Bladder Cancer 8 (2022) 335–337
DOI 10.3233/BLC-229006
IOS Press

Paper Alert

Open vs Robotic Surgery

Edward M. Messing*
University of Rochester Medical Center, Rochester, NY, USA

Received 21 July 2022
Accepted 16 August 2022
Pre-press 26 August 2022
Published 15 September 2022

Robotic surgery has spread rapidly, both in the United States (US) and elsewhere. In 2020 it was estimated that 86% of radical prostatectomies for prostate cancer were performed robotically in the US [1] compared with 22% in 2003 [1], and nearly similar rises have been seen in surgery for benign and malignant renal diseases and abdominal and pelvic surgeries in other specialties. Much of this increase has been driven by several factors including presumed lower morbidity, shorter lengths of stay during the initial hospitalization, more rapid recovery, and less blood loss. Indeed in urology in the US robotic surgery has quickly replaced "standard" laparoscopy for almost all operations performed minimally invasively (MIS). However, few head to head randomized prospective studies have been performed comparing robotic with laparoscopic or open surgery and one needs only to look at early-stage cervical cancer, where a well done randomized prospective study of minimally invasive to open radical hysterectomy, in which the 4.6 years disease free survival rate was found to be significantly inferior in MIS patients (86.0%) compared with those undergoing open surgery (96.5%) [2], to see that the rapid embrace of MIS for oncologic procedures may not always be beneficial. While this is not a urologic procedure, given the increase in robotic operations it is not surprising to learn that even for one of the most complex urologic operations, radical cystectomy (RC), by 2018, 54% were being performed robotically [3] with little evidence to prove superiority to open surgery.

One "smallish" (118 patients from a single institution) [4], and one larger multi-institutional randomized study [5], have been undertaken looking at various endpoints (90 day complications in the first and 2 year oncologic outcomes [progression free survival] for the second), with neither showing a significant advantage for either approach. In both studies, as expected, robotic surgery took longer but was associated with less blood loss, and, in the multicenter trial, a one day shorter length of stay. It should be noted that extracorporeal urinary diversions were done in each study in the MIS group.

With this background it is impressive that Catto, et.al recently published the results of a well-designed, prospective randomized robotic (with intracorporial diversions) versus open RC study for bladder cancer in the United Kingdom, randomizing 317 patients between 2017–2020, with the primary endpoint being a composite one; median number of days out of the hospital and alive at 90 days postoperatively in each group [6]. This time interval included operative and postoperative deaths, lengths of stay postoperatively and readmissions and their durations for complications. In each arm patients underwent enhanced recover after surgery (ERAS) protocols which included pre and postoperative nutritional support, early mobilization, venous thromboembolism (VTE) prophylaxis, etc.

*Correspondence to: Edward M. Messing, University of Rochester Medical Center, Rochester, NY, USA. E-mail: Edward_Messing@urmc.rochester.edu.

and robotic surgeons had to have completed at least 30 cystectomies as "sole operators" to participate. The surgical fields were specified and required removing the prostate and seminal vesicles in men and the uterus, fallopian tubes, anterior vaginal wall (vaginal sparing was not done), and at least one ovary in women, and pelvic lymph dissections went at least up to where the ureter crossed the common iliac vessels. While type of diversion was at patient and surgeon choice only 12% in the robotic arm and 10% undergoing open cystectomy had continent urinary diversions. A rigorous follow up regimen was used with exercise and strength being assessed at postoperative intervals. A variety of validated quality of life questionnaires were also completed.

Important to note is that patients were excluded if they were considered unfit for one of the surgical approaches, had prior abdominal or pelvic surgeries, previous pelvic radiotherapy or synchronous upper urinary tract or urethral disease.

While randomization occurred at 9 institutions nearly 70% were accrued at 3 sites (not unusual for multi-institutional studies). The arms were equal for tumor characteristics, comorbidities, demographics, smoking status, ECOG performance status (PS) (ECOG PS = 0 in 81%) and other relevant factors, although race was not provided.

The primary endpoint, alive and median days out of the hospital at 90 days, favored the robotic arm, 82 (intraquatrile range, 76–84) days to 80 (IQR 76–83)- $p = 0.01$, and the robotic patients had fewer wound complications (5.6% vs 16%) and thromboembolic complications despite both being on similarly VTE prophylaxis (1.9% vs 8.3%). Questionnaire and other testing indicated worse quality of life and greater disability at 5 weeks for those undergoing open surgery but these were equalized by 12 weeks. At median 18th month follow up, disease reoccurrence rates (18% robotic and 16% open) were similar as was overall mortality (14.3% robotic and 16% open). However, the follow-up for oncologic outcomes were too brief to show meaningful differences and the trial was not adequately powered to assess these. As expected, robotic surgery took longer, had less blood loss, fewer transfusions and shorter length of stay (7 vs 8 days = P = 0.05). Pathological findings including positive surgical margins (7% robotic and 8% open) and node counts (16 robotic and 15 open) were similar.

As the authors concluded, while there were statistically significant differences in the primary and some of the 20 secondary endpoints, "The clinical importance of these findings remains uncertain".

Additionally, over 780 patients of the 1121 assessed for eligibility were excluded. While some were for excellent reasons (e.g. not undergoing cystectomy, not suitable for it, unable or unwilling to be randomized) many (273) were excluded for reasons which arguably were patients who would be more likely to undergo open surgery (e.g. prior pelvic or abdominal surgery, prior pelvic radiotherapy, planned RC combined with other operations, prior kidney transplant, etc.)

So what have we learned from this very well designed and conducted study? This study confirmed that in well selected patients robotic surgery provides equal pathologic outcomes to open cystectomy with very modest decrease in postoperative and short term morbidity. Costs were not compared (and may not be applicable to the US health care system) and whether the 1 day shorter initial hospitalization and 2 days of being alive and out of the hospital (including the 1 day gained at the initial hospitalization) pays for the longer surgery (by 30 minutes) in the robotic arm (or amortization of the robot) is uncertain, but the shorter recovery and likely ability to return to independence is important. While items not discussed such as less postoperative pain in the robotic group, the cystectomy experience of the open surgeons, whether there was a delay in surgery because of getting "time" to use the robot, or whether the results would have been different if more patients underwent continent diversions (roughly 10% in each group), it appears that the two surgical approaches have relatively similar short term oncologic outcomes (given the limitations mentioned above) with robotic surgery having a minimally quicker recovery in healthy relatively uncomplicated patients. Whether other differences would be seen in either direction in less healthy and more complex patients is uncertain.

I have a few other thoughts about this article as pertains to practice in the US. Residents graduating now do not have the same open surgical experience that they had one or two decades ago owing to the expansion of robotics to prostatic, renal and reconstructive surgeries. Many will (or at least should) feel uncomfortable taking on a case as complicated and long as a RC and urinary diversion through an open approach when they enter practice, and there will be fewer senior colleagues available to assist them. This has obvious ramifications for hospitals without robotics, the potential need for fellowship training to gain the skills needed to perform an open cystectomy, and the need for centralization ("centers of excellence") to provide full cystectomy care (open

and robotic). While there are many reasons for why the trend toward centralization will help improve outcomes, as recently as 20 years ago, nearly two-thirds of cystectomies were performed at hospitals which did less than 10 per year [7]. This will not be practical in the near future.

CONFLICTS OF INTEREST

The author has no conflicts of interest to report.

REFERENCES

[1] Orhawese KE, ShihID, Lee SH, et al. Comparison of 1-year health care costs and use assosiated with organ VS robotic-assisted radical prostatectomy. JAMA Netw Open. 4;e212265. doi10.1001/jamanetworkopen2021.2265

[2] Ramirez PT, Framouitz M, Pareja R, et al. Minimally invasive versus abdominal hysterectomy for cervical cancer. N Engel J Med. 2018;379:1895-904.

[3] Montorsi F, Bandini M Brigenti A, et al. EAU Robotic Urology Section Scientific Working Group. Re-establishing the role of robot-assisted medical cystectomy. After The EAU Muscle-Invasive and Metastatic Guidelines Panel Recommendations. Eur Urol. 2020;78:489-91.

[4] Bochner BH, Dalbagni G, Sjoberg DD, et al. Comparing open radical cystectomy and robot-assisted laparoscopic radical cystectomy: a randomized clinical trial. Eur Urol. 2015;67:1042-50.

[5] Parekh DJ, Reisim IM, Castle EP, et al. Robot-assisted radical cystectomy versus open radical cystectomy in patients with bladder cancers (RAZOR): an open-label, phase 3, non-infelicity trial. Lancet. 2018;391:2525-36.

[6] Catto JWF, Khetrapal P, Ricciardi F, et al. Effect of robot-assisted radical cystectomy with intracorporal diversion vs open radical cystectomy on 90-day morbidity and mortality among patients with bladder cancer. A randomized clinical trial. JAMA. doi:1001Jama2022:7393.

[7] Elling LS, Pettaway C, Bekele BN, et al. Correlation between annual volume of cystectomy professional staffing, and outcomes: a statewide population-based study. Cauces. 2015;104:975-8.