



Analysis of surgeon biometrics during open and robotic radical cystectomy with electromyography and motion capture analysis

Adam Baumgarten ¹, Joon Kyung Kim ¹, Jeff Robison ¹, John Mayer ², Dustin Hardwick ², Trushar Patel ¹

¹ Department of Urology, University of South Florida, FL, United States; ² Department of Physical Therapy, University of South Florida, FL, United States

ABSTRACT

Purpose: To determine feasibility of measuring surgeon physical stress during both open radical cystectomy (ORC) and robotic radical cystectomy (RRC).

Materials and Methods: One patient underwent ORC, while the other underwent RRC by a single surgeon. The diversion was excluded from this study. Noraxon® myoMOTION™ kinematics sensors were used to quantify the amount of joint and segmental motion of the spine, shoulders, and head. myoMUSCLE™ EMG sensors were used to measure activation levels, patterns, and fatigue characteristics of key muscle groups. The Prone Static Plank Test (PSPT) and Modified Biering-Sorensen Test (MBST) were used to assess surgeon strength and endurance of core musculature.

Results: The surgeries were represented in five stages. During ORC, the percentage of time spent in cervical flexion was 98%, 91.8%, 87.5%, 100%, and 97.1%, respectively. During RRC, 100% of the time was spent in cervical flexion. Activation of key muscle groups was examined across all stages and expressed as a percentage of peak activation. MBST times were both 25 second pre-and post-surgery ORC and 25.1 seconds pre-surgery and 32.4 seconds post-surgery for RRC. PSPT times were 68 second pre-surgery and 48 seconds post-surgery for ORC, and 59 second pre-surgery and 51 seconds post-surgery for RRC.

Conclusion: We were able to identify meaningful data using kinematic and EMG analysis during ORC and RRC. We were able to identify target muscle groups that will be used to conduct a larger study with multiple surgeons to help determine if there is an ergonomic advantage to RRC over traditional ORC.

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 Adam Baumgarten

<https://orcid.org/0000-0001-8042-7036>

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Correspondence address:

Adam Baumgarten, MD
Department of Urology
University of South Florida, CA, USA
2 Tampa General Circle
Tampa, 33620-9951, Florida, CA, United States
E-mail: abaumgar@health.usf.edu