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Multiple High Strength Sutures Yield Better Biomechanical Properties Comparing With Conventional Suture Tape For Anterior Cruciate Ligament Repair Augmentation

King Chulalongkorn Memorial Hospital
The Thai Red Cross Society

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Disclosures:

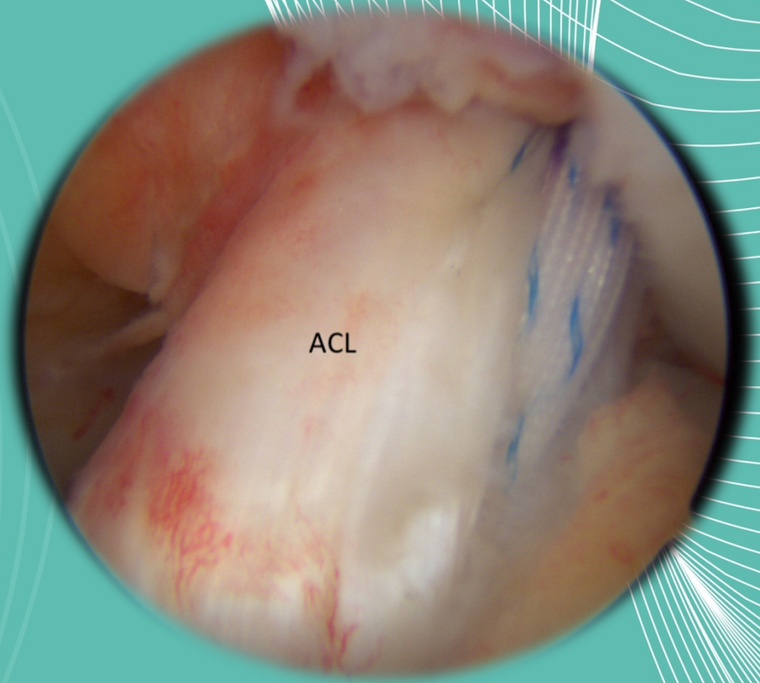
I have no conflict of interest

Introduction

- There is an increasing trend towards the use of anterior cruciate ligament (ACL) repair/reconstruction with internal bracing.

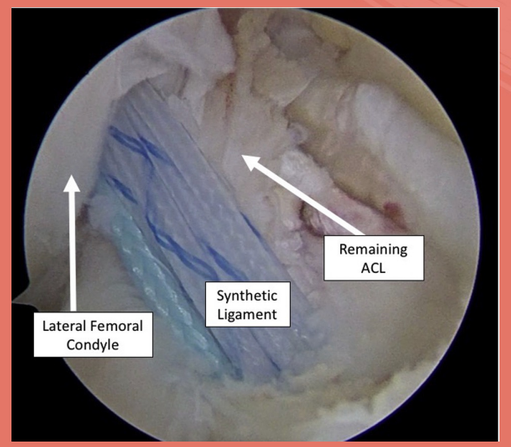
- Multiple clinical and biomechanics studies have shown improved results

- Little data available for a different type of internal bracing



Introduction

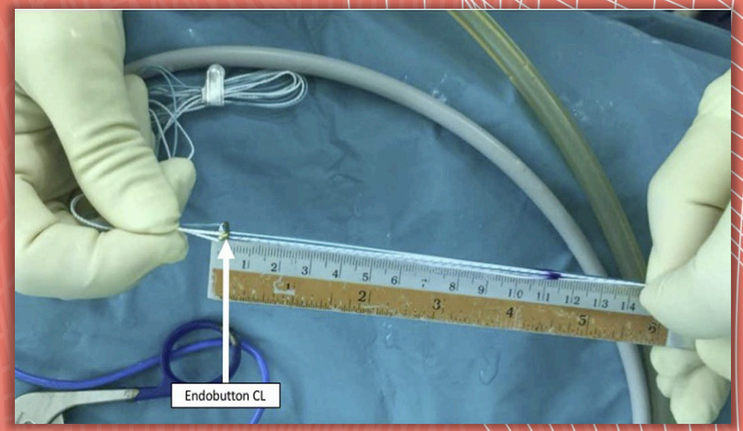
- We have introduced the technique of using multiple high-strength sutures as an internal brace after an ACL injury



Technical Note

Arthroscopic Synthetic Augmentation in Acute Partial Injury of the Anterior Cruciate Ligament

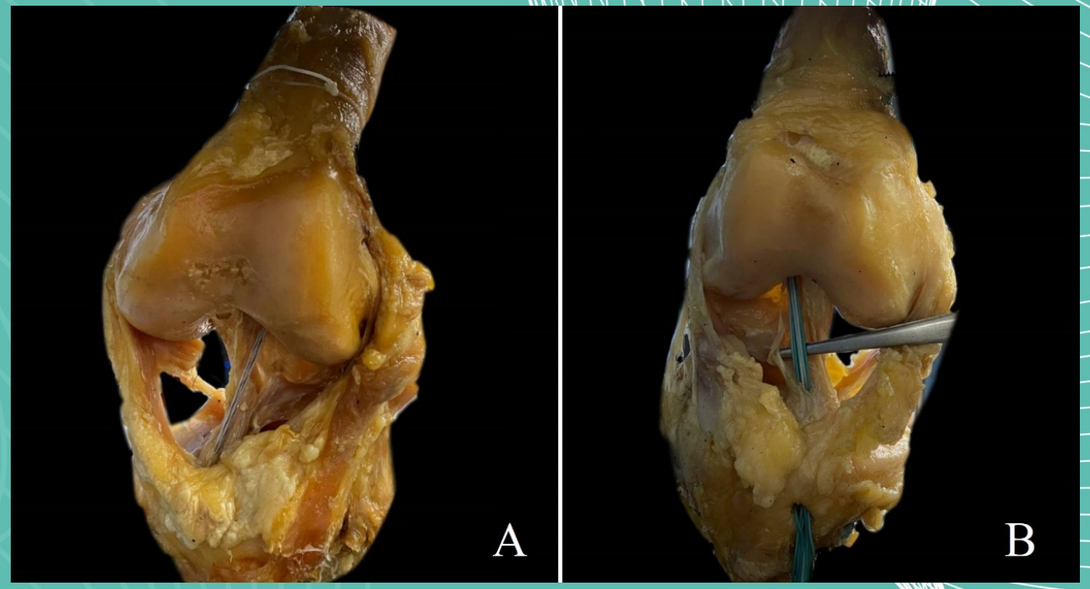
Somsak Kuptniratsaikul, M.D., Thun Itthipanichpong, M.D., and Vanasiri Kuptniratsaikul, M.D.



- *The purposes of this study are to compare the biomechanics properties between conventional suture tape and multiple high-strength sutures ACL augmentation.*

Materials and Methods

- Study design: Controlled laboratory study
- 10 cadaveric knees were used and divided into 2 groups
  - (A) conventional suture tape ACL augmentation(5 knees)
  - (B) multiple high-strength sutures ACL augmentation(5 knees)



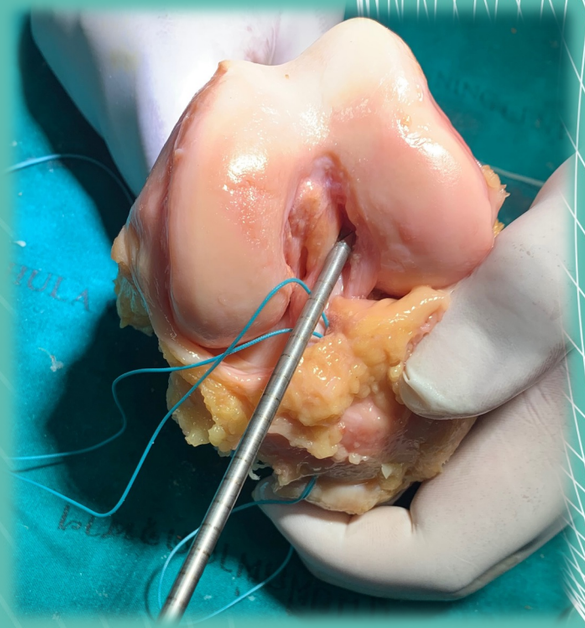
Materials and Methods: Procedure

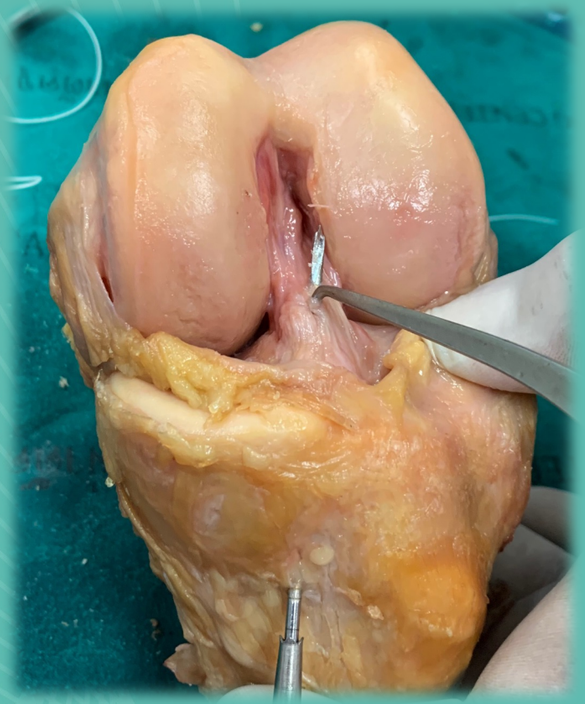
Suture tape group

- One HiFi tape (Conmed, Utica, NY) was used.
- The tape was inserted through the XO button (Conmed, Utica, NY)
- Tied the tibial end with a surgical knot and five half-hitches on another XO button on the medial tibial cortex

Multiple high-strength suture group

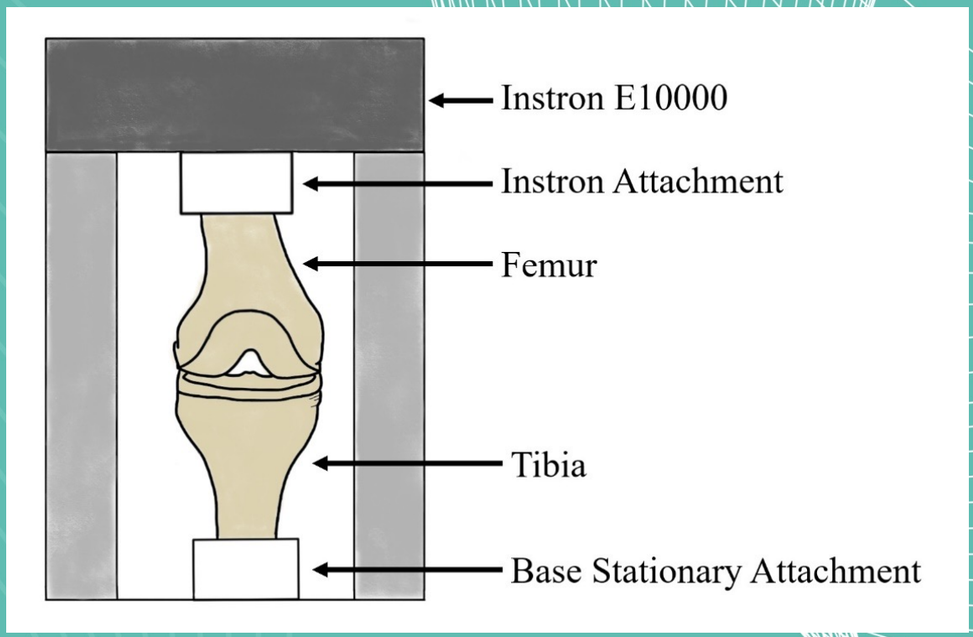
- Five #2 HiFi sutures (Conmed, Utica, NY) were used
- Similar technique to suture tape group





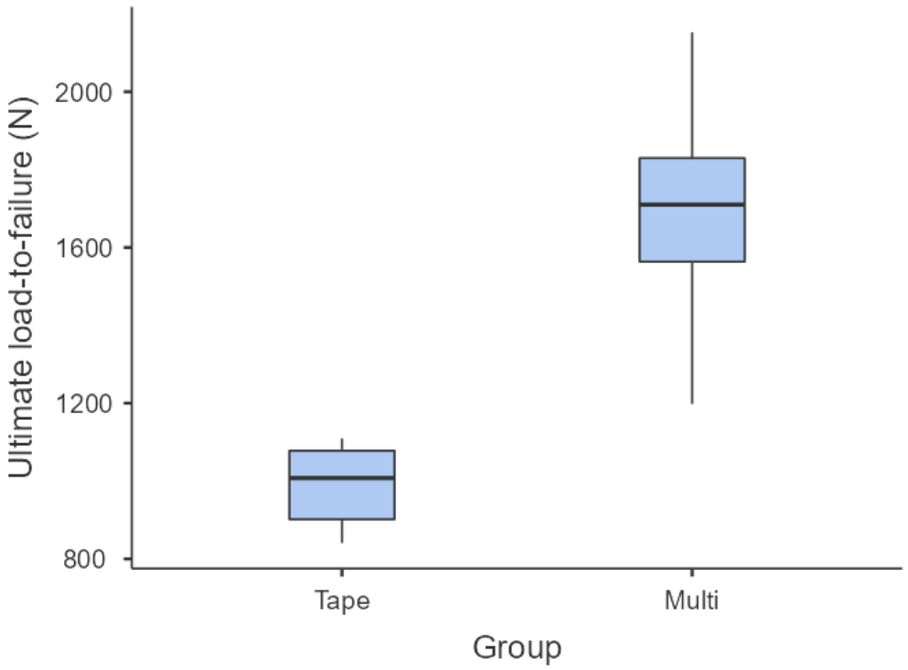
Materials and Methods: Test

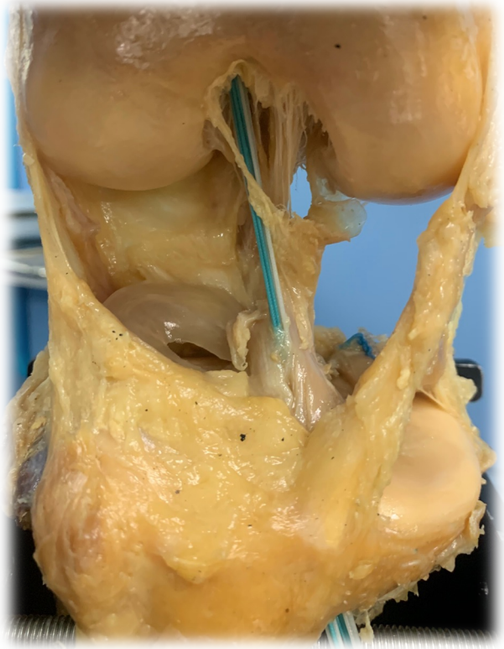
- Cyclic load 0-250 N with 1-Hz frequency for 1,000 cycles by Instron E10000 to each
- Axial distraction load to failure was applied at a knee in full extension in each group.
- The displacement and the ultimate load-to-failure were measured.



Results

- Ultimate load to failure (1013N Vs 1815N) (P = 0.02)

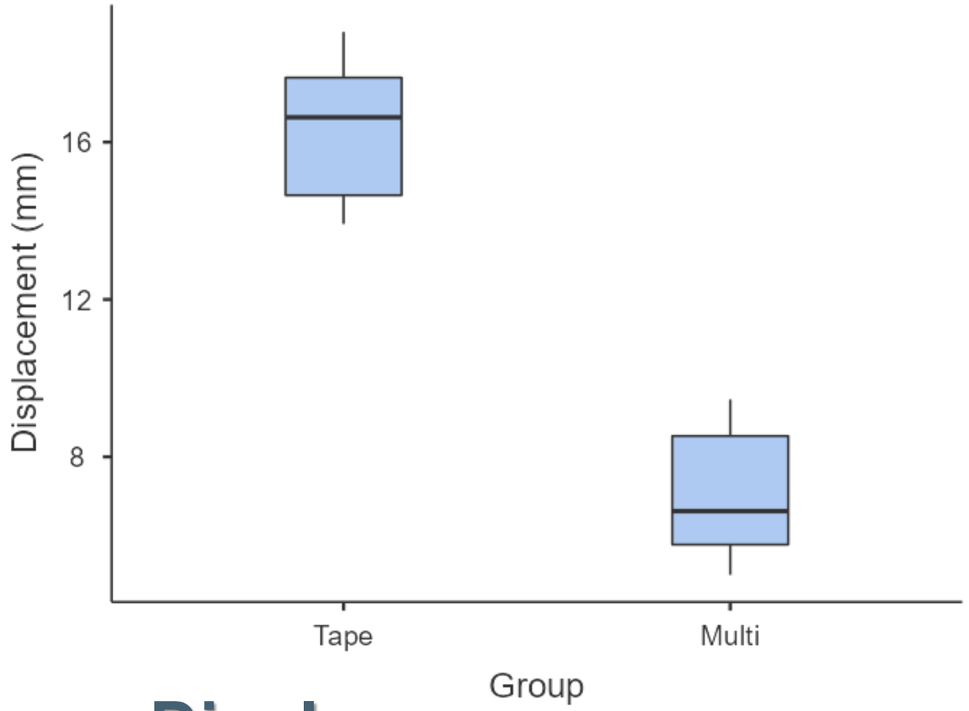




Displace

Results

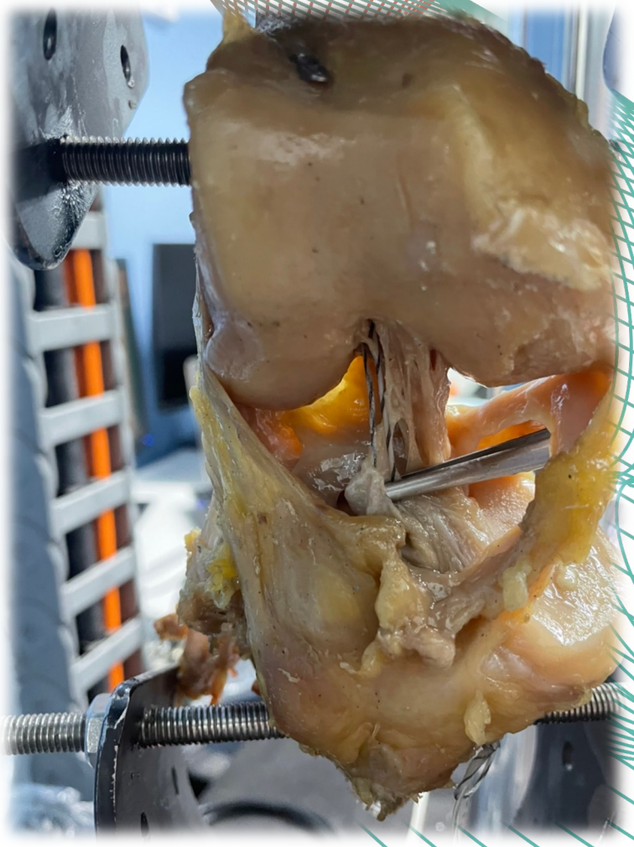
- Cyclic-load to failure (6.9 mm Vs 15 mm) (P=0.012)



Displace

Discussion

- Our finding
  - Multiple high-strength sutures show better biomechanical properties for augmentation of ACL
  - Multiple high-strength sutures have much less displacement following cyclic loading than suture tape
- ACL loads during daily activities(Dargel et al.)
  - Normal level walking = 169 N
  - Descending stairs = 445 N
- Both suture tape and multiple high-strength sutures used to augment ACL have a greater ultimate load-to-failure than ACL loads during daily activities.

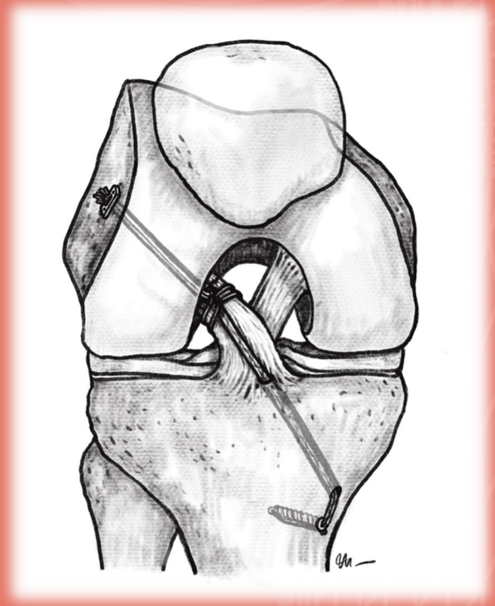


Limitation

- Small sample size
- The average age of our cadavers was 70.7 ± 14.5 years, which does not properly represent the younger population with ACL injury
- The loads were pulled vertically along the longitudinal axis, resembling the worst-case scenario rather than anterior translation or pivot-shifting

Conclusion

- Multiple high-strength sutures show better biomechanical properties for ACL internal bracing than suture tape.
- The ultimate load-to-failure of both suture tape and multiple high-strength sutures was higher than the natural ACL load.



Acknowledgment



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