Robotic Total Knee Arthroplasty is Associated with Decreased Surgeon Physiologic Demand

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INTRODUCTION:

Robotic technology in total knee arthroplasty (TKA) is becoming increasingly popular. Robotic assisted TKA can generally be incorporated into TKA workflow without significant disruption, however the effect of the technology on surgeon physiologic stress remains unknown. The purpose of this study was to compare surgeon energy expenditure during TKA with and without robotic technology.

METHODS:

Two physicians at a single institution were consecutively enrolled in a prospective manner to collect physiologic parameters, including heart rate variability, ventilation data and energy expenditure via a smart vest worn during surgery. One physician performed only robotic TKA while the other physician performed both manual and robotic TKA. Patient demographic and surgical variables were collected. Complex primary TKA and revision TKA cases were excluded. 53 (68.2%) TKA cases with a single robotic-assisted technology system were compared to 24 (31.8%) manually instrumented TKA cases. Categorical variables were compared with Chi Square test and physiologic parameters were compared using Student T-test.

RESULTS:

Robotic and manual TKA patients were comparable in age, sex, BMI and ASA (p>0.05). Robotic TKA cases were similar in length to manual TKA cases (84.4 ± 18.2 vs 86.7 ± 12.7 min, p=0.578). Robotic TKA was associated with lower energy expenditure (282.8 ± 108.2 vs 363.8 ± 90.8 cal, p=.002), lower average heart rate (76.1 ± 5.1 vs 79.2 ± 5.9 beats per minute, p=0.029) and decreased minute ventilation (23.9 ± 2.7 vs 28.1 ± 3.0 , p<0.001).

DISCUSSION AND CONCLUSION:

Robotic total knee arthroplasty has decreased physiologic burden relative to manual total knee arthroplasty. As arthroplasty surgical volume continues to increase, it is prudent to understand how novel technologies can not only improve technical accuracy but also decrease the physiologic burden imposed by surgery.