

Higher Surgeon Energy Expenditure with Total Hip Arthroplasty compared to Total Knee Arthroplasty

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INTRODUCTION: Previously published studies have hypothesized that total hip arthroplasty (THA) requires the surgeon to expend more energy than total knee arthroplasty (TKA). However, techniques for performing these procedures have evolved. Therefore, we sought to compare if primary THA had increased energy expenditure compared to primary TKA.

METHODS: We prospectively recorded the heart rate, respiratory rate, minute ventilation, cadence, and energy expenditure of a single fellowship-trained arthroplasty surgeon over 83 days while performing primary THA and TKA. Patient demographics and operative records were reviewed to evaluate differences in the physical demands of each surgical case. Age (64.3 versus 65.9 years, $p=0.1$) and gender (54.8% versus 51.0% female, $p=0.5$) were similar between THA and TKA, but TKAs had a higher body mass index (31.1 versus 28.7 kilograms/meter², $p<0.001$). Chi-square and independent-samples t-tests were used to compare cohorts. Significance was set at $p<0.05$.

RESULTS:

THA tended to have 1.1 times longer operative time than TKA (102.2 versus 88.9 minutes, $p<0.001$). THA had a statistically higher heart rate compared to TKA, although this is unlikely to be clinically significant (82.5 versus 80.7 beats/minute, $p<0.001$). Respiratory Rate was 1.1 times higher (15.9 versus 14.9 respirations/minute, $p<0.001$) and minute ventilation was 1.2 times higher (19.6 versus 16.9 liters/minute, $p<0.001$) when performing THA. Cadence was 1.5 times higher when performing TKA (4.2 versus 2.8 steps/minute, $p<0.001$). THA had a 1.2 times higher energy expenditure/patient (378.8 versus 312.0 Calories/patient, $p<0.001$) and a 1.1 times higher energy expenditure/minute (3.7 versus 3.5 Calories/minute, $p=0.01$) compared to TKA.

DISCUSSION AND CONCLUSION: THA is associated with longer operative time and increased energy expenditure compared to TKA. Despite THA and TKA procedures becoming more efficient, arthroplasty surgery continues to have heavy physical burden on the surgeon. Further research is needed to understand ways to decrease surgeon energy expenditure and promote career longevity.