

The Incidence of All-Cause Mortality After Contemporary Total Hip Arthroplasty: A Meta-Analysis of 3,297,363 Cases.

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INTRODUCTION:

Mortality after total hip arthroplasty (THA) is a rare but devastating complication for patients and their loved ones. However, contemporary data on long term mortality rates after THA is relatively sparse. Therefore, the present study aimed to estimate the mortality rates at 30-days, 90-days, 1-year, 5-years, and 10-years after THA.

METHODS:

This was a level III meta-analysis investigating all-cause mortality after unilateral, primary THA. Queries were performed in PubMed, MEDLINE, Cochrane, EBSCO host, and Google Scholar databases for eligible studies between January 2011 and October 2021. Mortality rates were extracted at 30-day, 90-day, 1-year, 5-year, and 10-year follow-up timepoints. Inverse-variance proportion models using Freeman-Tukey Double-Arcsine Transformations were constructed to quantify the incidence of mortality normalized per 100 cases at each timepoint. At timepoints with complete data, random-effects multiple meta-regression was performed to investigate the potential effect modifiers of age (captured at time of THA) and body mass index (BMI) on mortality.

RESULTS:

A total of 61 studies (3,297,363 patients) were included. The overall mortality rate was 3.9%. The pooled incidence of mortality at 30-days was 0.49 (95% confidence interval [95% CI]: 0.23-0.84) deaths/100 patients (n=15 studies; age=65.1±7.1 years) (See Fig.1A). Mortality at 90-days was similar at 0.47 (95% CI: 0.38-0.57) deaths/100 patients (n=30 studies; age=65.8±7.9 years) (See Fig.1B). Mortality increased exponentially between 90-days and 5-years, with a rate of 1.90 (95% CI: 1.22-2.73) deaths/100 patients at 1-year (n=18 studies; age=65.7±8.3 years) and 9.85 (95% CI: 5.53-15.22) deaths/100 patients at 5-years (n=6 studies; age=66.5±8.4 years) (See Figures 1C and 2A, respectively). At 10-year follow-up, the mortality rate increased to 16.43 (95% CI: 11.17-22.48) deaths/100 patients (n=12 studies; age=65.1±7.1 years) (See Fig.2B). Multiple meta-regression at 90-days, 1-year, and 5-years indicated that for every 1-year increase in age, the mortality effect size increased by 0.007 (95% CI: 0.002-0.01; p<0.001), 0.008 (95% CI: 0.005-0.01; p<0.001), 0.02 (95% CI: 0.01-0.03; p<0.001), respectively (See Fig.3). The overall trend in mortality rates from 30-days to 10-years after THA is illustrated in Figure 4.

DISCUSSION AND CONCLUSION:

All-cause mortality remains low after contemporary THA. Relative changes in mortality rates are not observed within 90-days after THA. As expected, age, but not BMI, was significantly associated with treatment effect size, with older age partially explaining higher mortality rates. More long-term studies are needed to further clarify modifiable risk factors associated with mortality among THA patients.

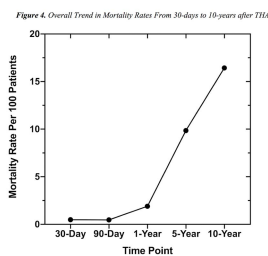
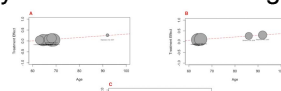
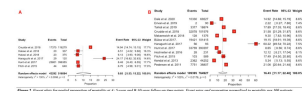
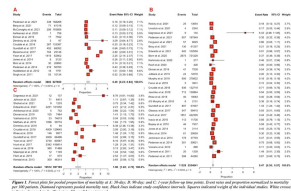


Figure 4. Overall Trend in Mortality Rates From 30-days to 10-years after THA

Figure 3. Multiple meta-regression plots demonstrating the association of mortality of age and BMI. *p<0.001, **p<0.01, ***p<0.0001. BMI=Body Mass Index; CI=Confidence Interval; THA=Total Hip Arthroplasty. The forest plot shows the association between age and mortality rates at 90-days, 1-year, and 5-years. The x-axis is 'Age' and the y-axis is 'Mortality Rate Per 100 Patients'. The forest plot shows the association between BMI and mortality rates at 90-days, 1-year, and 5-years. The x-axis is 'BMI' and the y-axis is 'Mortality Rate Per 100 Patients'.