

Paper #53

The Impact of Total Hip Arthroplasty on Pelvic Motion and Functional Component Position is Highly Variable

Denis Nam, MD, MSc, Venessa Riegler, BA, John C. Clohisy, MD, Ryan M. Nunley, MD, Robert L. Barrack, MD

Notes

Introduction: The impact of pelvic motion on functional total hip arthroplasty (THA) component position continues to be studied with the hope that preoperative functional imaging could aid in predicting an ideal, patient-specific component position. This study's purpose was to determine the effect of THA implantation on pelvic motion, and to assess if pelvic motion differs in patients with a lumbar fusion or history of prosthetic dislocation.

Methods: This was an IRB-approved, prospective investigation consisting of three cohorts: 1) patients without a history of lumbar surgery undergoing THA (Group A), 2) patients with a lumbar fusion (Group B), and 3) patients with a history of THA prosthetic dislocation (Group C). All patients received both standing and sitting, biplanar pelvic radiographic images (EOS Inc.). Chi-square, independent t-tests, and non-parametric Kruskal-Wallis tests were performed (p<0.05 = significant).

Results: To date, 58 patients have been enrolled (24 Group A. 27 Group B. 7 Group C) with no differences in baseline age, gender, or BMI amongst the three groups (p=0.1 to 0.7). In patients undergoing THA, the mean change in sacral slope from standing to sitting preoperatively was $22.1^{\circ} + 15.2^{\circ}$, and postoperatively was $19.5^{\circ} + 14.8^{\circ}$. However, when comparing the change in sacral slope from standing to sitting in each individual patient from before to after THA, pelvic motion decreased in 10 and increased in 14 patients. This preoperative to postoperative difference was >5° in 12 patients, and >10° in 9 patients. The mean change in sacral slope from standing to sitting in patients with a lumbar fusion $(9.8^{\circ} + 8.2^{\circ} \text{ vs. } 22.1^{\circ} + 15.2^{\circ})$. p=0.003) and a history of prosthetic dislocation (12.5° + 4.7° vs. $22.1^{\circ} + 15.2^{\circ}$, p=0.007) was significantly less than in Group A.

Conclusions: Implantation of a THA can increase or decrease sagittal plane pelvic motion from the standing to seated position with a high degree of variability. Thus, the ability to predict ideal component positioning solely from preoperative functional imaging may be challenging.