## Dual Mobility for Oncological Hip Reconstruction: Significantly Reduced Dislocation Rates at 5 Years

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INTRODUCTION: Dual mobility (DM) total hip arthroplasty (THA) has become increasingly popular due to its increased hip mobility compared to standard THA. Despite the possible advantages of DMs in oncologic patients, limited investigations have addressed DMs for oncologic hip reconstruction and no study has compared DMs to conventional THAs and hemiarthroplasties (HAs) while adjusting for potential confounders. Our study sought to determine survivorship free of dislocation, revision, and reoperation, together with radiographic outcomes in patients undergoing DMs, conventional THAs, and HAs, for oncologic reconstruction of the hip.

METHODS: Our institution tumor registry was queried to identify patients undergoing DM, THA, or HAs for oncologic hip reconstruction between 2010 and 2020. We excluded patients with prior joint revisions, those undergoing conversions, as well as those receiving bilateral arthroplasty. Revision was defined as any component removal or exchange, and was per definition a reoperation, whereas surgeries with complete implant retention were reoperations, but not revisions. Radiolucency assessment was based on Gruen and DeLee zones for the femoral and acetabular components, respectively. A one-to-one propensity score match was performed based on age, sex, presence of hip metastasis vs. local hip tumor, and tumor location (acetabulum vs. femur). Comparisons between baseline demographics were performed with the chi-squared test for categorial variables, and the Wilcoxon rank-sum test for continuous variables. Survival analysis was performed using the Kaplan-Meier method. Calculations were performed with R version 3.6.2.

RESULTS: A total of 221 patients undergoing 45 unilateral DMs, 67 conventional THAs, and 109 HAs at two adult and one pediatric tertiary care centers were included (Table 1). In the unmatched cohort, five-year dislocation-free survival was 98% in DMs, 66% in conventional THAs, and 97% among HAs. The 5-year revision-free survival was 69% in DMs, 62% in conventional THAs (p=0.68), and 92% in HAs (p=0.06). Following propensity match (Table 2), five-year dislocation-free survival was 42% in 45 conventional THAs and 98% in DMs (p=0.027) (Figure 1). No differences between DMs and conventional THAs were found in 5-year revision-free survival (69 vs. 40%, p=0.91) (Figure 2) and 5-year reoperation-free survival (64% vs. 38%, p=0.95) (Figure 3). When comparing DMs with HAs, 5-year dislocation-free survival was 100% in matched DMs and 89% in HAs (p = 0.19) (Figure 4). The 5-year revision-free was 83% in DMs and 100% in HAs (p = 0.39). The 5-year reoperation-free was 72% in DMs and 100% in HAs (p = 0.29). Signs of radiolucency were noted in 4 patients with DMs (Gruen 1 and 7, DeLee II and III), none of which progressive or with definitive signs of loosening. In comparison, three patients with THAs showed radiolucency (Gruen 1, Gruen 4, and Gruen 2/6), none with definitive loosening or material failure, and 6 HAs (Gruen 1, 3-times Gruen 4, Gruen 7, Gruen 1/7), one of which progressive (Gruen 4) and predictive of loosening.

DISCUSSION AND CONCLUSION: DMs had the highest 5-year survivorship free of dislocation among all major arthroplasty designs, with statistically significantly lower rates of dislocation compared to conventional THAs. Given comparable rates of revision and reoperation, DMs should be considered the option of choice compared to conventional THAs in oncological reconstruction of the hip. In this patient population where tumor infiltration and progression into the soft tissues and the effect of radiation may play a role as factors increasing instability, it is beneficial to have constructs with additional femoroacetabular stability. More research will be necessary to determine possible indications of DMs as an alternative to HAs in case of femoral involvement.

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