Physical and Mental Demand During Total Hip Arthroplasty
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INTRODUCTION:
Manual total hip arthroplasty (MTHA) has been shown to be a physically demanding procedure for surgeons. Robotic-assisted total hip arthroplasty (RATHA) is a newer technology intended to enhance the accuracy of acetabular component placement. However, the impact of this technology on surgeon physical demand has yet to be explored. This study compared the mental and physical demand of RATHA compared to MTHA. Specifically, we assessed: 1) task duration, 2) biometric parameters (i.e., caloric energy expenditure, heart rate), and 3) subjective measures of mental and physical demand during MTHA compared to RATHA.

METHODS: Two surgeons performed 12 THAs on 6 cadaveric specimens. For each specimen, one hip underwent MTHA, and RATHA was performed on the contralateral hip. Using a wearable technology, biometric parameters including heart rate and caloric energy expenditure were measured in each surgeon. Following each surgery, each surgeon surveyed to compare the physical and mental demand of MTHA and RATHA. All questions were assessed on a scale from 1 (low) to 10 (high). Student’s t-tests were performed to compare data between MTHA and RATHA.

RESULTS: Mean task duration was 10.5 minutes with RATHA and 12.3 minutes with MTHA (Table 1). Surgeon caloric expenditure was 83.5 kcal with RATHA and 100 kcal with MTHA (P=0.49) (Figure 1). Overall mental demand was 4.2 for RATHA and 5.5 for MTHA (P=0.10). Mental demand during acetabular reaming was 3.2 with RATHA compared to 5.7 with MTHA (P=0.007) (Figure 2). Overall physical demand was for 4.3 for RATHA and 5.5 for MTHA (p=0.42). Mean physical demand reported during acetabular reaming was 4.3 for RATHA and 5.5 for MTHA (p=0.08).

DISCUSSION AND CONCLUSION:
Robotic-assisted THA reduces the mental demand of acetabular reaming compared to manual THA. In addition, RATHA may reduce surgeon energy expenditure compared to MTHA. There may be a relationship between surgeon experience and energy expenditure.