The Fragility of Statistical Differences Between Surgical Approaches in Total Hip Arthroplasty

Alec Michael Giakas, Alexandra L Hohmann[1], Emma Grace Boyajieff, Mason Thomas Sellig, Jess H Lonner[1]
[1]Rothman Orthopaedic Institute

INTRODUCTION:
Total hip arthroplasty (THA) is a successful treatment for hip osteoarthritis, but the optimal surgical approach for this procedure is a topic of debate. This review utilizes a fragility analysis to determine the statistical fragility of randomized controlled trials (RCTs) comparing the most common three surgical approaches for THA: direct anterior, direct lateral, and posterior.
METHODS:
A systematic review was conducted to identify RCTs comparing two of the three surgical approaches for THA. Dichotomous outcomes and study characteristics including cohort size and loss to follow up were extracted from each study meeting inclusion criteria. Fragility index (FI) and fragility quotient (FQ) were calculated for each significant outcome ($p \geq 0.05$) and reverse fragility index and quotient (rFI and FQ) were calculated for each nonsignificant outcome ($p > 0.05$). Median fragility values were calculated for each study, outcome category, approach comparison, and for favored approach.
RESULTS:
Our search yielded 20 studies in total with 146 identified dichotomous outcomes. In total, the outcomes had a median FI of 5 (IQR 4-6) and a median rFI of 5 (IQR 1-11). All subgroup analyses of outcome categories and approach comparisons had median FIs between 5 and 7 and rFIs between 4 and 6. Significant outcomes that favored the anterior approach had a median FI of 6, and significant outcomes that favored the posterior approach or the lateral approach both had a median FI of 1.
DISCUSSION AND CONCLUSION:
Randomized control trials comparing approaches to THA had an average median FI of 5, signifying that the reversal of five events would be sufficient to change the significance of the entire outcomes. This value is comparable to other FIs within the orthopaedic literature, but subgroup analyses elucidated areas of greater statistical fragility, particularly in outcomes favoring either the lateral or posterior approaches in THA.