

## **Robotic-Assisted Versus Manual Total Hip Arthroplasty Performed for Hip Dysplasia**

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**INTRODUCTION:** Developmental dysplasia of the hip (DDH) often requires more complex planning and execution of total hip arthroplasty (THA) secondary to abnormal bone morphology, soft-tissue contractures, and hip center migration. The purpose of this study was to compare radiographic and clinical outcomes in patients with DDH undergoing robotic-assisted (RA) THA versus manual (M) THA.

**METHODS:** A retrospective review identified 115 patients (82% female, median age 49 years, and median BMI 28) with Crowe II–IV dysplasia who underwent primary THA at a single institution from 2016 to 2022. 59 M-THAs and 56 RA-THAs were performed. Radiographic assessment included acetabular inclination, anteversion, leg length discrepancy (LLD), and hip center location. Operative time and complications (dislocation, reoperation, revision) were recorded. Median follow-up was two years.

**RESULTS:** There was no significant difference in operative time between cohorts (median duration 105 minutes for RA-THA v. 119 minutes M-THA,  $p=0.23$ ). Postoperatively, there was no significant difference in mean LLD or hip center restoration between cohorts. The rate of acetabular component malposition (inclination and/or anteversion outliers) was lower in the RA-THA cohort (15%) than in the M-THA cohort (40%) ( $p=0.01$ ). Dislocation occurred in two patients (3%) in the M-THA group and in none of the RA-THA patients ( $p=0.17$ ). Three reoperations, including two component revisions, were required in the M-THA group, while no reoperations occurred in the RA-THA group ( $p=0.09$ ). At one-year follow-up, there were no statistically significant differences in patient-reported outcome measures between groups.

**DISCUSSION AND CONCLUSION:** In this cohort of patients with moderate to severe DDH, RA-THA was associated with a reduced rate of acetabular component malposition with no increased operative time compared to manual technique. These findings suggest that robotic guidance may be a valuable tool in optimizing component positioning for the challenging anatomy associated with DDH.