Can External Rotator Preservation Reduce Dislocation Risks Following Posterior Approach Total Hip Arthroplasty in High-Risk Patients? A Multicenter, Propensity Score Matched Comparative Study

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INTRODUCTION: Dislocation following posterior approach total hip arthroplasty (THA) is a major concern and remains one of the leading causes of revision surgery. While various researchers have proposed muscle-sparing techniques to reduce dislocation risk in posterior approach THA, previous studies are limited by small sample sizes and a lack of long-term data. Moreover, no studies have specifically evaluated the efficacy of muscle-sparing techniques in reducing dislocation risk among high-risk patients, such as those with osteonecrosis of the femoral head (ONFH), inflammatory arthritis (IA), or prior history of spinal fusion, which are known as independent risk factors for dislocation after THA. Therefore, in this study, we conducted a minimum 2-year comparison between the previously described external rotator preservation (ERP) approach and the standard posterior approach with soft tissue repair in THA, focusing specifically on these high-risk populations. The primary outcome was overall and 90-day dislocation risk. Secondary outcomes included 10-year survival rate for revision due to dislocation, all-cause revision, clinical outcomes (surgical complications, Harris Hip Score [HHS]), and postoperative radiographic parameters. Additionally, subgroup analyses were conducted for patients with ONFH, IA, and a history of spinal fusion to evaluate whether specific patient subgroups derived greater benefit from the ERP approach.

METHODS: We retrospectively identified 7,212 cases that underwent primary THA using the ERP approach (4,055 cases) or standard posterior approach (3,157 cases) with soft tissue repair between January 2008 and December 2022, by four dedicated hip arthroplasty surgeons at eight sites of one academic center. To analyze the results of patients at high risk of dislocation after THA, we included the patients who underwent surgery for ONFH or inflammatory arthritis (rheumatoid arthritis, ankylosing spondylitis) and patients with a prior spinal fusion before surgery. The exclusion criteria were as follows: (1) patients with less than two years of follow-up data, (2) post-traumatic ONFH, (3) history of prior surgery on the affected hip, (4) neurologic disorder or deficit on the operated limb (e.g. hemiplegia, poliomyelitis), (5) simultaneous bilateral THA. After exclusion, a total of 512 cases were eligible for analysis in the ERP group, comprising 221 ONFH cases, 105 IA cases, and 186 prior spinal fusion cases. For the control group, a 1:1 matched cohort of age, sex, body mass index (BMI), surgical indication, history of prior spinal fusion, and year of surgery was selected among 3,157 cases who underwent THAs through the standard posterior approach with soft tissue repair who were eligible for analysis (512 cases, control group). The mean age was 55.1 and 55.2 years, with follow-up durations of 102.7 and 102.4 months for the ERP and control groups, respectively. Binary logistic regression analysis was performed to compare the odds of surgical complications, including overall and 90-day dislocation risk between the two groups. Kaplan-Meier survivorship analysis was used to compare the 10-year implant survivorship for revision due to dislocation and all-cause revision.

RESULTS: The overall rate of dislocation was significantly lower in the ERP group than in the control group (1.0% vs. 5.5%; odds ratio (OR), 0.17; [95% confidence interval (CI), 0.05-0.58]; $p = 0.001$). In addition, patients in the ERP group were at decreased risk for 90-day dislocation (0.6% vs. 4.5%; OR, 0.18; [95% CI, 0.03-0.61]; $p = 0.009$). In subgroup analyses, dislocation rates for ONFH patients were significantly lower in the ERP group (0.5% vs. 4.5%; OR, 0.10; [95% CI, 0.01-0.76]; $p = 0.006$) and prior spinal fusion group (2.2% vs. 8.6%; OR, 0.23; [95% CI, 0.07-0.72]; $p = 0.009$), but we found no differences in IA patients (1.0% vs. 3.8%; OR, 0.33; [95% CI, 0.03-3.22]; $p = 0.621$). There were no differences in 10-year survivorship free from both revision for dislocation (100% for the ERP group and 98.2% for the control group [log-rank test, $p = 0.083$]), and any revision (97.7% for the ERP group and 96.9% for the control group [$p = 0.569$]). There were also no differences in the risk of any surgical complications except for dislocation (periprosthetic joint infection, aseptic component loosening, periprosthetic fracture, ceramic fracture, sciatic nerve palsy, heterotopic ossification, hematoma formation, and wound complication). Additionally, no differences were found in the latest HHS (91.9 vs. 90.8; p=0.481) and radiographic parameters including the mean acetabular cup inclination (41.5 ± 6.2 vs. 42.3 ± 6.7, degrees; $p = 0.476$), anteversion (15.7 ± 5.8 vs. 16.2 ± 6.6, degrees; $p = 0.665$) and perioperative differences in leg length discrepancy (6.9 ± 3.1 vs. 5.8 ± 4.4, mm; $p = 0.771$) between the ERP and control group, respectively.

DISCUSSION AND CONCLUSION:

In patients with high-risk indications for postoperative dislocation after primary THA, the ERP approach showed significantly reduced risks in both overall and 90-day dislocation compared with the standard posterior approach with soft tissue repair. This difference was observed without any significant variation in other clinical outcomes or radiographic parameters after surgery. The external rotator preservation in THA may serve as an effective option for performing posterior approach THA in these high-risk patients, especially in patients with ONFH or a history of spinal fusion.