

How Does Pelvic Tilt Change Post-Total Hip Arthroplasty? A Longitudinal Assessment Raising Awareness of the Postoperative Period

Moritz Innmann¹, Aidin Eslam Pour², Tobias F Renkawitz³, Christian Merle, George A Grammatopoulos⁴
¹Heidelberg University Hospital, ²Yale school of Medicine, ³Heidelberg University, ⁴The Ottawa Hospital

INTRODUCTION:

Spinopelvic characteristics influence instability-risk post-total hip arthroplasty (THA). Although most dislocations occur early post-THA, data presented on spinopelvic characteristics to-date reports pre- and 1-year, with little information on what happens in the early post-THA period. This study aims to elucidate the variations in key postural spinopelvic parameters, at distinct postoperative intervals post-THA, especially early post-THA.

METHODS: This is a prospective, single center, multi-surgeon, consecutive case series of 250 patients [132 female; 66.7 years (32-88)] that underwent THA for unilateral hip osteoarthritis (OA). Comprehensive analysis was conducted on standing EOS images preoperatively, at 7-days (early-post-THA) and minimum 1year post-THA. Parameters of interest included demographics, pelvic tilt (PT), lumbar-lordosis (LL), sacral-slope (SS), Pelvic-Femoral Angle (PFA), and pelvic incidence (PI). Spinal deformity was defined as $PI-LL > 10^\circ$. Significant difference in PT was defined as $> 10^\circ$ as this leads to significant difference in cup orientation.

RESULTS:

There was little difference in PT between pre- and 1-year values (3° ; -31° to $+13^\circ$). Early-postoperatively 56.8% showed decreased PT (anterior tilt); 13% (31/250) exhibited significant ($> 10^\circ$) change in PT compared to preoperative, most anteriorly tilted their pelvis (22/31). At 1 year, 70.5% patients showed increased PT (posterior tilt); 10% (26/250) had significant PT change but most posteriorly tilted their pelvis (19/26). All of those that were excessively anteriorly-tilted early-postoperatively, were posteriorly-tilted at 1-yr postoperative. Changes in PT were accompanied by reciprocal changes in LL and PFA ($p=0.28-0.58$; $p<0.001$). There were no correlations between PT changes and sex, age, or PI-LL.

DISCUSSION AND CONCLUSION:

Most THA patients initially experience an increase in anterior pelvic tilt, which leads to functional cup retroversion and increased risk of anterior impingement, contributing to the increased instability-risk seen in early post-THA period. This is likely to occur due to pain or psoas contraction. With time post-THA, the pelvis tilts posteriorly (increase in PT) improving functional anteversion and reducing impingement-risk.