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Background

- A capsular shift procedure has been described for the treatment of hip instability, however, the biomechanical effects of such a shift are unknown.
The purpose was to create a cadaveric model of hip capsule laxity and evaluate the biomechanical effects of a capsular shift used to treat hip instability on this model.
Methods

- Eight cadaveric hips, average age 58.5 years, were tested with a custom hip testing system in six conditions:
  - Intact
  - Vented
  - Stretched
  - Capsulotomy
  - Side to side repair
  - Capsular shift

- Measurements included
  - Internal (IR) and external (ER) rotation with 1.5 Nm of torque at 5 positions:
    - 5° extension, 0°, 15°, 30° and 45° flexion for each of the above conditions
  - Maximum extension with 5Nm torque, and femoral distraction with 40N and 80N of force.
Capsular Shift  Side to Side Repair
To create the hip laxity model, the capsule was stretched in extension under 35Nm of torque for 1 hour in neutral rotation.
Results
Internal Rotation

• The stretched state had significantly higher IR at 5° extension, 0° flexion, 15° flexion.
• The capsular shift significantly decreased IR compared to stretched state at 5° extension, 0°, and 15° flexion.
• Side to side repair restored IR back to the stretched state but not to the intact state at 5° extension and 0°.
The capsular shift and side to side repair had similar effects on ER at all flexion-extension positions.
Results
Distraction Testing

- Venting the capsule created large increases in the amount of distraction.
- Repair restored distraction back to the vented state with a trend toward the stretched state.
- Capsule shift/plication significantly decreased the amount of distraction compared to the stretched/instability state.
Results
Extension Testing

- The “stretched” state demonstrated a trend toward increased extension. Repair restored the hip to the stretched state from capsulotomy.
- The capsular shift/plication restored the extension back to the intact/vented state.
Results
Capsular Shift

- The capsular shift significantly decreased IR compared to stretched state at 5° extension, 0°, and 15° flexion.

- The capsular shift and side to side repair had similar effects on ER at all flexion-extension positions.

- The capsular shift decreased distraction and max extension compared to the stretched state but the repair did not.
Conclusion

✧ Venting the hip capsule had effects primarily on distraction with minimal effect on rotation and extension.

✧ The hip capsular instability model was shown to have significantly greater range of motion, and distraction compared with the intact condition.

✧ The greatest effects of capsular shift are seen with internal rotation, extension, and distraction with minimal effect on external rotation.

✧ The biomechanical effects of the capsular shift procedure indicate it can be used to treat hip capsular laxity with no obvious detrimental effects to functional range of motion.