



Biomechanics effect of partial thickness tenotomy and tendon gap closure in harvesting site of bone patellar tendon autograft

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Declaration of Interest

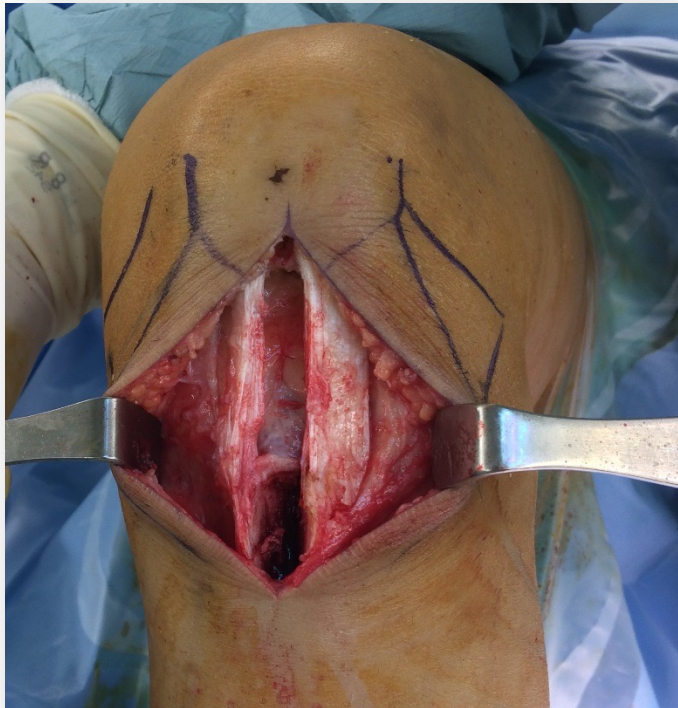


I declare that in the past three years I have:

- No held shares
- No received royalties
- Not done consulting work
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- Received institutional support from: Faculty of Medicine Ramathibodi Hospital, Mahidol University



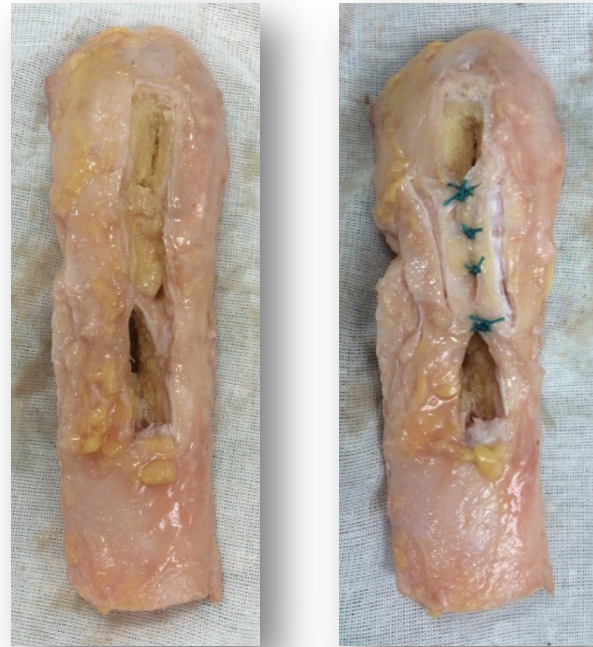
INTRODUCTION



- Post-operative quadriceps weakness usually been found after bone-patellar tendon-bone (BPTB) autograft harvesting
- Partial thickness tenotomy with gap closure was designed to create the defect healing and may improve the post-operative quadriceps strength



PURPOSE OF STUDY

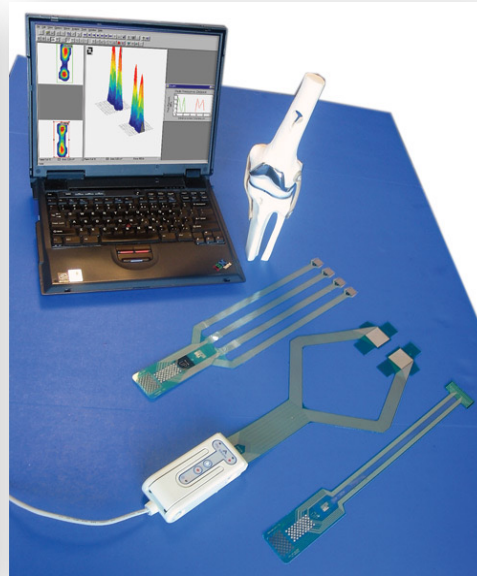


- Primary outcome
 - PF pressure (kPa)
 - Max load (N)
- Secondary outcome
 - PF area (mm²)
 - Max stress (MPa)
 - Stiffness (N/mm)
 - Modulus (Mpa)
 - Location of failure
 - Length (mm)
 - Width (mm)
 - Thickness (mm)

- To compare the biomechanics between the donor's tendon defect repair and conventional non-repair techniques



MATERIALS & METHODS



Tekscan
PF pressure
PF area

Dimension
Length
Width
Thickness

- Twelve cadaveric knees were randomized the side and middle third BPTB was harvested
- Repair group (longitudinal partial thickness tenotomy and side-to-side repair with No. 2 Ethibond) and non-repair group were measured the patellofemoral (PF) pressure and area in different knee motions

MATERIALS & METHODS

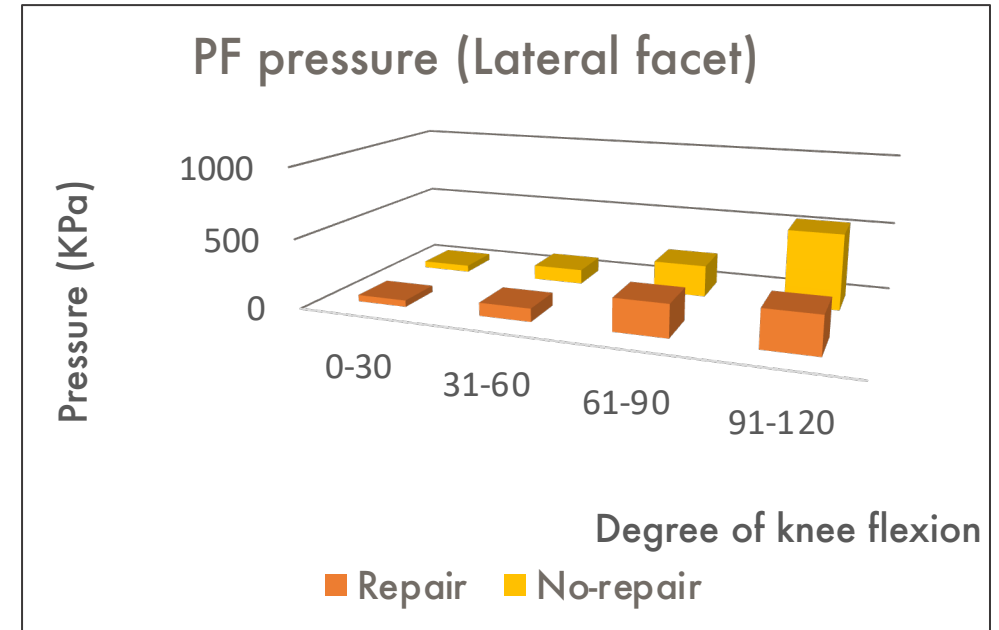
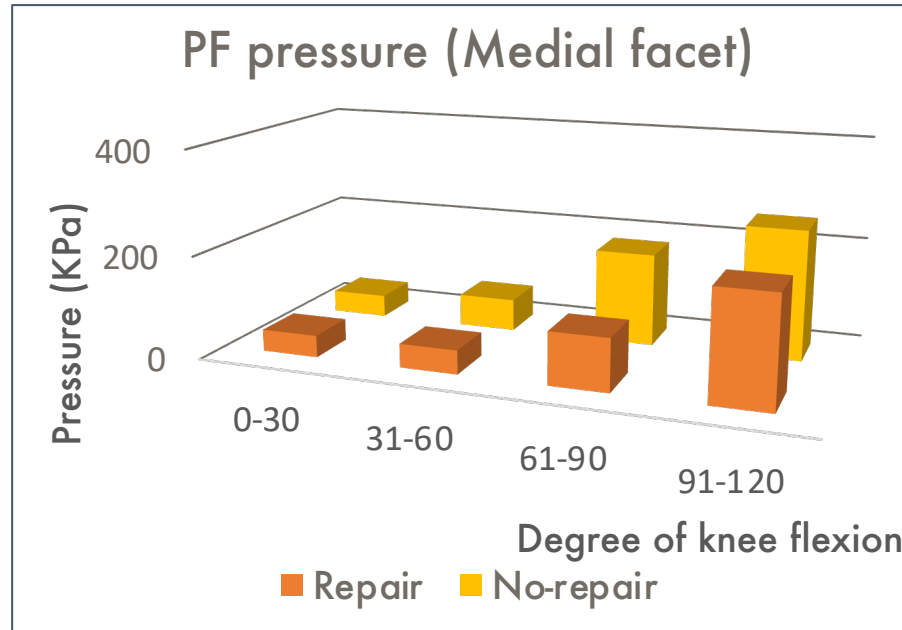


Instron 4467
Young's modulus
Max load
Max stress
Stiffness

- All specimens were cut and mounted to Instron 4467 machine for biomechanics tests
- Paired t-test, Wilcoxon signed-rank test, Kruskal-Willis equality of populations rank test were analyzed and p-value <0.05 was set as a significant difference

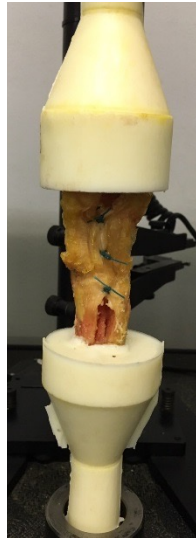


RESULTS



- PF pressure was no significantly different between two groups.
- PF pressure at medial facet show no significantly different in various degrees of knee flexion in repair group

RESULTS



Factors	Repair	No-repair	P-value
Length (mm)	32.04 ± 5.63	32.28 ± 2.644	0.995
Width (mm)	22.10 ± 5.154	27.24 ± 9.7	0.336
Thickness (mm)	2.34 ± 0.197	2.69 ± 0.317	0.023
Young's modulus(MPa)	90.19 (24.02,202.47)	50.83 (19.96,115.29)	0.028
Max load (N)	927.63 (380.93,1763.72)	911.92 (380.93,2013.37)	0.674
Max stress (MPa)	19.35 (5.21,35.54)	13.30 (5.21,24.23)	0.046
Stiffness (N/mm)	124.12 (50.58,263.88)	111.57 (34.61,279.56)	0.173

Paired T test
Wilcoxon signed- rank test

- Thickness was significantly decreased in repair group
- Young's modulus and Max stress were significantly increased in repair group
- No mid-substance tear was found in both groups



DISCUSSION



- This study proved that the patellofemoral pressure did not change after patella tendon defect repairing.
- **Radiographic study** for patella position should be further studied to make sure there was no patella baja.
- Young's modulus and max stress after BPTB defect repair had increased because tendon fibers had more strength immediately.
- **Clinical functional assessment** should be researched for the application of this defect repair technique.



CONCLUSION



- BPTB defect repairing did not increase PF pressure
- Biomechanics study found that increasing of Young's modulus and max stress were advantage for maintain the extensor mechanism

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