

Capsulotomy and Repair Have Minimal Effects on Hip Joint Behavior During Simulated Activities of Daily Living

Degen RM¹, Donnelly E², Toobaie A¹, Ng KCG³, Getgood A¹, Willing R²

1 – Fowler Kennedy Sport Medicine Clinic, Western University, London, Ontario, Canada

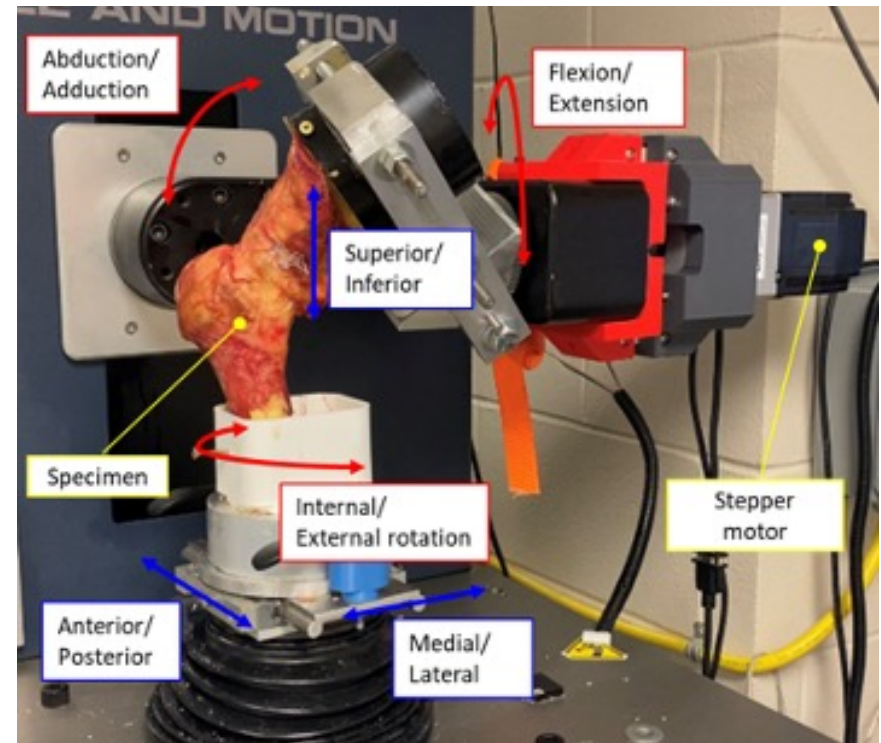
2 – Department of Mechanical and Materials Engineering, Western University, London, Ontario, Canada

3 – Department of Medical Biophysics, Western University, London, Ontario, Canada

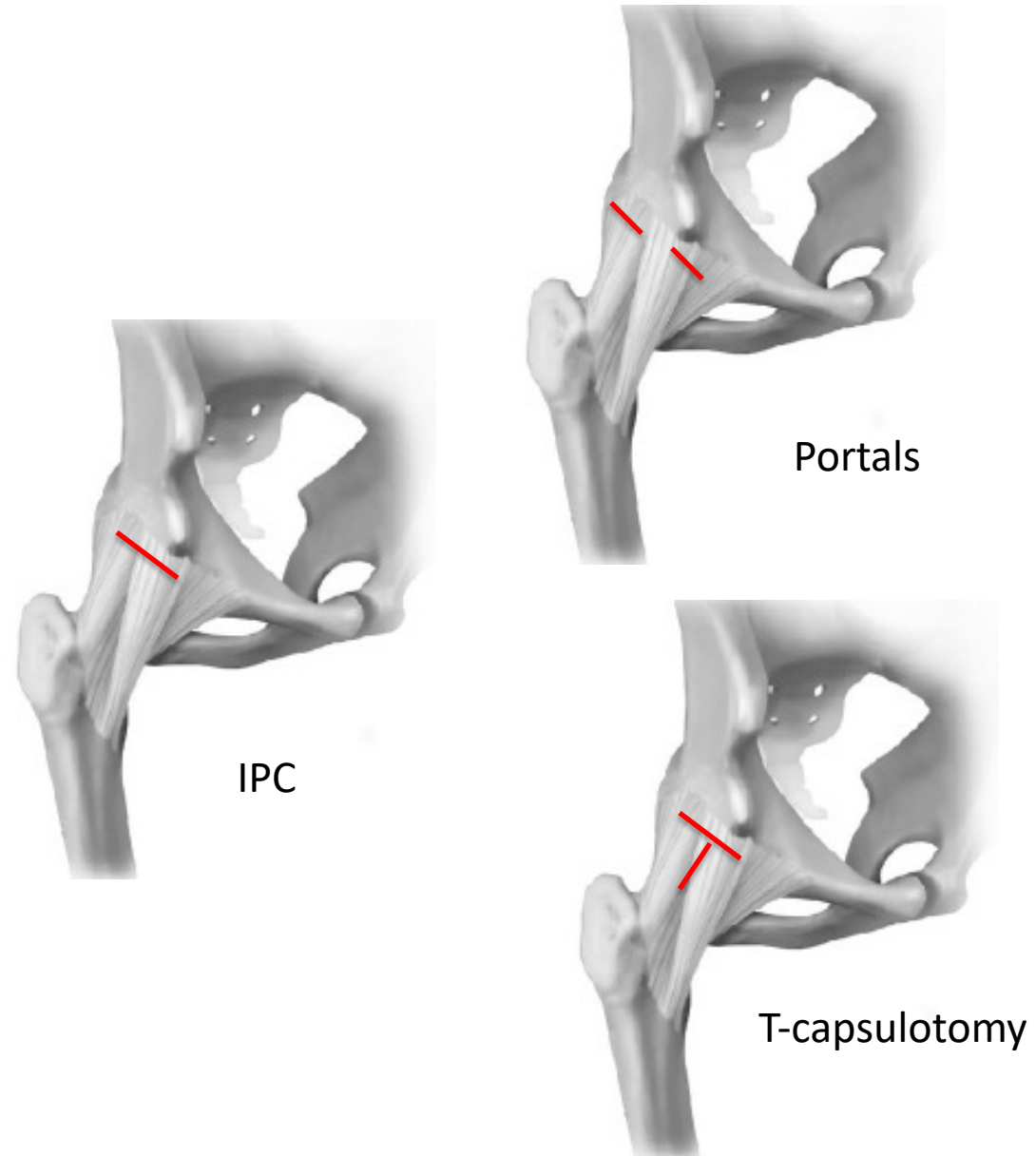
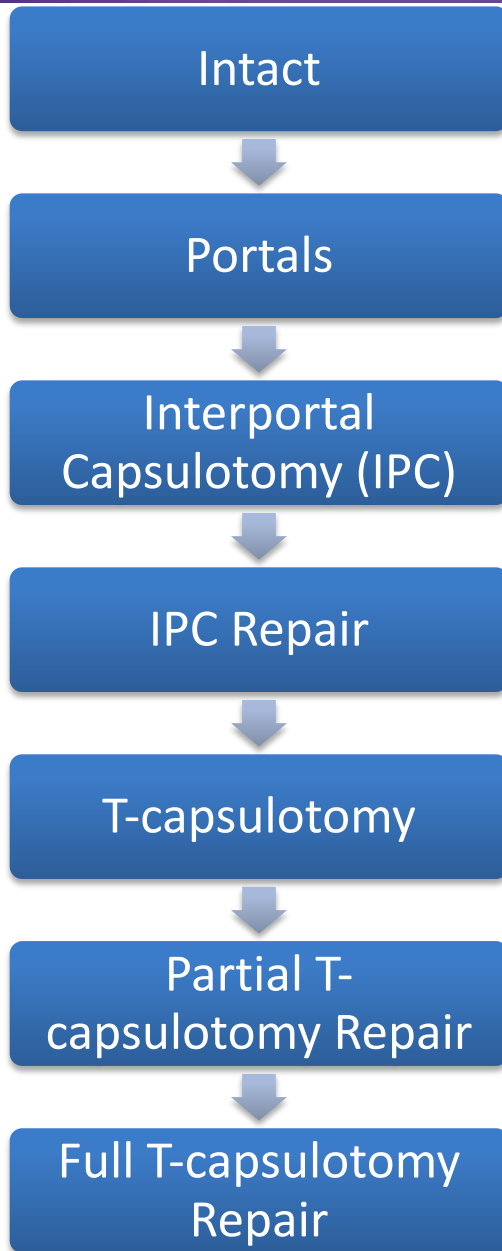
- In recent years, biomechanical studies have supported complete capsular closure following hip arthroscopy to restore native joint kinematics
- Most studies, however, base these conclusions on joint behaviors at the extremes of range of motion
- The relevance of adverse end-ROM kinematics to joint behavior during simple activities of daily living (ADL) is not clear

- Purpose:
 - To evaluate the effects of capsulotomies and repair on joint behavior during gait, stand-to-sit and sit-to-stand using a joint motion simulator.

- 6 cadaveric hip specimens
 - Dissected, preserving all capsular tissue
 - Potted and mounted on AMTI VIVO
 - Simulated ADL loading applied with 6-degree of freedom joint motion simulator
 - Gait & Sitting



Methods



- **Loading Protocol**
 - During force application, anterior-posterior (AP), medial-lateral (ML), and axial compression DOF were operated in force control;
 - Joint rotations (flexion-extension [FE], adduction-abduction [AA] and internal-external [IE] rotation) were manipulated in displacement control
- **Data Collection**
 - Resulting femoral head translations and joint reaction torques were recorded and evaluated
 - Subsequently, the mean-centered range of femoral head displacements and peak signed joint restraint torques were calculated and compared

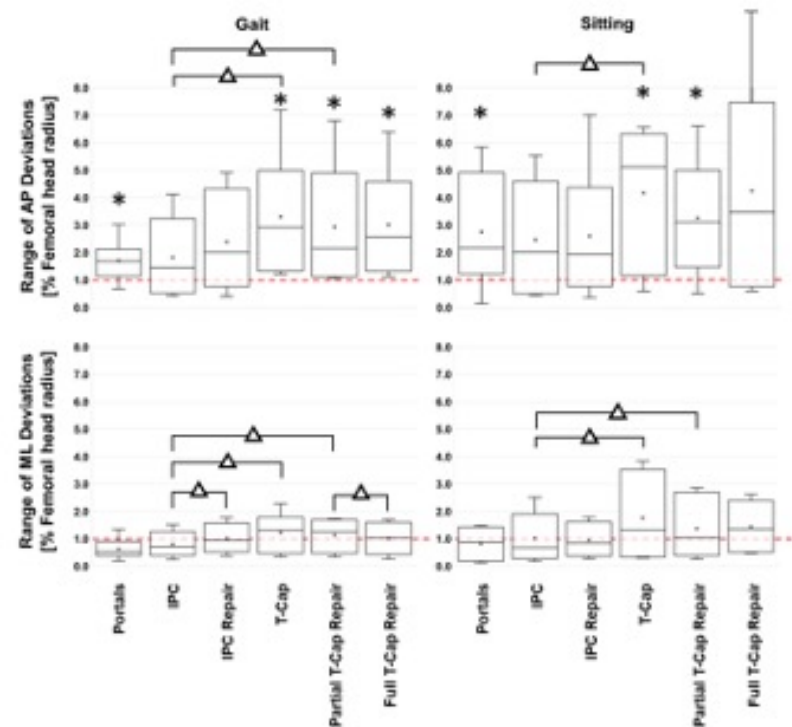
- AP Displacement

- During simulated gait and sitting, the mean range of AP femoral head displacements exceeded 1% of the femoral head diameter after creating portals, T-capsulotomies and partial T-capsulotomy repair

- (Wilcoxon Signed Rank $p < .05$);
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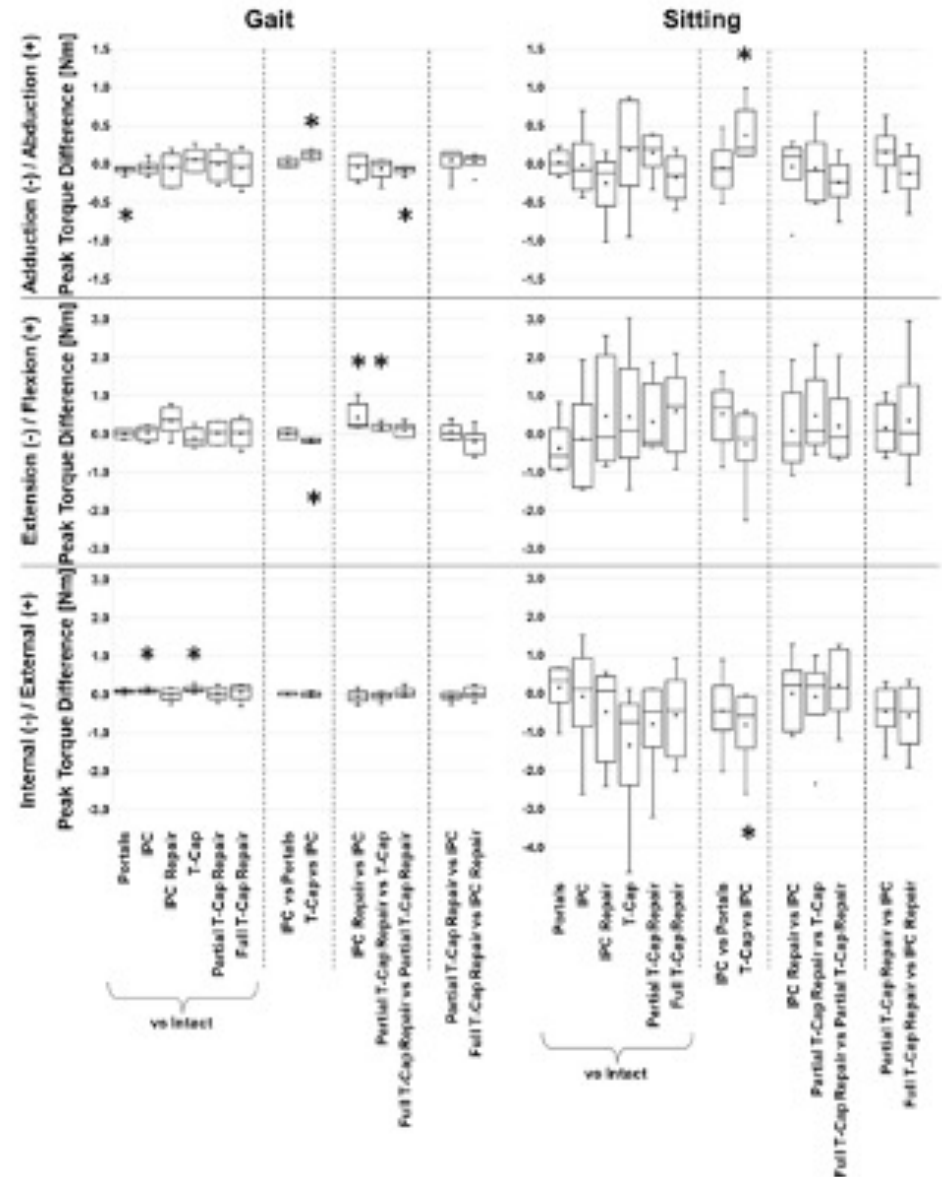
- ML Displacement

- The mean ranges of ML displacements did not exceed 1% of the femoral head diameter



Results – Kinematic Differences

- Deviations in femoral head kinematics varied by capsule stage but were never very large
- No consistent trends were observed with respect to alterations in peak joint restraint torques



- In this cadaveric biomechanical study, capsulotomy and repair minimally affected resultant femoral head translation and joint torques during simulated ADLs.
- Capsular repair may not be as critical for joint stability in the tested ADLs.
 - However, further study is required to determine its impact beyond time-zero biomechanics and the resultant effect on patient reported outcomes.



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