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 intracorporeal 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 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.
and robotic surgeons had to have completed at least 30
cystectomies as “sole operators” to participate. The
surgical fields were specified and required remov-
ing the prostate and seminal vesicles in men and the
uterus, fallopian tubes, anterior vaginal wall (vagi-
nal 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 post-
operative 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, demograph-
ics, 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
(intraquarticile 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 dis-
ability 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 posi-
tive surgical margins (7% robotic and 8% open) and
node counts (16 robotic and 15 open) were similar.

As the authors concluded, while there were sta-
tistically 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 cy-
xectomy, 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 cystec-
tomy 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 divers-
sions (roughly 10% in each group), it appears that
the two surgical approaches have relatively similar
short term oncologic outcomes (given the limita-
tions 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
certains 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 recon-
structive 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 cy-
xectomy, 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**


