Reverse Fragility Index: Comparing Rates of Secondary Procedures After Hemiarthroplasty VersusTotal Hip Arthroplasty for Geriatric Femoral Neck Fractures: A Systematic Review of Randomized Controlled Trials

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Purpose: The reverse fragility index (RFI) quantifies the reliability of studies reporting statistically nonsignificant results. The purpose of this study was to use the RFI to determine the robustness of randomized controlled trials (RCTs) reporting nonsignificant differences in rates of secondary/revision procedures between hemiarthroplasty (Hemi) and total hip arthroplasty (THA) for treatment of geriatric femoral neck fractures (FNFs) (OTA/AO 31B).

Methods: A systematic review was performed to identify RCTs published in the last 25 years that compared Hemi to THA for FNFs. Studies reporting nonsignificant differences in rates of secondary procedures were included. The RFI, defined as the minimum number of event reversals necessary to change nonsignificant outcomes to statistically significant ($P<0.05$), was calculated for each study. The reverse fragility quotient (RFQ) was calculated by dividing the RFI by the sample size.

Results: Five RCTs were included for a total of 1867 patients and 138 secondary procedures. The overall rate of secondary procedures was 7.4%. The median (interquartile range) of secondary procedures was 5.0% (3.8%-7.3%) in the Hemi group and 7.9% (5.0%-10.0%) in the THA group. The most common secondary procedures were implant revision and closed reduction of a dislocation for the Hemi and THA groups, respectively. The median RFI was 3, indicating that if the outcome of 3 patients were reversed, then the result would change from nonsignificant to statistically significant. The median RFQ was 2.5% (1.9%-2.5%), indicating that an outcome reversal of 2.5% of patients would change the results to significant. The median number of patients lost to follow-up was 29 (21-37). Every one of the 5 included studies had a loss to follow-up greater than its RFI.

Conclusion: The results of RCTs reporting similar rates of secondary/revision procedures between Hemi and THA would become statistically significant if the outcome of only a small number of patients were reversed. This number was always less than the loss to follow-up; thus, the results of these studies are fragile and a true difference in rates of secondary procedures may have been undetected.