

Original article

Robotic-assisted laparoscopic and radical retropubic prostatectomy generate similar positive margin rates in low and intermediate risk patients☆

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Abstract

Objective: Robotic-assisted laparoscopic prostatectomy (RALP) is being increasingly utilized. To assess the efficacy of the operation, we compared apical and overall margin status for RALP with radical retropubic prostatectomy (RRP) in a group of contemporary patients.

Patients and methods: We retrospectively reviewed 98 consecutive RRP and then 94 RALPs from a single institution. Groups were analyzed and matched with regard to preoperative prostate-specific antigen (PSA), cancer grade, pathologic stage, and tumor volume. Surgical margins were quantitated.

Results: Clinicopathologic parameters were compared and additional high risk patients were observed in the RRP vs. RALP group. To risk-adjust these patient groups, those meeting preoperative high risk criteria were excluded from further positive margin analysis. Postoperatively, the average tumor volume was 13% in both groups. Pathologic stage pT3 was similar between RRP (14%) and RALP (11%). A positive surgical margin (PSM) was found in 12 cases (14%) after RRP and 11 cases (13%) after RALP including apical margins. Positive margins at the apex, non-apex, and both were statistically similar between groups.

Conclusions: In this study, no differences were seen between robotic prostatectomy with regard to apical or overall margin status compared with open prostatectomy in lower risk patients. This suggests that despite improved visualization, RALP generates a similar margin status as RRP. © 2009 Elsevier Inc. All rights reserved.

Keywords: Prostate; Prostate cancer; Prostatectomy; Robotics; Positive surgical margin

1. Introduction

Laparoscopic retropubic (LRP) and robotic-assisted laparoscopic (RALP) prostatectomies are modern, minimally invasive alternatives to open surgery. Potential advantages of these surgical approaches are decreased postoperative pain, shorter hospital stay, and diminished perioperative blood loss [1]. Increased degrees of maneuverability in the deep pelvis and improved visualization through magnification, especially of the apex, have been attributed to RALP compared with open retropubic prosta-

tectomy (RRP) [2]. Conversely, the loss of tactile sensation has generated concern among some surgeons for an increased risk of positive surgical margins (PSM) with RALP. To date, little information is available comparing the pathologic outcomes of RALP to RRP. The objective of this study was to compare apical and overall surgical margin status between RRP to the early RALP outcomes for an experienced cancer surgeon.

2. Patients and methods

This retrospective review evaluated and analyzed a recent single institution (University of Wisconsin Hospital and Clinics, UWHC) series of RRP and RALP cases with Institutional Review Board Approval. During a 9-month

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period in 2006, 114 men underwent RALP by a single surgeon. In order to minimize the effect of the learning curve, we excluded the first 20 cases from our analysis. RALP operative times were consistently below 180 minutes by that point. A distinct RRP group, performed a year before instituting RALP and consisting of 98 consecutive open operations, was used for comparison. This RRP group was performed after an open experience of over 600 RRP cases by a fellowship-trained surgeon (DFJ). Therefore, data on the two groups were collected sequentially rather than synchronously to avoid bias.

Robotic prostatectomy was performed using a 4-arm da Vinci Robotic System™ (Intuitive Surgical, Sunnyvale, CA) and the transperitoneal approach in a manner previously described [3]. Radical prostatectomy was performed in a manner similar to Walsh et al. [4], with the exception that a McDougal clamp was not used for apical dissection, but rather sharp dissection was performed. Pelvic lymphadenectomy was performed to all RRP patients and a subset of 6 RALP patients. No procedures were aborted in both groups and open conversions were not performed in RALP group.

Medical records and surgical pathology reports of the 192 men were reviewed. Baseline characteristics included patient age, preoperative prostate-specific antigen (PSA), clinical stage, and cancer biopsy grade (Gleason sum). Patients receiving neoadjuvant hormonal therapy were not included in the analysis.

All prostatectomy specimens were pathologically processed using a standard protocol as described [5]. Briefly, after fixation in 10% buffered formalin, the external surface of the specimen was coated with India inks. The apex was amputated and radially sectioned. The prostatic base was evaluated using a shave technique. The remaining specimen was serially sectioned from apex to base. The seminal vesicles and vas deferens were processed. All histologic material was examined by an experienced genitourinary pathologist (WH) in the Department of Surgical Pathology, UWHC. Histopathologic parameters included final tumor stage (TNM Staging System), postoperative cancer grade, tumor volume, and location and prostate weight. Recorded information also included a detailed surgical margin status.

Statistical analyses were performed using Internet based calculators [6]. The results were expressed as average and range. The numeric parameters between both groups were compared using Student's *t*-test. The χ^2 test and Fischer's exact test were used for the analysis of nominal data.

3. Results

Clinical and preoperative pathologic characteristics are presented in Table 1 for the 192 patients undergoing either RALP or RRP. The average patient age was 58.8 years (range 37–74 years) in the RRP group, and 59.8 years (range 47–71 years) for RALP ($P = 0.6$). Average PSA

Table 1
Preoperative pathologic data and clinical staging for overall group

	RRP (<i>n</i> = 98)	RALP (<i>n</i> = 94)	Total (<i>n</i> = 192)
PSA			
0–4	13	14	27
4–10	73	74	147
10 or higher*	12	6	18
Clinical stage			
T1c	85	91	176
T2†	13	3	16
Gleason sum			
2–4	0	0	0
5–7	88	92	180
8–10‡	10	2	12
High risk patients§	14	6	20

RRP = radical retropubic prostatectomy; RALP = robotic-assisted laparoscopic prostatectomy; PSA = prostate specific antigen.

* $P = 0.2$.

† $P = 0.02$.

‡ $P = 0.03$.

§ Based on preoperative D'Amico criteria [6] and excluded from further positive margin analysis. Includes PSA greater than 20 ng/ml, advanced local T stage (T2c or higher) or high grade cancer (GS > 7).

levels before open or robotic-assisted laparoscopic prostatectomy were 6.7 (range 0.3–42) and 5.9 (range 1.3–13), respectively ($P = 0.03$). This statistically significant difference in preoperative PSA level distribution was corrected in the further risk-stratified analysis.

In RRP and RALP groups we found 89% and 97% of the biopsies were intermediate grade, and that a greater number of RALP patients (97%) were preoperatively staged T1c without palpable or otherwise clinically apparent disease. Using the definition of D'Amico et al. [7] to stratify patients into preoperative risk categories, 14% of the patients were high risk in the RRP group compared to 6% in the RALP group ($P = 0.03$) (Table 1). This greater percentage of high risk patients in the RRP group was due to recruitment to an ongoing high risk protocol, and may also represent a selection bias early in our RALP experience. To correct for this, we limited further analysis of the margins to low and intermediate risk patients. Re-evaluation of the groups demonstrated statistically similar preoperative average PSA (6.1 vs. 5.8; $P = 0.4$), Gleason sum (6.2 vs. 6.3; $P = 0.2$), and clinical stage (T1 90% vs. 96%; $P = 0.1$).

Evaluation of pathological specimens comprising intermediate and low risk patients revealed an average prostate weight of 47 gm (22–147 gm) in the RRP group, and 42 gm (23–81 gm) for RALP ($P = 0.2$). The average tumor volumes for RRP and RALP were identical at 13.0% vs. 12.7%, respectively ($P = 0.9$). Final pathologic grade was also similar with 95% of the RRP and 92% of the RALP cancers being intermediate grade (Gleason sum 5–7) ($P = 0.4$). For RRP, 12 (14%) and 10 (11%) of RALP demonstrated extracapsular or seminal vesicle invasion and were staged as pT3.

Among intermediate and low risk patients, a positive surgical margin was found in 12/84 cases (14%) after open

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