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

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

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

ARTICLE INFO

Adam Baumgarten
https://orcid.org/0000-0001-8042-7036

Available at: http://www.intbrazjurol.com.br/video-section/20190163_Baumgarten_et_al
Int Braz J Urol. 2019; 45 (Video #X): XXX-X