

## How to Predict Spinopelvic Characteristics Post-Total Hip Arthroplasty: A Prospective Study

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### INTRODUCTION:

Spinopelvic characteristics are associated with outcome post-total hip arthroplasty (THA). Predicting what the post-THA spinopelvic characteristics will be using preoperative parameters would enable clinicians to take this change into account for individual THA component planning. This study aims to describe the postoperative change in spinopelvic characteristics, and test whether prediction of what the spinopelvic characteristics are post-THA is possible using demographic and preoperative radiographic parameters.

### METHODS:

This is prospective, cohort study from two tertiary academic centers. In total, 385 patients that underwent primary THA (66±12 years old, 55% females; BMI:28±6) were included. All patients underwent standing and deep-seated radiographs to determine spinopelvic characteristics pre- and 1-year post-THA. The difference in sacral slope ( $\Delta$ SS), lumbar lordosis ( $\Delta$ LL), and pelvic-femoral angles ( $\Delta$ PFA) allowed for calculation of pelvic-, spinal-, and hip- mobility respectively.

### RESULTS:

Preoperatively, patients demonstrated lumbar flexion of 41° (±15), pelvic flexion of 5° (±18) and hip flexion (PFA) of 83° (±21). Postoperatively, lumbar flexion decreased by 3° (±13), pelvic tilt increased by 7° (±16), and hip flexion increased by 3° (±13) (all p-values for paired t-tests < 0.001).

The change in spinopelvic mobility for spine, pelvis, and hip between pre-and post-THA values could not be reliably predicted ( $R^2=0.19$  for  $\Delta$ PFA (dependent on LL,  $PFA_{standing\ pre-op}$  and  $Combined-Sagittal-Index_{post-op}$ ) and  $R^2=0.05$  for  $\Delta$ PT). However, standing PFA could be reliably predicted post-THA [ $PFA_{standing\ postop} = 109^\circ + (0.506 \times PT_{standing\ preop}) + (0.368 \times PFA_{standing\ preop}$ );  $R^2=0.46$ ].

### DISCUSSION AND CONCLUSION:

Post-THA spinopelvic characteristics change little on average but variability of change is large. The change in spinopelvic mobility post-THA, could not be reliably predicted by preop spinopelvic values and thus algorithms that use mobility in their planning might be unreliable. However, standing PFA angle could be reliably predicted with an equation and would be a more reliable preoperative parameter to consider as part of preoperative planning for optimum component orientation.