

Question: Is there a difference in outcomes between hemiarthroplasty and total hip arthroplasty for patients with displaced femoral neck fractures?

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Response/Recommendation: Based on randomized controlled trials (RCT), at up to 5 years follow up, there appears to be no important difference between hemiarthroplasty (HA) and total hip arthroplasty (THA) performed for patients with displaced femoral neck fracture. The use of THA is associated with better health-related quality of life (HRQoL) and function. Estimated blood loss and operative time are both significantly lower in hemiarthroplasty compared to THA.

Level of Evidence: High

Rationale:

Given the preponderance of RCT studies available, this analysis was limited to published RCTs on the topic, with up to 5 years' follow-up. Nineteen RCTs were included with a total sample size of 3,414 patients with a mean age of 78.1 years old (1–19). The outcomes of interest included all important clinical outcomes which were reported in a sufficient number of studies to allow for quantitative meta-analysis. These outcomes included mortality, revision surgery, periprosthetic fracture, complications, dislocations, operative time, estimated blood loss, function, and HRQoL.

In summary, based on quantitative meta-analyses, there was no significant difference between HA and THA in terms of mortality, revision surgery, periprosthetic fracture, total complications, or dislocations. The most robust evidence exists for revision and dislocation, each of which were reported in 14 studies (1–3,5,8,10–16,18,19). It should be noted that dislocations, which have previously been reported as being more likely with THA, were not significantly different between the groups in this analysis. While the absolute dislocation rate was indeed higher in THA patients (4.6%, 59/1270) compared to HA (2.9%, 38/1325), this difference was not significant (odds ratio [OR]: 1.48, 95% Confidence Interval [CI]: 0.60–3.65). Mortality rates (11 RCTs) were nearly identical between groups, at 15.3% for THA patients versus 15.8% for HA patients (OR: 0.98, 95% CI: 0.79–1.22) (3,8–15,19,20).

One option which may be considered to help reduce the risk of dislocation is dual mobility THA. While beyond the scope of this question, a systematic review mostly comprising of non-randomized studies did find a significantly lower dislocation rate with dual mobility THA compared to HA in patients with femoral neck fracture (21). The only RCT included in the present review (n = 60) demonstrated a significant reduction in dislocation rates in the dual mobility THA group (0%) compared to the bipolar HA group (16.6%) (20). However, the role of dual mobility THA remains unclear due to a lack of strong, RCT evidence, and in particular, it is unclear if there is a sufficient reduction in dislocation rates to justify the added cost and unique complications associated with dual mobility implants.

There were small and statistically significant differences in favour of THA in terms of function and HRQoL. Based on 9 RCTs, and with scores converted to the most common

instrument (Harris Hip Score, range 0-100, higher scores = better), THA patients had a significantly higher mean score than HA patients (Mean Difference [MD]: 4.59, 95% CI: 1.65-7.53) (4–6,11–14,16,18). However, this is smaller than the previously established minimal clinically important difference (MCID) for the Harris Hip Score following arthroplasty (8 points) (22). Similarly, based on 5 studies, there was a significantly higher HRQoL score based on the EuroQol-5-Dimensions for THA versus HA patients (MD: 0.05, 95% CI: 0.02-0.08) (11–14,18). The MCID estimate for EQ-5D has been determined to be 0.145 based on the best available literature (22), exceeding the mean difference.

Patients undergoing HA had significantly lower estimated blood loss (MD: 133.04 mL, 95% CI: 96.39-169.69) (3–7,9,16,17), and significantly shorter operative times (MD: 29.72 mins, 95% CI: 17.95-41.49) (3–7,13,16,18,20). These findings are not surprising, given that acetabular work is not required in HA, whereas it is required in THA. The clinical importance of these findings is difficult to estimate – on the one hand, it is well-established that longer operative times increase the risk of infection. However, the weighted mean operative time for the THA patients was only 96 minutes, and thus operative times in all patients were relatively short. As well, total complications (which included infection in some studies), did not differ between groups. In terms of estimated blood loss, the difference is statistically significant, but less than 150mL, which may not have clinical significance. Transfusion rates, which were not reported in enough studies to allow for quantitative analysis, would be a more clinically important outcome to compare between groups.

Some interesting secondary analyses have been performed using data from the largest RCT on this topic, the HEALTH trial. Patients who underwent HA or THA by non-arthroplasty trained surgeons had significantly higher rates of peri-prosthetic joint infection and discharge to a facility other than home. There was no significant difference in reoperation rate (23). In terms of the functional and HRQoL differences, THA compared to monopolar arthroplasty was associated with a small but clinically unimportant benefit, whereas THA versus bipolar arthroplasty was not. Higher American Society of Anesthesiologist (ASA) score and pre-operative use of a mobility aid were associated with lower functional and HRQoL scores regardless of treatment (24). Finally, a secondary analysis of the HEALTH trial identified a range of factors associated with risk of revision surgery, including age, body mass index, comorbidities, and length of operation (25).

Overall, there is no evidence to support recommending THA or HA universally in elderly patients with femoral neck fractures. Given high mortality rates following hip fractures, and the reduced costs, operative time, and blood loss, HA remains an excellent option in treating these patients. Given that the arguments regarding THA in this population commonly revolve around potentially improved function, and the small but statistically significant benefits found in these data, THA can be considered in younger, healthier, and more active patients, however this recommendation cannot be said to be evidence-based as the studies analyzed did not differentiate among patients on these criteria.

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APPENDIX – FOREST PLOTS

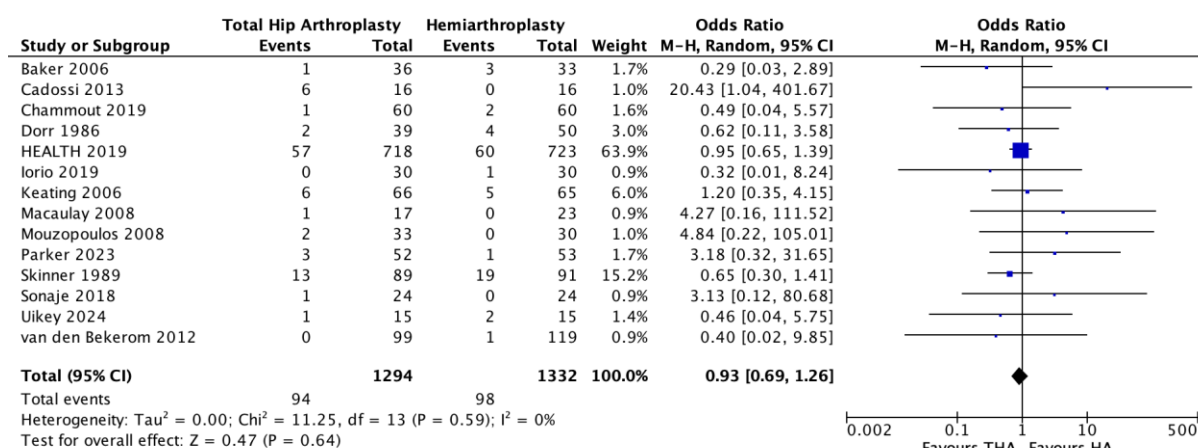


Figure 1 – Revision Surgery

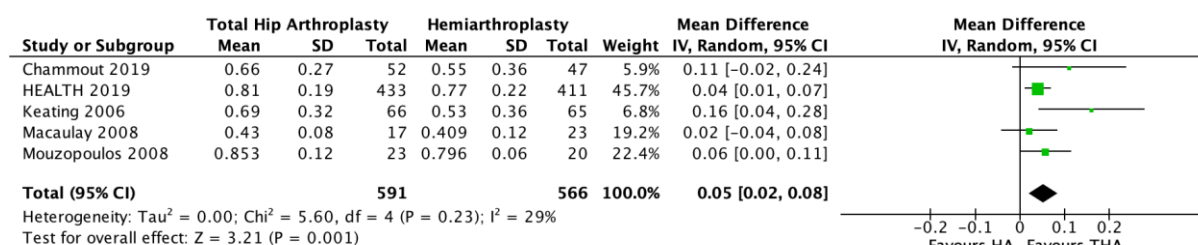


Figure 2 – Health-related quality of life

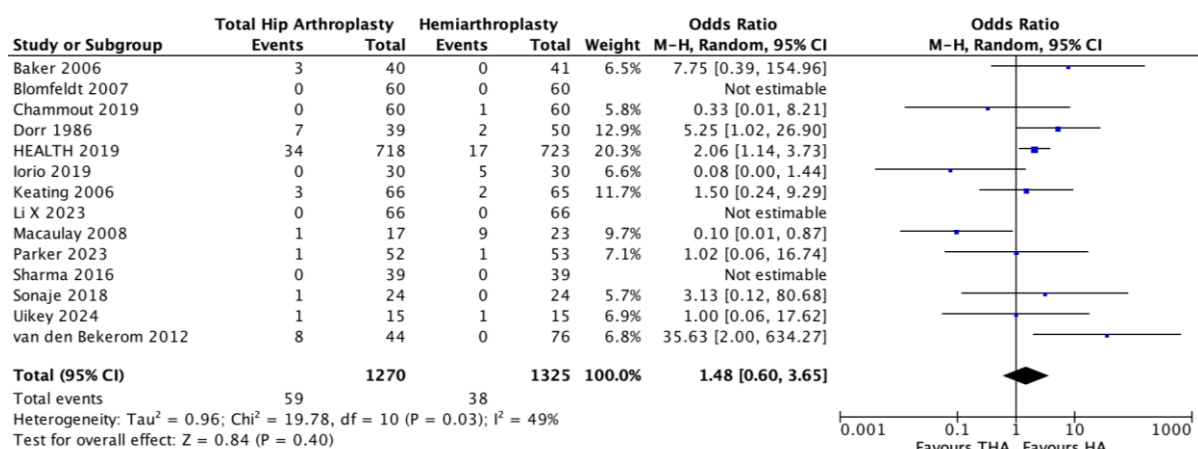


Figure 3 – Dislocation rates

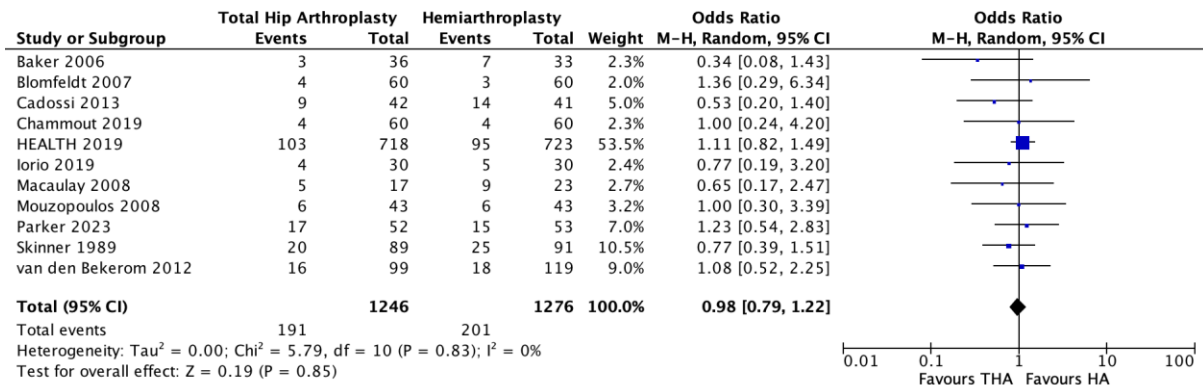


Figure 4 – Mortality rates

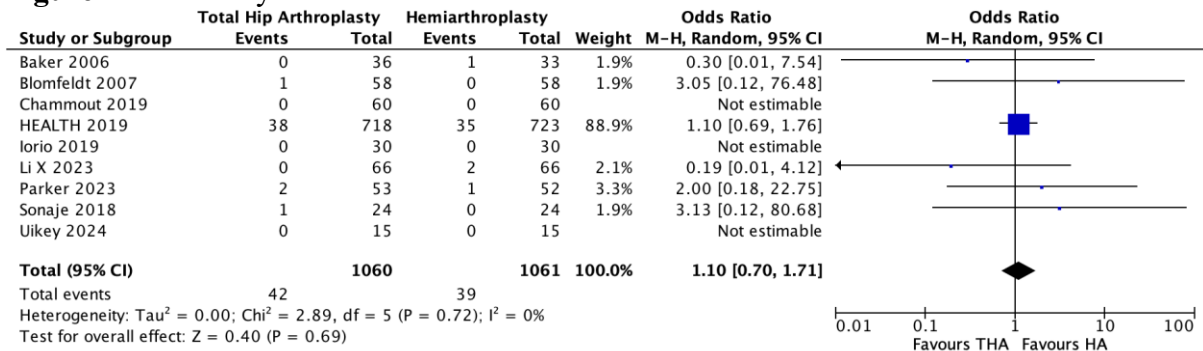


Figure 5 – Periprosthetic Fracture

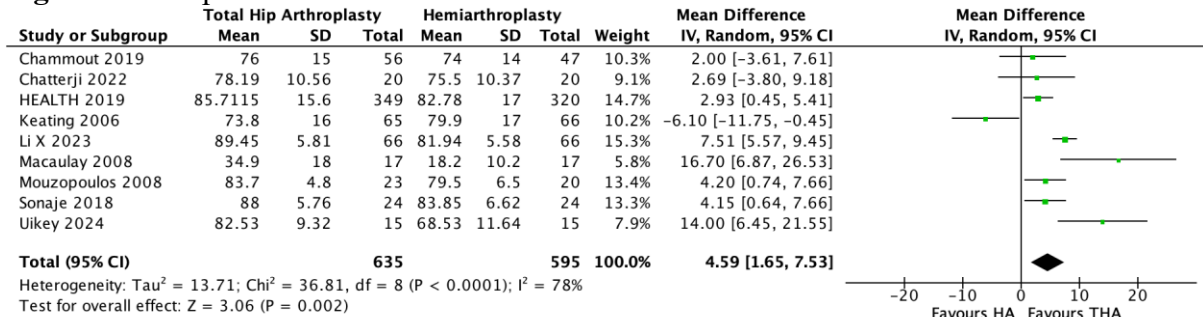


Figure 6 – Function

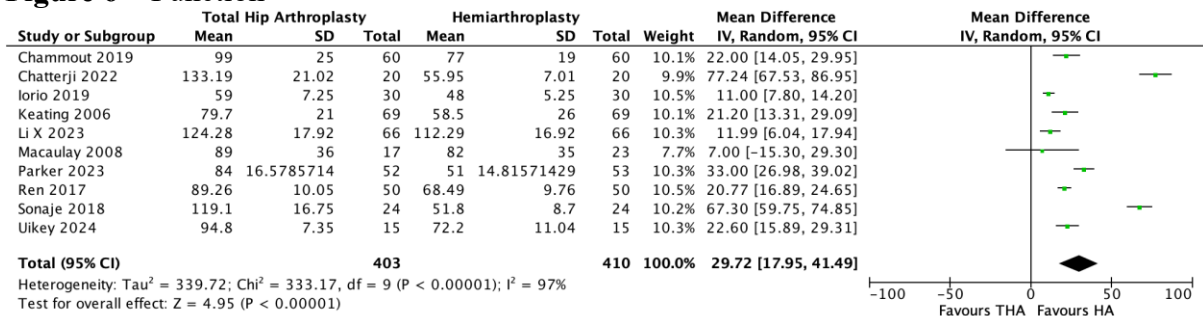


Figure 7 – Operative Time

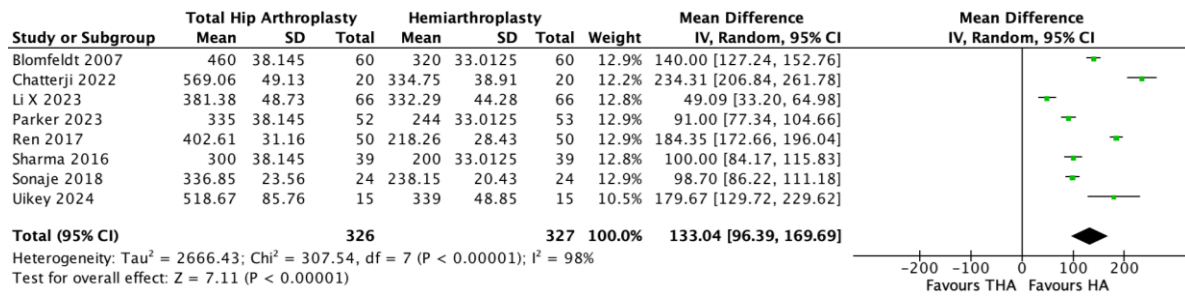


Figure 8 – Estimated Blood Loss