Midterm Functional Outcomes of Periacetabular Osteotomy After Failed Hip Arthroscopy for Symptomatic Acetabular Dysplasia

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No Disclosures

Introduction
Prior failed hip arthroscopy has been associated with worse short-term outcomes after periacetabular osteotomy (PAO). This study aimed to assess its relationship with mid-term PAO outcomes by evaluating hip-specific patient-reported outcome measures (PROMs) and assessing differences in achieving patient acceptable symptom state (PASS) and minimal clinically important difference (MCID) thresholds. It was hypothesized that prior hip arthroscopy would not be associated with achieving PASS or MCID at mid-term follow-up.

Methods
Patients with symptomatic acetabular dysplasia undergoing isolated PAO with or without concomitant hip arthroscopy between September 2016 and June 2020 were identified retrospectively from a prospective, single-center hip preservation registry. Patients with a minimum 2-year follow-up from their most recent PAO with PROMs were included (161 patients, 216 hips; mean follow-up, 5.7 ± 1.7 years). Patients were either placed into the PREVSCOPE group, which consisted of those who had undergone hip arthroscopy before PAO (47 patients, 52 hips), or the PAOALONE group, which consisted of patients who had not undergone prior hip arthroscopy (114 patients, 164 hips). Demographic and radiological variables were assessed, with 96.3% (51 of 52) and 98.1% (158 of 164) of hips in the PREVSCOPE and PAOALONE groups, respectively, coming from female patients. The modified Harris Hip Score (mHHS) and the International Hip Outcome Tool-12 (iHOT-12) were assessed pre- and postoperatively. The MCID was defined as an outcome change ≥ 18 for the mHHS and ≥ 26 for iHOT-12. PASS was defined as a postoperative score of ≥ 71 for mHHS and ≥ 65 for iHOT-12. For patients with bilateral PAOs, the follow-up time for PROMs was described from the most recent procedure. Radiographic parameters were analyzed on a per-hip basis, while PROMs were analyzed on a per-patient basis. Normality was assessed. Comparisons between the PREVSCOPE and PAOALONE groups were performed using independent-sample t-tests or Wilcoxon Mann-Whitney tests, where appropriate, for continuous variables and using the chi-square or Fisher exact test, where appropriate, for categorical variables. To determine the independent effect of prior hip arthroscopy on achieving PASS and MCID, a multivariate logistic regression analysis controlling for baseline radiographic differences was performed. Significance was defined as p-values less than 0.05.

Results
Age, body mass index, and sex were not different between the PREVSCOPE and PAOALONE groups. The mean preoperative lateral center edge angle was higher in the PREVSCOPE group ($p < 0.001$). Mean alpha angle was lower in the PREVSCOPE group ($p < 0.001$). There was no difference in mean Tönnis grade, femoral version, or acetabular version between groups. Mean follow up was 5.9 ± 1.6 years for the PREVSCOPE group and 5.6 ± 1.7 years for the PAOALONE group ($p = 0.37$). There was no difference in mean preoperative mHHS or iHOT-12 scores. Patients in the PREVSCOPE group had lower mean postoperative mHHS scores than patients in the PAOALONE group (85.2 ± 13.1 vs 89.2 ± 13.3, $p = 0.03$). However, no differences were found in the PASS or MCID rates for mHHS or iHOT-12 between groups (all $p > 0.05$). Rates of subsequent surgery were not different between the groups ($p = 0.62$). More patients in the PREVSCOPE group converted to THA (5.3% (3 of 52 hips) vs 0.6% (1 of 164 hips) $p = 0.04$).

Discussion
The principal finding of this study was that, at a mean 5.7-year follow-up, prior failed hip arthroscopy was not associated with a reduced likelihood of achieving clinically meaningful improvement, as defined by PASS and MCID thresholds for mHHS and iHOT-12, after PAO. This result persisted after adjustment for baseline radiographic and procedural confounders. Secondarily, hips that failed prior arthroscopy underwent THA at a higher rate, although the overall incidence of subsequent surgery was similar between the two groups. This study has several limitations. First, since the majority of prior arthroscopies were performed at outside institutions, data regarding these procedures is missing. However, thorough imaging performed prior to PAO ensured reasonable understanding of joint condition. Second, this is a retrospective study, which by nature, has the potential for bias; however, many variables included were collected prospectively, lessening this effect when possible. Third, radiographic data only were analyzed per hip, not accounting for non-independence between hips from the same patient; however, this is unlikely to substantially affect interpretation of the main findings. In conclusion, this study found that prior failed hip arthroscopy is not a risk factor for failing to achieve a clinically successful outcome at mid-term follow-up after PAO. While the failed arthroscopy patient population may be more complex and at higher risk for eventual arthroplasty, the PAO remains a durable and effective treatment.

Clinical Relevance
Surgeons can be confident offering PAO to appropriately selected patients, regardless of prior arthroscopy history. However, patients should be made aware of the potentially slower recovery timeline.