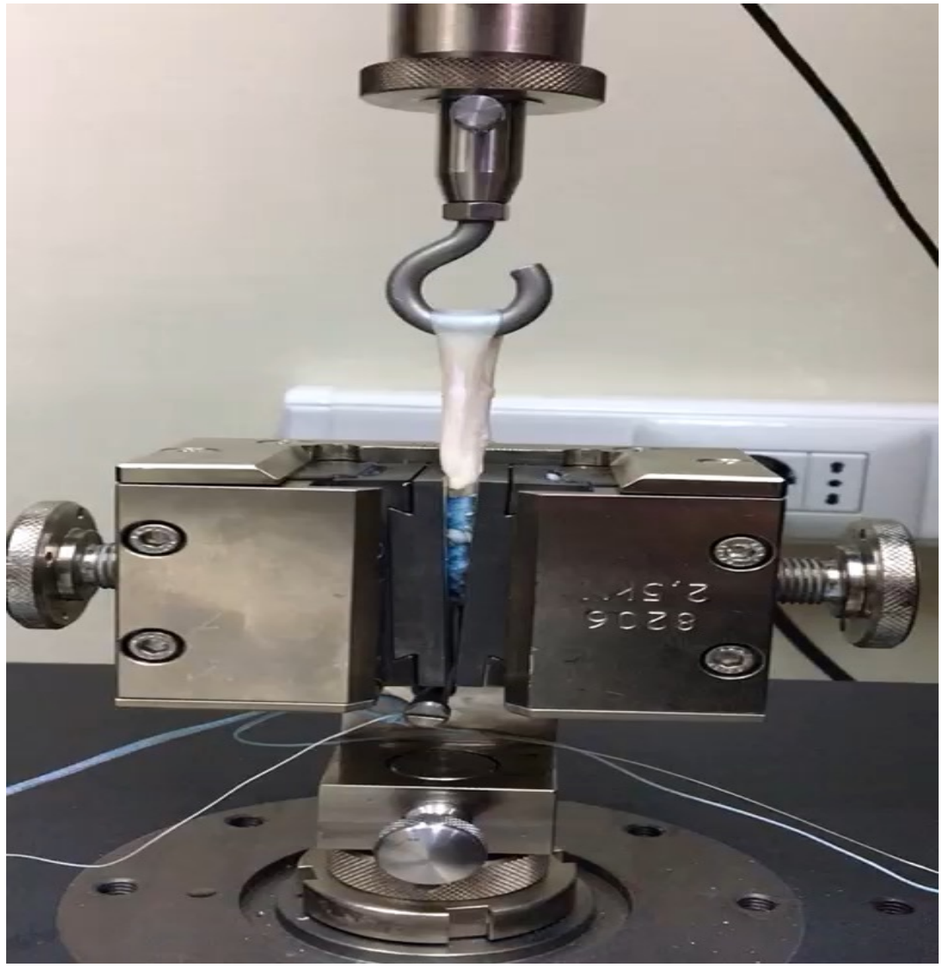
- Group B: 9 mm compressed to 8 mm

- Group C: Native 8 mm grafts

Materials and Methods

Machine: Zwick / Roell Z005

- Cyclic loading: 50–250 N at 1 Hz for 1000 cycles
- Then: continuous traction until failure



ISAKOS CONGRESS 2025

MUNICH GERMANY

June 8–11

Results

Maximum Failure Force (Mean ± SD):

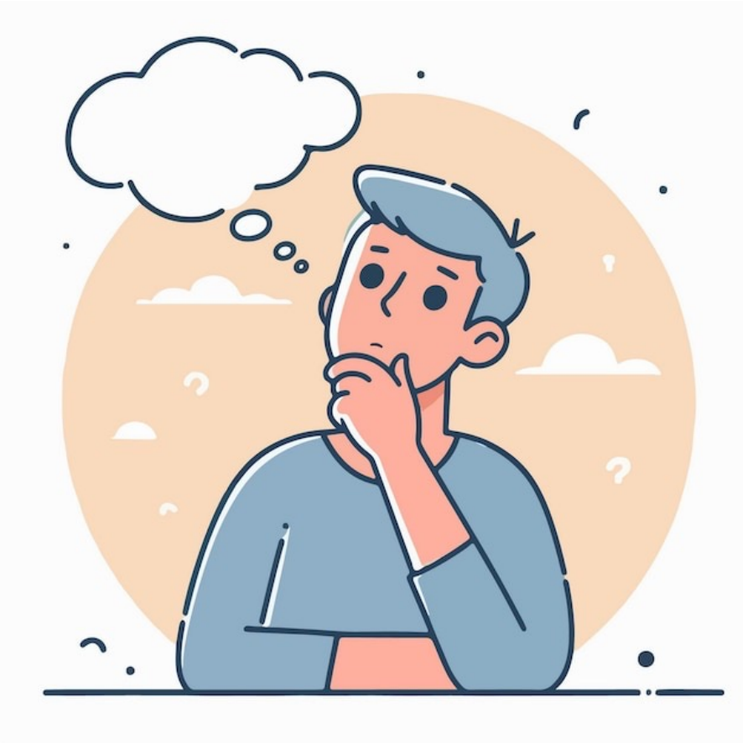
- Group A: 1902 N ± 432.12
- Group B: 1608 N ± 233.12
- Group C: 1341 N ± 936.67

Statistically significant difference between **Group A and B**

No significant difference between Groups B and C

Trend: Compressed grafts stronger than native 8 mm

Discussion



Compression reduces resistance but remains clinically acceptable

Useful technique for smaller anatomical knees

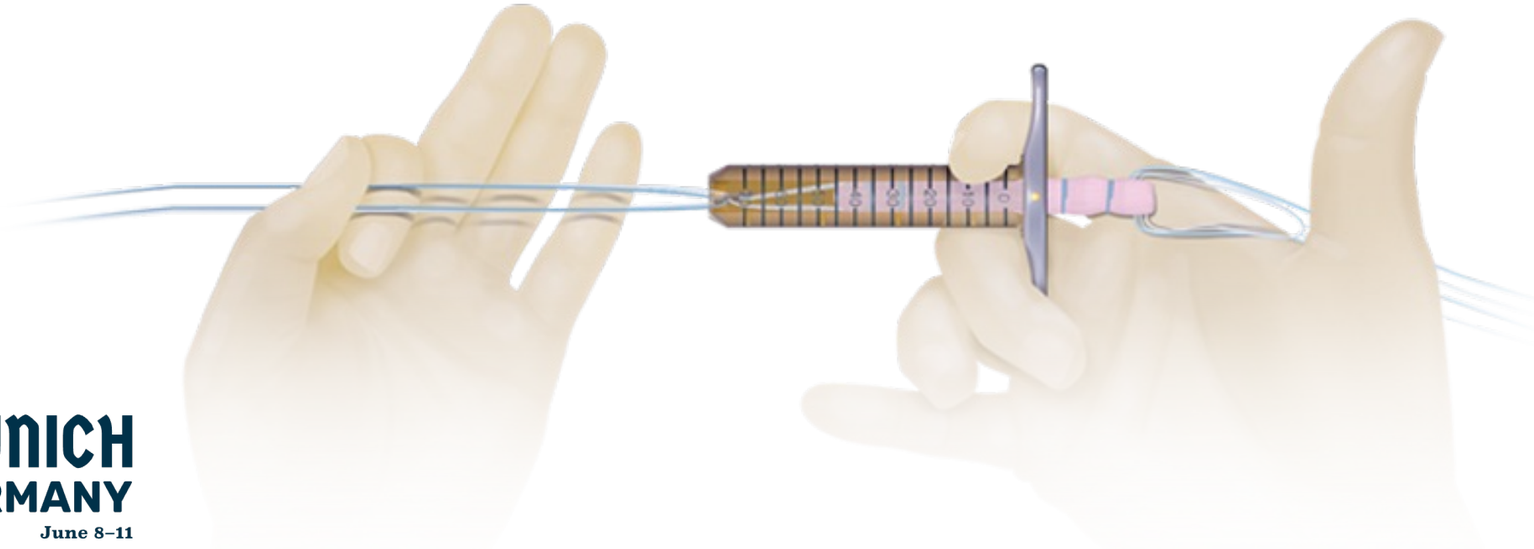
Balance between diameter, resistance, and anatomical feasibility

Compression may preserve more biomechanical properties than smaller grafts

Conclusions

Compressed group had less strength than the original grafts (9 mm diameter, maximum strength of 1902 N vs. 1608 N for the compressed one).

When compared to the smaller graft, there was no significant difference between the compressed group and the smaller group; however, the compressed group showed a trend toward greater strength than the smaller graft.



References

- Angthong C., Chernchujit B., Apivatgaroon A., Chaijenkit K., Nualon P., Suchao-in K. The anterior cruciate ligament reconstruction with the peroneus longus tendon: a biochemical and clinical evaluation of the donor ankle morbidity. J. Med. Assoc. Thail. 2015;98(6):555–560.
- Fritsch, B., Figueroa, F., & Semay, B. (2017). Graft Preparation Technique to Optimize Hamstring Graft Diameter for Anterior Cruciate Ligament Reconstruction. Arthroscopy techniques, 6(6), e2169–e2175.