

# Robotic Assisted Laparoscopic Prostatectomy Versus Radical Retropubic Prostatectomy for Clinically Localized Prostate Cancer: Comparison of Short-Term Biochemical Recurrence-Free Survival

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## Abbreviations and Acronyms

BCR = biochemical recurrence

GS = Gleason score

PSA = prostate specific antigen

RALP = robot assisted laparoscopic prostatectomy

RP = radical prostatectomy

RRP = radical retropubic prostatectomy

SM- = negative surgical margin

SM+ = positive surgical margin

VUMC = Vanderbilt University Medical Center

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**Purpose:** We compared biochemical recurrence-free survival of patients who underwent radical retropubic prostatectomy vs robot assisted laparoscopic prostatectomy in concurrent series at a single institution.

**Materials and Methods:** A total of 2,132 patients were treated between June 2003 and January 2008. We excluded from study patients with prior treatment (115), missing data (83) and lymph node involvement (30). The remaining cohort (1,904) was compared based on clinical, surgical and pathological factors. Kaplan-Meier analysis was performed comparing biochemical recurrence after robot assisted laparoscopic prostatectomy and radical retropubic prostatectomy. A Cox proportional hazards model was generated to determine whether surgical approach is an independent predictor of biochemical recurrence.

**Results:** There were 491 radical retropubic prostatectomies (25.9%) and 1,413 robot assisted laparoscopic prostatectomies (74.1%) performed, and median followup was 10 months (IQR 2 to 23). On univariate analysis the robot assisted laparoscopic prostatectomy group was slightly lower risk with lower median prostate specific antigen (5.4 vs 5.8,  $p < 0.01$ ), a lower proportion of pathological grade 7–10 (48.5% vs 54.7%,  $p < 0.01$ ) and lower pathological stage (80.5% pT2 vs 69.6% pT2,  $p < 0.01$ ). The 3-year biochemical recurrence-free survival rate was similar between the robot assisted laparoscopic prostatectomy and radical retropubic prostatectomy groups on the whole as well as when stratified by pathological stage, grade and margin status. On multivariate analysis extracapsular extension ( $p < 0.01$ ), pathological grade 7 or greater ( $p < 0.01$ ) and positive surgical margin ( $p < 0.01$ ) were independent predictors of biochemical recurrence while surgical approach was not.

**Conclusions:** The likelihood of biochemical recurrence was similar between groups when stratified by known risk factors of recurrence. Surgical approach was not a significant predictor of biochemical recurrence in the multivariate model. Our analysis is suggestive of comparable effectiveness for robot assisted laparoscopic prostatectomy, although longer term studies are needed.

**Key Words:** prostatic neoplasms, prostatectomy, laparoscopy, robotics, disease-free survival

THERE are approximately 186,000 incident cases of prostate cancer annually in the United States, of which

90% are clinically localized or regional at diagnosis.<sup>1</sup> Surgery remains the most commonly used treatment

for clinically localized prostate cancer<sup>2</sup> and the only treatment demonstrated to provide a survival advantage compared to watchful waiting.<sup>3</sup> Approximately 90,000 RPs are performed each year in the United States.<sup>4</sup> During the last 5 to 7 years there has been explosive growth in the use of RALP as an alternative to open RP (often RRP and sometimes perineal prostatectomy).<sup>5</sup> It is estimated that in 2008 approximately two-thirds of all RPs performed in the United States were robot assisted.<sup>4</sup>

The reasons for this growth in the use of robotic surgery for prostate cancer include real and perceived benefits in perioperative and functional outcomes, as well as market forces. The underlying assumption of this rapid rollout of new technology is that RALP is equally effective in controlling cancer as the standard surgical approach of RRP. Whereas a number of large single and multi-institution studies have demonstrated acceptable cancer control rates with the robotic approach, there have been no large comparative studies of BCR in concurrent RALP and RRP series to our knowledge.<sup>6,7</sup> Because of the high market penetration of robotic prostatectomy and the market forces touting its benefits, the opportunity for a randomized trial has probably passed.

Since 2003, when the first RALP was performed at VUMC, the volume of RALPs has increased rapidly to more than 700 per year in 2008 (fig. 1). At the same time despite a decrease in RRP volume we have maintained an average of more than 100 RRs per year. This volume of concurrent RALPs and RRs, along with the existence of a prospectively collected database, has enabled us to perform a cohort study to compare the cancer control outcomes of RALP and RRP. Thus, we examined whether RALP provides an intermediate-term BCR-free survival similar to that of RRP.

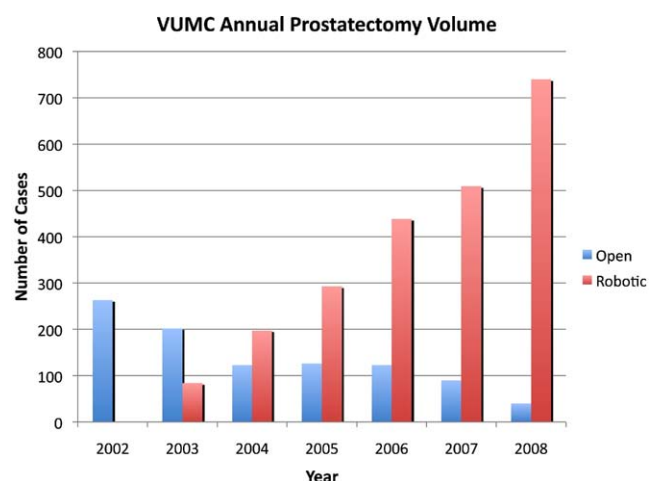


Figure 1. Open RRP and RALP volume at VUMC

## METHODS

### Study Design

This was a cohort study of patients undergoing radical prostatectomy for clinically localized prostate cancer at VUMC. The exposure of interest was surgical approach (RALP vs RRP) and the outcome measure was time to BCR.

### Patient Population

Since our aim was to compare outcomes of patients undergoing RALP and RRP in a concurrent series we selected a start date for our study of June 2003, reflecting the fact that the first RALP was performed in May 2003. We ended with patients who underwent surgery in January 2008 so that we would have the opportunity to have some followup data on the latest patients in the cohort. Between June 2003 and January 2008, 2,132 consecutive men underwent radical prostatectomy for clinically localized prostate cancer by 1 of 6 urological oncologists at VUMC. Patients with prior hormonal therapy or radiation therapy were excluded from study as were those with missing followup data (which includes patients who underwent immediate adjuvant radiation or hormonal therapy) and patients with positive lymph nodes, leaving a final cohort of 1,904 patients (fig. 2). The clinical stage was T1 in 1,437 patients (75.8%), T2 in 451 (23.8%), T3 in 8 (0.4%) and missing in 8 (0.4%). The selection of procedure was up to the discretion of the surgeon and the patient. Two surgeons performed RALP exclusively (SDH, RD), 2 performed only RRP (SSC, PEC) and 2 performed both procedures (JAS, MSC).

### Surgical Technique

RRP was performed in the anatomical fashion described by Walsh and Partin with modifications by each surgeon based on experience.<sup>8,9</sup> RALP was performed by standard techniques with small modifications on 1 of 3 da Vinci® surgical robots.<sup>9,10</sup>

### Data Collection and Definitions

The Vanderbilt Prostatectomy Database is an institutional review board approved institutional repository of patients undergoing radical prostatectomy for prostate cancer. Patient data are captured at surgery, and baseline demographic and clinical characteristics are collected. Perioperative variables and pathological outcomes are entered prospectively. Biochemical outcomes are periodically updated and added to the database. At present our institutional review board limits collection of followup data to those patients who continue to receive care at VUMC. Consequently only those receiving followup care at VUMC are represented.

There was no pre-specified followup regimen, but in general patients were followed with routine evaluation and PSA every 6 months in the first 2 years, and annually thereafter. BCR was defined as a PSA greater than 0.2 ng/ml (confirmed on 1 or more subsequent assays), or when a patient received postoperative hormone therapy, radiation or chemotherapy in the face of an increasing PSA.

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