

# Utilization of Pelvic Lymph Node Dissection for Patients With Low-Risk Prostate Cancer Treated With Robot-Assisted Radical Prostatectomy

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## Abstract

**Pelvic lymph node dissection (PLND) is not recommended for men with low-risk prostate cancer (PCa); however, the frequency of its use is not well known. This study utilized the National Cancer Data Base to evaluate the use of PLND in a contemporary cohort of low-risk men with PCa undergoing robot-assisted radical prostatectomy and found that a significant proportion of men receive PLND despite guidelines against its use.**

**Introduction:** Pelvic lymph node dissection (PLND) is not recommended for low-risk prostate cancer (PCa) patients. However, the rate of PLND in this population is unknown. **Methods:** We queried the National Cancer Data Base for PCa patients who underwent robot-assisted radical prostatectomy from 2010 to 2013 and stratified them by D'Amico risk classification. We identified the frequency of PLND in low-risk patients and identified factors associated with receipt of PLND. Further, we determined the number of lymph nodes evaluated (quality) and proportion of patients with detected nodal metastatic disease (utility) in each risk group. **Results:** Of 51,971 patients with low-risk PCa who underwent robot-assisted radical prostatectomy, 19,059 (36.7%) received PLND. Predictors of PLND in low-risk patients included rural residence (odds ratio [OR], 1.157; 95% confidence interval [CI], 1.009-1.327), treatment at an academic center (OR, 1.492; 95% CI 1.188-1.874), and high-volume facility (OR, 1.327; 95% CI, 1.078-1.633). The mean number of lymph nodes obtained in low-risk patients was lower than in intermediate/high-risk patients (4.74 vs. 5.86,  $P < .0001$ ). Lymph node positivity was identified in 0.4% of low-risk patients and 4.6% of intermediate/high-risk patients. **Conclusion:** While PLND is not recommended for low-risk PCa by clinical practice guidelines, it was performed frequently (36.7%) in a large hospital-based data set. PLND in this population was of lower quality (nodal yield) and had less utility of detecting nodal metastatic disease than PLND in intermediate/high-risk PCa. Treatment at a high-volume or academic center was associated with increased use of PLND. Reasons for the variation in practice patterns should be investigated to improve the value of PCa care.

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## Introduction

Overtreatment of low-risk prostate cancer (PCa) in the United States has had a negative impact on the costs of care and patient quality of life.<sup>1</sup> The cost of PCa care is projected to reach up to \$19

billion in 2020.<sup>2</sup> The high costs of PCa treatment can be attributed to multiple factors, including the use of a robot-assisted surgical platform,<sup>3,4</sup> the high cost of pharmaceuticals for advanced disease,<sup>5</sup> readmissions, and postacute care.<sup>6</sup> These factors, while adding cost to PCa care, may also add value. The use of unindicated treatment, on the other hand, is unlikely to contribute to improved outcomes. This overtreatment occurs most often in patients with very low-risk and low-risk PCa. While increased utilization of active surveillance may limit excess costs and harms of therapy in this cohort, the use of radical prostatectomy (RP) has also increased in low-risk PCa patients.<sup>7</sup>

Pelvic lymph node dissection (PLND) at the time of RP for low-risk PCa is not recommended by clinical practice guidelines.<sup>8-10</sup> However, some data suggest that a significant proportion of

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## PLND for Low-Risk Prostate Cancer

low-risk PCa patients are inappropriately treated with PLND at the time of RP.<sup>11</sup> This overuse of PLND in patients unlikely to benefit from the procedure contributes to the cost and morbidity of care without adding value.

We sought to characterize the frequency, quality, and utility of PLND in a contemporary cohort of low-risk PCa patients undergoing robot-assisted radical prostatectomy (RARP) in the United States. Furthermore, we aimed to identify hospital and patient characteristics that are associated with the use of PLND in a low-risk population. We hypothesized that PLND was performed frequently at nonacademic and low-volume centers. We expected these unindicated PLND procedures to be of low quality with fewer lymph nodes retrieved and to have poor utility with a small chance of detecting lymph node metastases, particularly when compared to a cohort of patients with intermediate/high-risk disease.

### Methods

#### Study Population

The National Cancer Data Base (NCDB) was queried for patients aged 40 to 80 who underwent RARP for PCa from 2010 to 2013 (N = 425,811). Patients with low-risk PCa were identified by D'Amico risk criteria based on prostate-specific antigen < 10 ng/mL, Gleason score ≤ 6, and clinical stage ≤ T2a (n = 147,694). Intermediate- and high-risk PCa patients were similarly identified in accordance with standard D'Amico criteria. Patients who underwent RP without robot assistance or those with unknown or conflicted PLND status or nodal yield were excluded (n = 54,886). Further, patients with missing clinical or socioeconomic parameters were also removed, which left 51,971 patients for analysis.

#### Outcome and Covariates

The primary outcome of this study was the receipt of PLND. Secondary outcomes included the number of nodes retrieved (used as a proxy for surgical quality) and the detection of nodal metastatic PCa (used as a proxy for the utility of PLND in this cohort).

Covariates included: age at diagnosis (40-50, 50-59, 60-69, and 70-80 years), race (white, black, other, and unknown), 2000 census tract annual median income (< \$30,000; \$30,000-\$35,999; \$36,000-\$45,999; and \$46,000+), insurance status (none, private, government, and unknown), geographic region of treating facility (Northeast, South, Midwest, and West), patient location (metro, urban, or rural), Charlson-Deyo comorbidity score (0, 1, or 2+), hospital academic status (academic or community), and hospital volume (high or low).

Hospital volume was calculated on the basis of each facility's number of RARP procedures submitted from 2010 to 2013. Hospitals at which ≥ 229 RARP procedures were performed (75th percentile) were considered high-volume centers, while those with < 229 RARP procedures over the study period were considered low-volume centers.

#### Statistical Analyses

Patients' baseline clinical and socioeconomic characteristics categorized, and multiple levels were summarized in contingency tables with counts and percentages for PLND versus no PLND. Hospital information was compiled in the same way. To account for correlation within facilities, the generalized estimation equation

approach was adopted to analyze the association of receipt of PLND with covariates of interest in both univariate and multivariate models. For each of the models, the logit link function was used to relate receipt of PLND with covariates, and exchangeable correlation structure within hospital was assumed. Unadjusted and adjusted odds ratios (ORs) of receipt of PLND were reported for each covariate in the models, along with 95% confidence intervals (CIs). With the number of lymph nodes retrieved as an outcome, univariate and multivariate negative binomial regression models using the generalized estimation equation approach equipped with log link and exchangeable correlation were fit. Estimated rate ratios (RR) along with 95% CIs were calculated. All statistical tests were conducted in 2-sided format with a significance level of  $P \leq .05$ . Statistical analyses were performed by SAS 9.4 software (SAS Institute, Cary, NC).

### Results

A total of 51,971 patients with low-risk PCa underwent RARP from 2010 to 2013 in this cohort. Of these, 19,059 (36.7%) underwent PLND. A majority of patients were white, had private insurance, and resided in a metro area (Table 1). Most patients were treated at a community medical center (55.9%) and were treated at a high-volume facility (82.2%).

Significant predictors of receipt of PLND for low-risk PCa in a multivariate setting included: treatment at a high-volume hospital (OR, 1.327 [95% CI, 1.078-1.633],  $P = .008$ ), treatment at an academic facility (OR, 1.492 [95% CI, 1.188-1.874],  $P = .0006$ ), and rural residence (OR, 1.157 [95% CI, 1.009-1.327],  $P = .038$ ). Patients aged 50 to 59 were significantly less likely to receive PLND than those 40 to 50 years of age (OR, 0.934 [95% CI, 0.88-0.99],  $P = .022$ ) (Table 2).

Patients with low-risk PCa had significantly fewer lymph nodes retrieved, on average, during PLND than patients with intermediate/high-risk PCa (4.7 vs. 5.9,  $P < .0001$ ). Among all patients undergoing PLND, predictors of higher nodal yield included intermediate/high-risk PCa (RR, 1.226 [95% CI, 1.184-1.27],  $P < .0001$ ), treatment at an academic facility (RR, 1.364 [95% CI, 1.259-1.479],  $P < .0001$ ), treatment at a high-volume hospital (RR, 1.094 [95% CI, 1.022-1.169],  $P = .008$ ), rural residence (RR, 1.053 [95% CI, 1.006-1.103],  $P = .029$ ), and treatment at a facility in the West region (RR, 1.159 [95% CI, 1.032-1.301],  $P = .013$ ). Black (vs. white) race was associated with fewer lymph nodes retrieved (RR, 0.93 [95% CI, 0.91-0.952],  $P < .0001$ ) (Table 3).

Finally, nodal metastatic disease was found in 0.4% of low-risk patients who underwent PLND as opposed to 4.6% of intermediate/high-risk patients. Additional exploratory analysis was conducted to evaluate the rate of PLND in low-risk PCa patients each year during the study duration (Figure 1).

### Discussion

We used a large hospital-based dataset to evaluate the frequency, quality (based on nodal yield), and utility (based on detection of nodal metastatic disease) of PLND for patients with low-risk PCa undergoing RARP. We found that despite clinical practice guidelines about one-third of patients with low-risk PCa undergoing RARP received PLND. These PLNDs resulted in lower lymph node

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