



Experience of surgeon, hospital, and comprehensive cancer team critical to the outcomes of radical cystectomy and urinary diversion

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Though radical cystectomy is considered gold standard for muscle-invasive urothelial carcinoma (UC) of the bladder, the operation is fraught with significant perioperative morbidity with a complication rate ranging from 34% to 52% (1,2). Given the nature/biology of the disease, operative time, hospital stay and complication profile, UC is costly from a health services perspective (3). Mossanen *et al.* investigated the rate and incidence of complications and its effect on perioperative mortality utilizing the Premier Healthcare Database. Despite the limitations of utilizing a population-based hospital discharge database, the authors found that as the number of complications increase, the predicted probability of mortality also increased, especially if patients suffered from ≥ 4 complications during their index stay (1.0% to 9.7%, $P < 0.001$) (4). Moreover, a complication causing readmission resulted in an increase in the predicted probability of postoperative mortality from 3.9% to 7.4%, $P < 0.001$. Cardiac, pulmonary and renal complications were the most significant predictors of mortality of the 12 categories studied (4). Intuitively, the study confirms the notion that as perioperative or postoperative complications increase, patient outcomes worsen.

More critical than the results of the study is the notion that an opportunity exists to enact changes in the management of these patients to not only avoid complications but also successfully manage them. The authors focus on the early diagnosis and successful treatment of complications by adopting early warning

scores such as the Modified Early Warning Score (MEWS) or by wearing bracelets that provide dynamic monitoring of patient vital signs when patients transition to home (4). However, solely focusing on the early diagnosis and treatment of complications misses the “big picture” and fails to address patient-, surgery- and hospital-specific factors that, when modified, can improve patient morbidity and mortality. Inability to correct these factors will drive complication rate and worsen patient outcomes.

Treatment of vulnerable populations such as the frail or elderly impacts complication rate and postoperative morbidity/mortality. For example, the co-morbid diagnosis of sarcopenia, and even more critical, frailty, can result in a higher degree of Clavien-Dindo $> 3b$ complications in patients undergoing radical cystectomy compared to non-sarcopenic patients (5). Moreover, oncologic outcomes are severely impacted in sarcopenic patients as one series determined a significant difference of about 2 years with respect to overall survival in patients receiving adjuvant chemotherapy (6). Optimization of these patient-specific factors improves patient outcomes and can lessen morbidity. Specifically, aggressive preoperative nutritional support and rehabilitation, as well as utilization of enhanced recovery after surgery (ERAS) protocols can assist in improving patient outcomes (7). With respect to age, octogenarians undergoing cystectomy had no increase in perioperative complication rate compared to septuagenarians when examining the NSQUIP database. Despite the similar

complication profile, octogenarians faced a higher mortality rate (4.3% *vs.* 2.3%, $P=0.04$) (8). Further understanding and optimization of vulnerable populations in the preoperative setting is critical to the successful management of these patients.

Surgical technique can also influence perioperative morbidity/mortality. Surgical approach—open *vs.* robot-assisted—may impact functional and oncologic outcomes. For instance, minimally-invasive approaches favor less blood loss, transfusion rates and lower Clavien >3 complication rate (9,10). The first and seminal series of robot-assisted cystectomy for men (11) and women (12) has been separately described, validating the approach from a functional and oncologic standpoint. In the present study by Mossanen *et al.*, the rate of MIS was only 11.5% and may not generalize to a contemporary cohort. Based on our institutional experience with the robotic approach (13,14), our views have changed as the robotic-assistance enables the surgeon to visualize tissue planes, allowing for finer dissection, hemostasis and ease of lymph node dissection (LND) (15). Moreover, the robotic approach has afforded the ability to exploit image-guided surgery utilizing indocyanine-green (ICG) with near infrared-fluorescence (NIRF) (16). Combined cystoscopic injection into the tumor and intravenous administration of ICG can assist in pelvic lymphangiography, tumor marking and mesenteric angiography (17). Ensuring adequate ileo-ileal and uretero-ileal anastomosis by visualizing perfusion using ICG/NIRF can assure the surgeon of a technically sound operation in real time, thereby mitigating anastomotic complications (18). Irrespective of open or robotic, it behooves us to maintain oncologically sound principles and surgeon experience is critical in this aspect.

Lastly, hospital-specific factors are vital when assessing patient outcomes after radical cystectomy. High-volume surgeons and hospitals are associated with lower morbidity and perioperative mortality (19), critical to both the AUA and EAU guideline statements. Using the National Inpatient Sample database, complication profile was compared to hospital volume with the finding that approximately 50–55 cases per year results in acceptable complication rate (20). Though the Mossanen *et al.* study includes surgeon volume in their descriptive statistics, more than 30% of patients underwent cystectomy from a surgeon with a volume less than the 75th percentile. Moreover, over 350 hospitals in the United States comprised the data for these results (4), certainly incongruent to the sentiment that high-volume centers should only be performing such

surgeries. Lastly, approximately 1/4 of patients in the dataset had an operative time greater than 8 hours (4). Our institutional data suggests that for robotic cystectomy with intracorporeal diversion can be achieved in approximately 6.5 hours (21).

Although the results of the present study by Mossanen *et al.* appear dismal, the manuscript should serve as an opportunity to “right the ship”. In fact, the precipitous rise in ERAS protocol publications (22) is an attempt to improve outcomes in these patients. Modifications in patient-, surgical- and hospital-factors may alleviate the morbidity and mortality faced by these patients. Experience of the surgeon MIS or open, hospital and comprehensive oncologic team is critical to successful outcomes.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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