Increased Cup Anteversion may not Prevent Posterior Dislocation in Patients with Abnormal Spinopelvic Characteristics in Total Hip Arthroplasty

Matthew J. Grosso, MD; Christopher Plaskos, PhD; Jim Pierrepont, PhD, MEng; Arjun Saxena, MD, MBA
1St. Francis Hospital and Medical Center, 2Corin Ltd, 3Rothman Orthopaedic Institute

Methods

- A commercial database of 245 dislocating THAs referred for post-operative CT and functional radiographic imaging and analysis were reviewed.
- Spinopelvic parameters, and cup and stem position were measured in the supine, standing, anterior pelvic plane (APP) positions.
- Safe zones were defined for the acetabular component as: inclination: 30-50° (all positions); anteversion:5-25° (APP); 15-30° (standing); 10-30° (supine).
- Spinopelvic characteristics were stratified by high, neutral, and low cup anteversion using thresholds of >35° and <15° anteversion in standing, respectively.

Results

- Measurements made on CT imaging:
  a) Cup and stem positioning and femoral head size were measured by registering 3D computer models of the implants within the CT image volume.
  b) Cup anteversion and inclination were measured in the supine position and transferred to the standing and seated positions.
  c) stem version and anatomical femoral version were measured as the angle between the neck axis and the posterior condyles on the operative and contralateral sides, respectively.

Conclusions

- In this dislocating cohort, there is a decreased percentage of cups within the safe zone in the APP and standing position compared to the supine reference.
- In addition, we found that patients having poor SP characteristics and high cup anteversion can still dislocate, suggesting that adjusting cup anteversion alone may not be sufficient for preventing instability.

Illustration of spinopelvic (SP) parameters shown in standing and flex-seated: lumbar lordosis (LL), sacral slope (SS), pelvic tilt (PT), spinopelvic tilt (SPT), pelvic incidence (PI), pelvic femoral flexion (PFA), anterior pelvic plane (APP).