

The Role of the Ligamentum Teres in Stability in a Hip with an Intact Capsule: A Cadaveric Study

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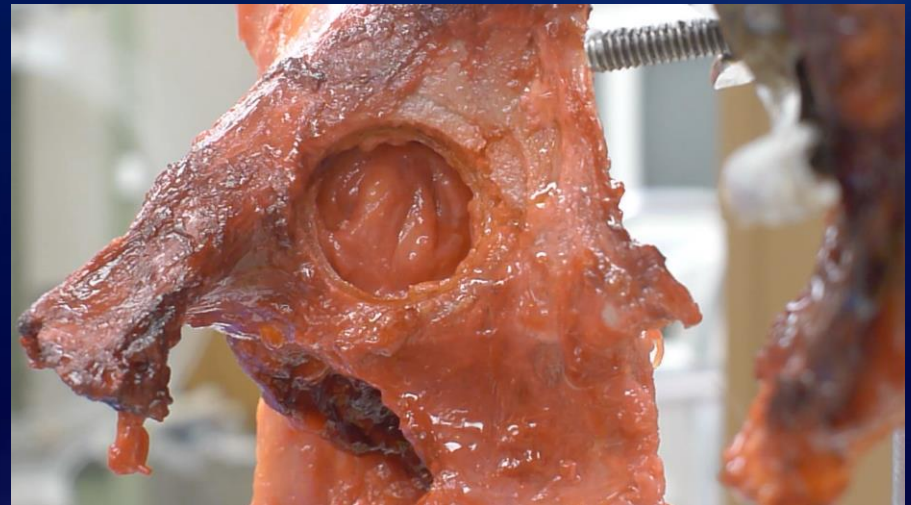
Disclosure

- Non conflict with current study
- SJ : none
- AH : none
- KA: none
- RS : Biomet
- RT : Depuy

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Objective

- Validate stability function of LT in mature hip joint with intact capsule
 - See if LT resection result in additional range of motion and translation



Materials

- IRB approved
- Cadaver exclusion criteria : osteoarthritis, coxa profunda, dysplasia, evidence of labrum or ligamentum teres injury as confirmed by arthroscopy and fluroscopy
- 7 fresh frozen cadaver pelvises
 - Mean age : 55.9 (range, 48 to 69)
 - Male : Female = 4:3

Test setup

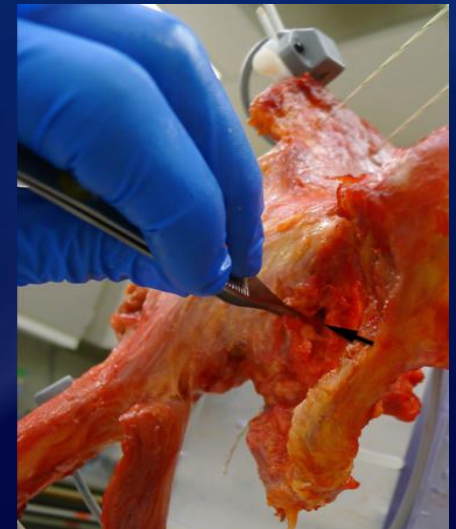


- Mounted on custom made construct in upright position
- 6 degree of freedom motion tracking sensor (Liberty, Polhemus)
- ISB guideline used to define anatomical coordination system
- Center of rotation defined as functional approach
- Axial rotation applied manually with torque ranch with accompanying load cell

- Test Scenarios

- Internal rotation with the hip at 10° of extension and in 0° flexion
- External rotation at 60°, 90° and 110° of flexion
- Test repeated at 15° of adduction for internal rotation
- Test repeated at 30° of abduction for external rotation
- Translation – difference in coordinate of femoral head's center of rotation in the maximum axial rotation with that in the neutral position

- Test repeated after LT resection through cotyloid fossa

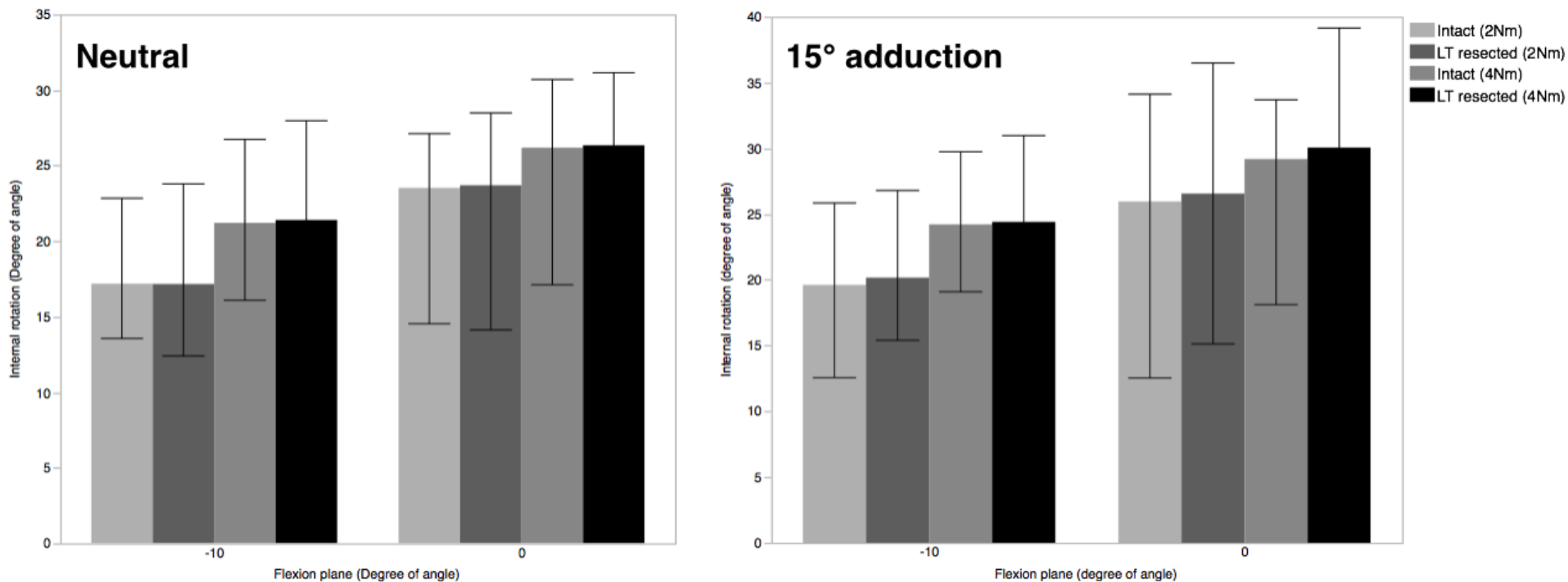


Statistics

- Data collected at 2Nm and 4Nm torque
- A pair wise repeated measures analysis
- JMP software (SAS institute, Cary, NC)
- Significance set at $p = 0.05$

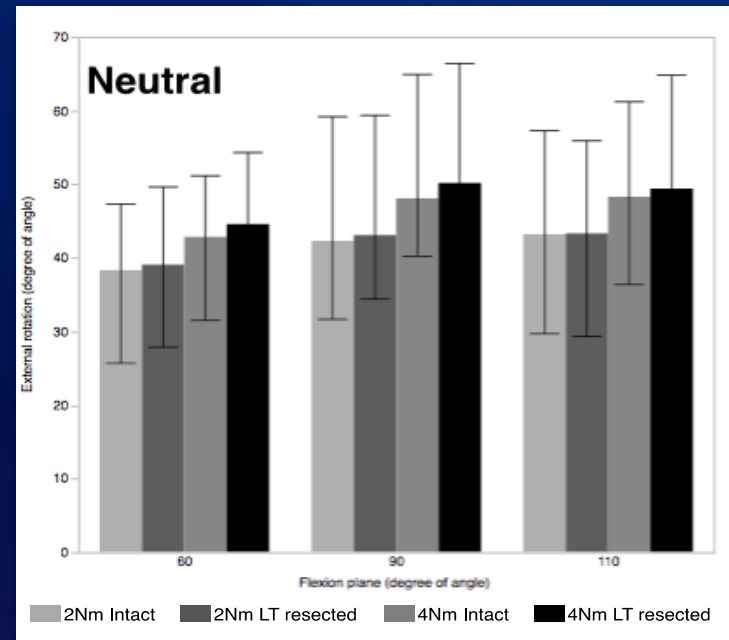
Results I – Internal rotation

- No difference between intact and LT resected condition at 2Nm and 4Nm in neutral abduction
- No difference found at 15° adduction



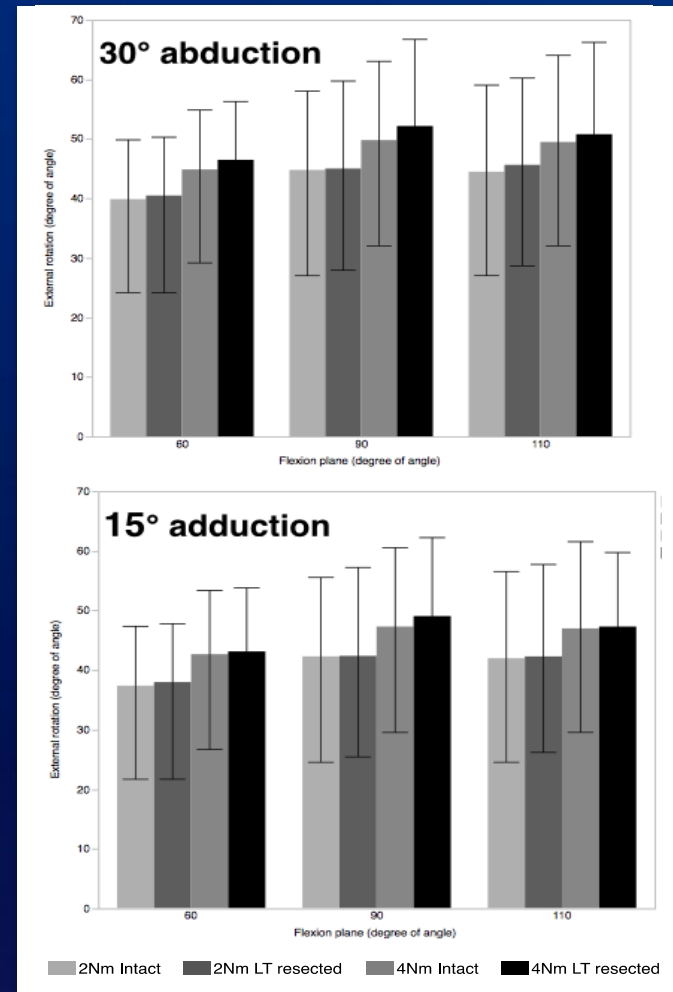
Results II – External rotation after LT resection

- Neutral abduction
 - At 2Nm
 - no difference across three flexion planes
 - At 4Nm
 - $1.7^\circ \pm 0.8^\circ$ increase
at 60° flexion ($p = 0.0013$)
 - $2.1^\circ \pm 1.1^\circ$ increase
at 90° flexion ($p = 0.0020$)



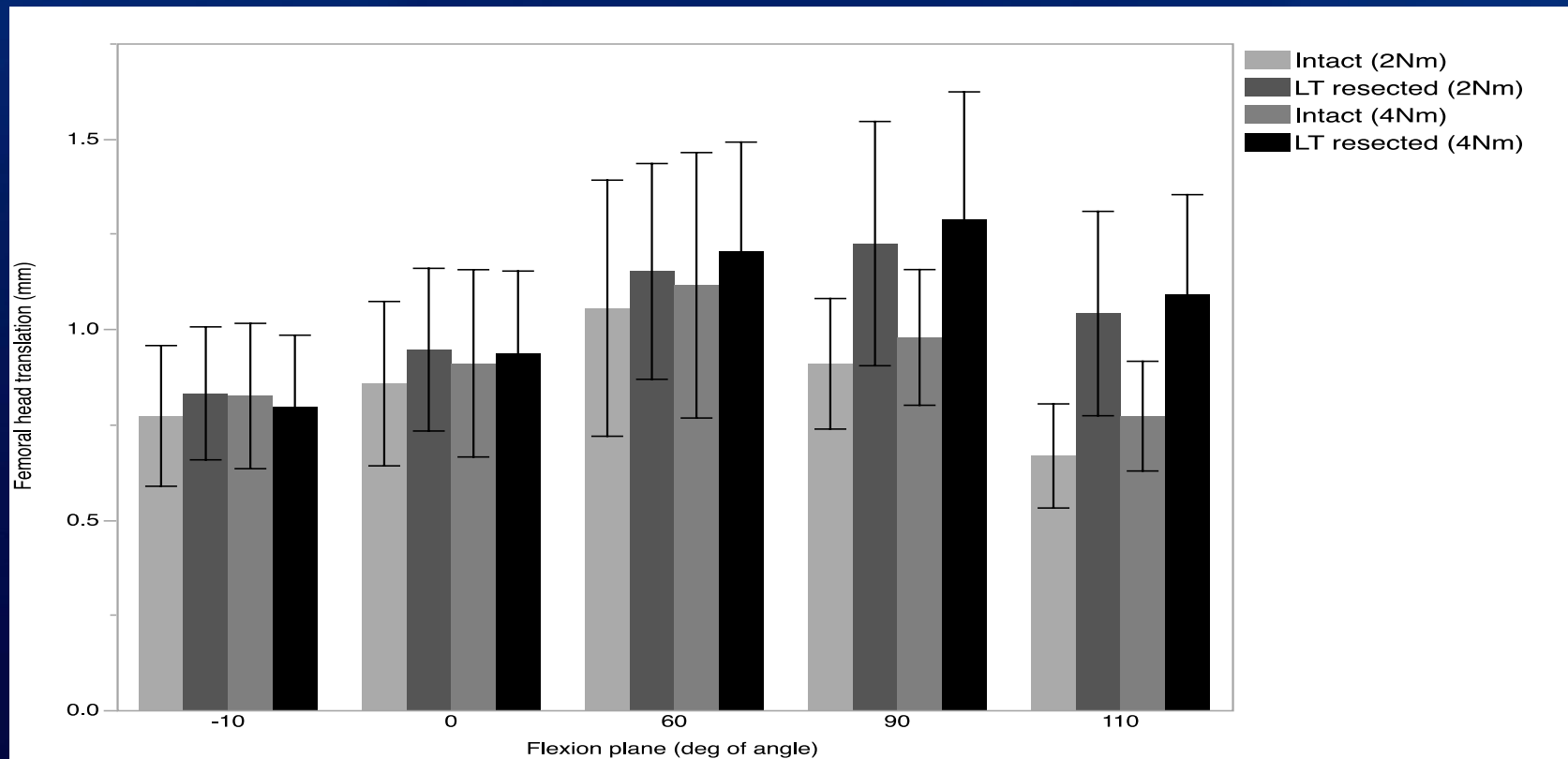
Results II – External rotation after LT resection

- At 30° abduction (4Nm)
 - 1.8° ± 1.4° increase at 90°
(p = 0.0137)
- At 15° adduction (4Nm)
 - 1.6° ± 1.1° increase at 60°
(p = 0.0072)
 - 2.4° ± 2.5° increase at 90°
(p = 0.0464)
 - 1.3° ± 1.2° increase at 110°
(p = 0.0325)



Results III - Translation

- No difference between intact and LT resected condition at 2Nm and at 4Nm in neutral abduction



Conclusion

- The significant increases in external rotation was found when hip is in 60° and in 90° of flexion at neutral abduction hip position with maximum of 2 degrees after LT resection
- LT resection does not contribute to excessive femoral head translation
- This demonstrates that with an intact capsule the LT contributes little to hip stability, and brings up the question whether the function of the LT is simply to trigger stimulation to provide proprioception.

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