Check for updates

International Journal of Urology

ORIGINAL ARTICLE OPEN ACCESS

Extent of Pelvic Lymph Node Dissection at Partial Cystectomy: Effect on Cancer-Specific Mortality

Mattia Longoni[1,2,3] | Andrea Marmiroli[1,4] | Fabian Falkenbach[1,5] | Quynh Chi Le[1,6] | Michele Nicolazzini[1,7,8] | Calogero Catanzaro[1,9] | Federico Polverino[1,10] | Jordan A. Goyal[1] | Markus Graefen[5] | Gennaro Musi[4] | Felix K. H. Chun[6] | Carlotta Palumbo[7,8] | Riccardo Schiavina[9] | Nicola Longo[10] | Fred Saad[1] | Shahrokh F. Shariat[11,12,13,14] | Marco Moschini[2,3] | Giorgio Gandaglia[2,3] | Francesco Montorsi[2,3] | Alberto Briganti[2,3] | Pierre I. Karakiewicz[1]

[1]Cancer Prognostics and Health Outcomes Unit, Division of Urology, University of Montréal Health Center, Montréal, Québec, Canada | [2]Division of Experimental Oncology/Unit of Urology, URI; IRCCS Ospedale San Raffaele, Milan, Italy | [3]Vita-Salute San Raffaele University, Milan, Italy | [4]Department of Urology, IEO European Institute of Oncology, IRCCS, Milan, Italy | [5]Martini-Klinik Prostate Cancer Center, University Hospital Hamburg-Eppendorf, Hamburg, Germany | [6]Department of Urology, Goethe University Frankfurt, University Hospital, Frankfurt am Main, Germany | [7]Division of Urology, Department of Translational Medicine, University of Eastern Piedmont, Maggiore Della Carità Hospital, Novara, Italy | [8]Division of Urology, Department of Oncology, University of Turin, Orbassano, Italy | [9]Department of Urology, University of Bologna, St. Orsola-Malpighi Hospital, Bologna, Italy | [10]Department of Neurosciences, Science of Reproduction and Odontostomatology, University of Naples Federico II, Naples, Italy | [11]Department of Urology, Weill Cornell Medical College, New York, New York, USA | [12]Department of Urology, University of Texas Southwestern Medical Center, Dallas, Texas, USA | [13]Hourani Center of Applied Scientific Research, Al-Ahliyya Amman University, Amman, Jordan | [14]Department of Urology, Comprehensive Cancer Center, Medical University of Vienna, Vienna, Austria

Correspondence: Mattia Longoni (longoni.mattia@hsr.it)

Received: 17 February 2026 | **Revised:** 4 April 2026 | **Accepted:** 21 April 2026

Keywords: bladder cancer | bladder-sparing surgery | NCCN guidelines | partial cystectomy | radical cystectomy

ABSTRACT

Introduction: We assessed the extent of pelvic lymph node dissection (PLND) at partial cystectomy (PC) according to PC eligibility (≤cT2 stage, tumor ≤3 cm and segmental resection possible) and tested its effect on cancer-specific mortality (CSM).

Methods: Within the SEER database (2004–2021), we identified PC patients undergoing PLND and tabulated the number of lymph nodes (LNs) removed according to PC eligibility. Multivariable Cox-regression models tested the effect of PLND extent on CSM after adjusting for age, sex, T stage, N stage, and chemotherapy.

Results: Of 1017 PC patients undergoing PLND, 197 (19.4%) were eligible vs. 820 (80.6%) ineligible according to PC eligibility criteria. Median number of LNs removed at PLND was 6 (IQR: 3–11) in eligible versus 7 (IQR: 3–14) in ineligible patients ($p=0.09$). Mean numbers of LNs removed at PLND increased over the study period, from 7 to 16 ($p=0.007$) in PC-eligible and from 8 to 13 ($p=0.001$) in PC-ineligible patients. In 1017 patients regardless of PC eligibility, 5-year CSM-free survival rate was 65.6%, and PLND extent predicted lower CSM (multivariable hazard ratio [mHR]: 0.99, $p=0.036$). In 197 PC-eligible patients, 5-year CSM-free survival rate was 84.2%, and the PLND extent was not associated with CSM (mHR: 0.96, $p=0.2$). Conversely, in 820 PC-ineligible patients, 5-year CSM-free survival rate was 61.1%, and PLND extent predicted lower CSM (mHR: 0.99, $p=0.043$).

Conclusion: In all PC patients regardless of eligibility status, more extensive PLND was associated with improved cancer-specific survival.

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2026 The Author(s). *International Journal of Urology* published by John Wiley & Sons Australia, Ltd on behalf of The Japanese Urological Association.

1 | Introduction

Partial cystectomy (PC) represents a treatment option reserved for carefully selected patients with carcinoma of the urinary bladder [1]. While radical cystectomy remains the standard of care for muscle-invasive disease, PC has recently gained renewed interest within the broader context of bladder-sparing strategies aimed at preserving organ function without compromising oncologic outcomes [2–5]. However, PC should ideally be restricted to individuals with specific clinical characteristics that are compatible with such surgery. Those characteristics consist of three criteria, namely ≤T2 tumor stage, tumor size ≤3 cm, and within a location amenable to segmental resection [6–8]. Those three criteria were eventually endorsed by the National Comprehensive Cancer Network (NCCN) within their guidelines as of 2012 (v2.2012) [9]. The same guidelines also recommend that pelvic lymph node dissection (PLND) should always be performed at PC, as an integral part of comprehensive PC. In patients treated with radical cystectomy (RC), a greater extent of PLND was previously shown to improve survival [10–13]. However, whether this association also applies to patients undergoing PC and PLND is unknown. We addressed this knowledge gap within the Surveillance, Epidemiology and End Results (SEER) database (2004–2021). We hypothesized that a higher number of removed lymph nodes (LNs) at PLND may be associated with lower CSM, and we tested this hypothesis in PC patients that either fulfilled all the eligibility criteria for PC or did not.

2 | Materials and Methods

2.1 | Study Population

Within the SEER database (2004–2021), we identified patients with histologically confirmed carcinoma of the urinary bladder (International Classification of Disease for Oncology [ICD-O] site code C67.0-67.9) treated with PC (ICD-O 30.29) and PLND. Patients with unknown TNM stage, tumor size and location, age, and vital status were excluded, as well as autopsy-only or death-certificate only cases. Patients not undergoing PLND were excluded, as the study objective was to assess the association between PLND extent and CSM, rather than the effect of PLND performance per se, which has been examined previously [12].

2.2 | Statistical Analyses

Criteria for PC eligibility were: (1) stage ≤T2, (2) tumor size ≤3 cm, and (3) tumor within a location amenable to segmental resection (outside bladder neck [ICD-O C67.0], trigone [ICD-O C67.1] or non-otherwise specified [ICD-O C67.9]). The estimated annual percentage changes (EAPC) described temporal trends of mean LNs removed within the study period. Kaplan–Meier (KM) plots depicted five-year CSM-free survival according to PC eligibility criteria. Multivariable Cox regression models (CRM) were fitted to test the effect of PC eligibility and LNs removed on CSM. Covariates consisted of age, sex, T stage, N stage, chemotherapy, and histological subtype (urothelial vs. non urothelial). Finally, the effect of PLND extent on CSM hazard was graphically depicted using locally estimated scatterplot smoothing (LOESS) methodology.

All tests were two-sided, with a significance level $p < 0.05$. R software environment for statistical computing and graphics (R version 4.4.2, R Foundation for Statical Computing, Vienna, Austria) was used for all analyses.

3 | Results

3.1 | Descriptive Characteristics of the Study Population

Within the SEER database (2004–2021), 2144 patients treated with PC were identified. Among them, 1017 (47.4%) underwent PLND at the time of PC. Of those, 197 (19.4%) fulfilled all three PC criteria, while the remaining 820 (80.6%) either fulfilled only two ($n = 407$, 40.0%), one ($n = 336$, 33.0%), or none ($n = 77$, 7.6%) of the three criteria (Table 1).

Overall, the median number of LNs removed was 7 (interquartile range [IQR]: 3–13). After stratification according to PC eligibility, the median number of LNs removed was 6 (IQR: 3–11) in eligible vs. 7 (IQR: 3–14) in ineligible patients ($p = 0.09$) (Figure 1A).

3.2 | Number of Lymph Nodes Removed at PLND in PC Patients Over Time

In 1017 patients undergoing PC + PLND, the mean number of removed LNs at PLND increased from 8 in 2004 to 14 in 2021 (EAPC: +2.6%, 95% confidence interval [CI]: +1.5, +3.6, $p < 0.001$). Within 820 PC-ineligible patients, the mean number of removed LNs at PLND increased from 8 in 2004 to 13 in 2021 (EAPC: +2.2%, 95% CI: −1.1, +3.3, $p = 0.001$). Similarly, within 197 PC-eligible patients, the mean number of removed LNs at PLND increased from 7 in 2004 to 16 in 2021 (EAPC: +5%, 95% CI: +1.9, +8.4, $p = 0.007$; Figure 1B).

3.3 | Survival Analyses

3.3.1 | CSM-Free Survival Regardless of PC Eligibility Criteria

In KM analyses within 1017 PC patients regardless of PC eligibility, the 5-year CSM-free survival rate was 65.6% (Figure 2A). The graphical depiction of the regression between the number of removed LNs and CSM illustrated a downward slope where the lowest CSM was recorded in patients with the highest number removed LNs (Figure 3A). Finally, in multivariable CRM, the number of LNs removed at PLND independently predicted lower CSM rates (HR: 0.98, 95% CI: 0.97–0.99, $p = 0.036$, Table 2).

3.3.2 | CSM-Free Survival in PC-Ineligible Patients

In KM analyses within 820 PC-ineligible patients, the 5-year CSM-free survival rate was 61.1% (Figure 2B). The graphical

14422042, 2026, 5, Downloaded from https://onlinelibrary.wiley.com/doi/10.1111/iju.70483 by CochraneItalia, Wiley Online Library on [06/11/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

TABLE 1 | Descriptive characteristics of 1017 patients treated with partial cystectomy (PC) and pelvic lymph node dissection (PLND) according to eligibility criteria for PC from the Surveillance, Epidemiology, and End Results database (2004–2021).

		PC eligibility (≤cT2 stage, size ≤3 cm, amenable to segmental resection)	
Characteristics	**Overall *N* = 1017[a]**	**PC-eligible (all 3 criteria) (*N* = 197, 19.4%)[a]**	**PC-ineligible (0–2 criteria) (*N* = 820, 80.6%)[a]**
Age	69 (59, 78)	69 (59, 77)	69 (59, 78)
Sex			
Male	742 (73.0%)	142 (72.1%)	600 (73.2%)
Female	275 (27.0%)	55 (27.9%)	220 (26.8%)
Race/ethnicity			
Caucasians	795 (78.2%)	156 (79.2%)	639 (77.9%)
Hispanics	81 (8.0%)	13 (6.6%)	68 (8.3%)
Asians/Pacific Islanders	70 (6.9%)	15 (7.6%)	55 (6.7%)
African Americans	71 (7.0%)	13 (6.6%)	58 (7.1%)
Income			
Higher/equal $70 k/year	715 (70.3%)	138 (70.1%)	577 (70.4%)
Lower $70 k/year	302 (29.7%)	59 (29.9%)	243 (29.6%)
Region			
Metropolitan areas	882 (86.7%)	173 (87.8%)	709 (86.5%)
Nonmetropolitan areas	135 (13.3%)	24 (12.2%)	111 (13.5%)
Tumor location			
Resectable	740 (72.8%)	197 (100.0%)	543 (66.2%)
Unresectable	277 (27.2%)	0 (0.0%)	277 (33.8%)
Tumor size			
≤30	486 (47.8%)	197 (100.0%)	289 (35.2%)
>30	531 (52.2%)	0 (0.0%)	531 (64.8%)
T stage			
T1/Ta/Tis	201 (19.8%)	73 (37.1%)	128 (15.6%)
T2	314 (30.9%)	124 (62.9%)	190 (23.2%)
T3-4	502 (49.4%)	0 (0.0%)	502 (61.2%)
N stage			
N0	882 (86.7%)	188 (95.4%)	694 (84.6%)
N1-3	135 (13.3%)	9 (4.6%)	126 (15.4%)
Histology			
UCUB	680 (66.9%)	142 (72.1%)	538 (65.6%)
Non-UCUB	337 (33.1%)	55 (27.9%)	282 (34.4%)
Chemotherapy delivered	379 (37.3%)	152 (37.3%)	72 (36.5%)

[a]Median (Q1, Q3); *n* (%).

depiction of the regression between the number of removed LNs and CSM illustrated a downward slope where the lowest CSM was recorded in patients with the highest number removed LNs (Figure 3B). Finally, in multivariable CRM, the number of LNs removed at PLND independently predicted lower CSM rates (HR: 0.98, 95% CI: 0.97–0.99, $p = 0.043$, Table 2).

14422042, 2026, 5, Downloaded from https://onlinelibrary.wiley.com/doi/10.1111/iju.70483 by CochraneItalia, Wiley Online Library on [06/11/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

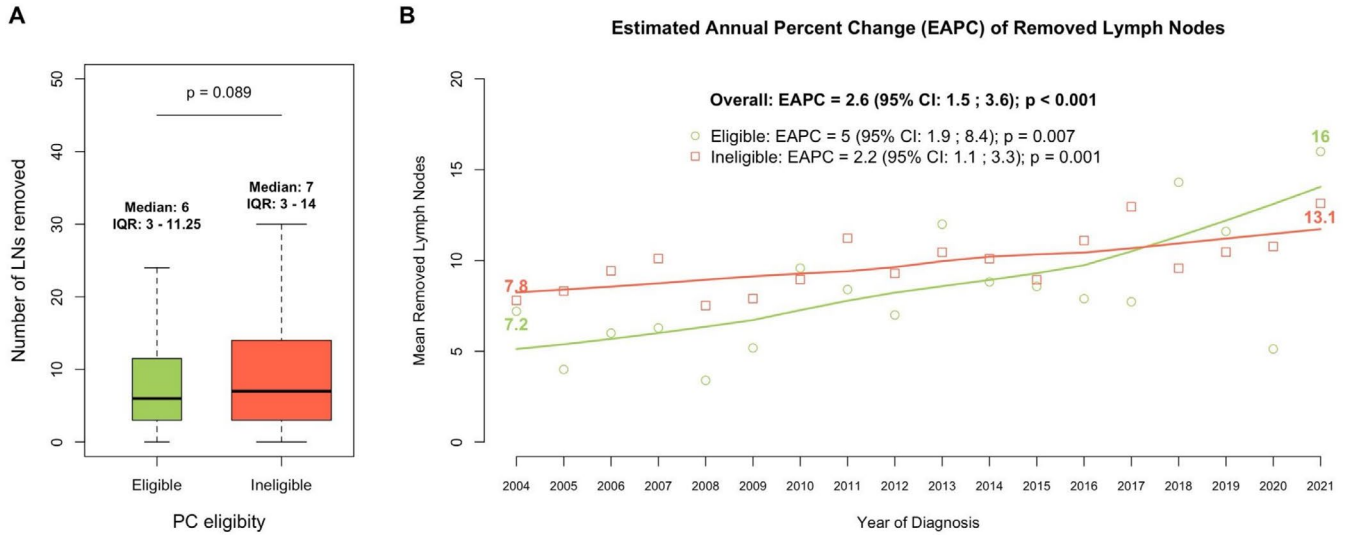


FIGURE 1 | Boxplots depicting median number (A) and estimated annual percent changes (EAPC) (B) of lymph nodes (LNs) removed in 1017 patients treated with partial cystectomy (PC) and pelvic lymph node dissection (PLND) according to PC-eligibility criteria in 1017 patients treated with partial cystectomy and pelvic lymph node dissection within the Surveillance, Epidemiology, and End Results database (2004–2021). Boxes are drawn with widths proportional to the square roots of the number of observations in the groups.

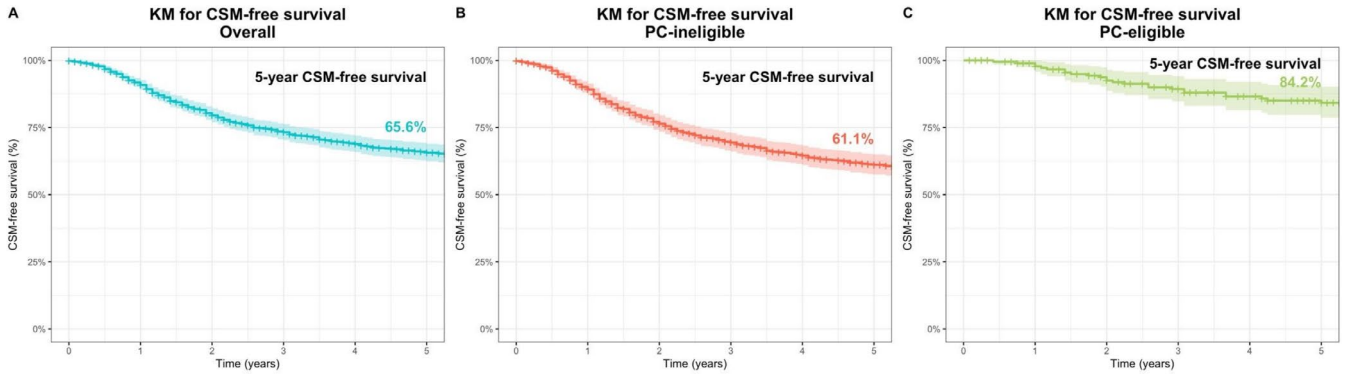


FIGURE 2 | Kaplan–Meier (KM) plots depicting cancer-specific mortality (CSM)-free survival according to partial cystectomy (PC) eligibility criteria, within 1017 patients treated with PC and pelvic lymph node dissection (PLND) from the Surveillance, Epidemiology, and End Results database (2004–2021).

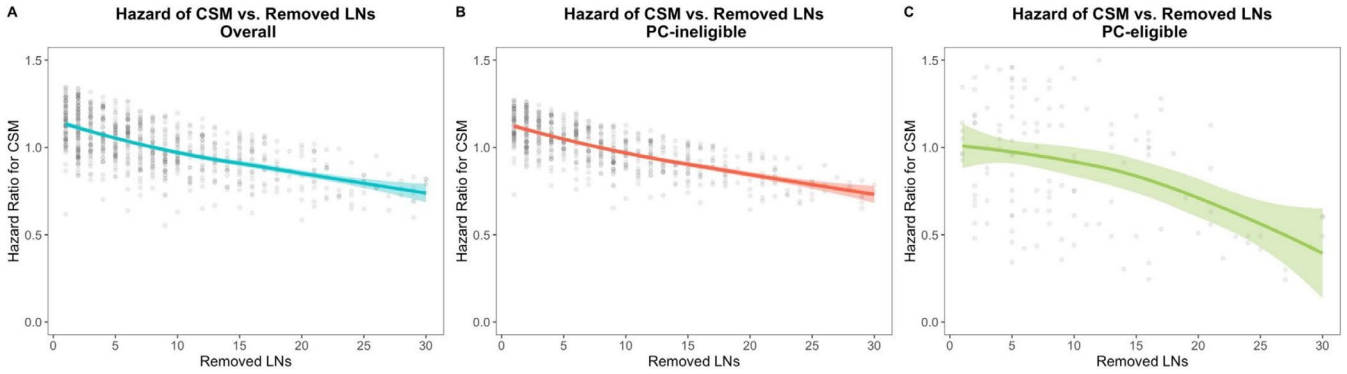


FIGURE 3 | Locally estimated smoothed scatterplot (LOESS) depicting hazard for cancer-specific mortality (CSM) versus number of lymph nodes (LNs) removed according to partial cystectomy (PC)-eligibility criteria within 1017 patients treated PC and pelvic lymph node dissection (PLND) from the Surveillance, Epidemiology, and End Results database (2004–2021).

3.3.3 | CSM-Free Survival in PC-Eligible Patients

In KM analyses within 197 PC-eligible patients, the 5-year CSM-free survival rate was 84.2% (Figure 2C). The graphical depiction of the regression between the number of removed LNs and CSM illustrated a downwards slope where the lowest CSM was recorded in patients with the highest number of removed LNs (Figure 3C). However, in multivariable CRM addressing

14422042, 2026, 5, Downloaded from https://onlinelibrary.wiley.com/doi/10.1111/iju.70483 by CochraneItalia, Wiley Online Library on [06/11/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

TABLE 2 | Separate multivariable Cox-regression models testing the effect of lymph node (LN) count on cancer-specific mortality (CSM) within 1017 patients treated with partial cystectomy (PC) and pelvic lymph node dissection (PLND) from the Surveillance, Epidemiology, and End Results database (2004–2021).

	Overall			PC-ineligible			PC-eligible		
	HR[a]	95% CI[a]	*p*	HR[a]	95% CI[a]	*p*	HR[a]	95% CI[a]	*p*
LN count	0.98	0.97–0.99	**0.036**	0.98	0.97–0.99	**0.043**	0.96	0.90–1.02	0.2

Note: Multivariable adjustment for age, sex, T stage, N stage, chemotherapy.
[a]HR, hazard ratio; CI, confidence interval. *p* values in bold are <0.05.

CSM, the number of LNs removed at PLND failed to reach independent predictor status (HR: 0.96, 95% CI: 0.90–1.02, $p=0.2$, Table 2).

4 | Discussion

Partial cystectomy is an established treatment for select bladder cancer patients [1]. Ideally, its use should be limited to those meeting the NCCN-endorsed criteria (≤T2 stage, tumor size ≤3 cm, segmental resection possible) in order to achieve adequate oncological outcomes [14, 15]. Pelvic lymph node dissection is recommended as an integral component of a comprehensive PC [5]. While PLND extent improved survival at RC, the association between the number of removed LNs and CSM in PC is unknown. We addressed this knowledge gap within the SEER (2004–2021) database, which yielded several noteworthy observations.

First, of 1017 PC patients who underwent a comprehensive PC that included PLND, only a minority fulfilled all three PC eligibility criteria ($n=197$, 19.4%), whereas the majority ($n=820$, 80.6%) did not meet all three criteria and were henceforth referred to as PC-ineligible. Of PC-ineligible, most fulfilled two out of three criteria ($n=407$, 40.0%), followed by one ($n=336$, 33.0%), and none ($n=77$, 7.6%). These proportions indicate that a comprehensive PC is more likely to be performed in patients who do not fulfill all eligibility criteria and in whom tumor burden may be more extensive than what is allowed by NCCN guidelines. The observed rate of PC according to NCCN eligibility criteria appears very low. This implies that the vast majority of the urology community either does not consider these criteria meaningful or considers tumors that are more extensive than the NCCN criteria definition as amenable to PC [1, 8]. The discrepancy between NCCN criteria and the rate of PC performed in PC-ineligible patients clearly requires a revision of either clinical practice profiles, or the NCCN PC-eligibility criteria, or both. Two distinct clinical scenarios may explain this observation: deliberate surgical extension beyond guideline recommendations in patients deemed suitable for PC despite exceeding standard criteria, or use of PC as an alternative to RC in patients considered unfit for more extensive surgery. These possibilities carry fundamentally different clinical implications and should be considered when interpreting the survival outcomes reported here. Additionally, limitations in SEER surgical coding may contribute to this observation, as procedure codes may not always accurately distinguish true PC from other partial resections. Regardless of the underlying explanation, it is important to note that the statistically significant association between PLND extent and CSM was confined to the PC-ineligible subgroup, and conclusions should be interpreted with this important nuance in mind.

Second, we assessed the extent of PLND according to the number of LNs removed. After stratifying the cohort of 1017 patients treated with comprehensive PC that included PLND according to PC-eligibility, the median number of LNs removed was 6 (IQR: 3–11) in PC-eligible patients and 7 (IQR: 3–14) in PC-ineligible patients ($p=0.09$). These findings suggest the extent of PLND does not differ according to NCCN PC-eligibility criteria. However, analyses of PLND extent over the study span demonstrated an increase in the number of LNs removed from 8 to 14 (2004–2021) in the overall cohort. Further stratification of temporal trends according to PC eligibility demonstrated that in PC-eligible patients the increase in removed LNs was from 7 to 16 (EAPC: +5.0%, $p=0.007$) vs. from 8 to 14 (EAPC: +2.2, $p=0.001$) in PC-ineligible patients within the same period (2004–2021). Despite the increase in LN count at PLND over time in both PC-eligible and ineligible patients, it is still much inferior to absolute LN counts recorded at RC within the SEER database [16, 17]. In consequence, the urologic community requires sensitization and encouragement aimed at increasing the appeal and the extent of PLND and LN count.

Third, when the impact of PLND extent on CSM was examined, key findings emerged. In all 1017 patients, regardless of PC eligibility, MCR models demonstrated that a higher number of LNs removed at PLND independently predicted lower CSM (HR: 0.98, $p=0.036$). Similarly, in 820 PC-ineligible patients, a higher number of LNs removed at PLND invariably predicted lower CSM (HR: 0.98, $p=0.043$). While statistically significant, the per-node effect size is modest. However, this effect is cumulative: across a clinically realistic increment of 10 additional nodes, it translates to an approximately 10%–20% relative reduction in CSM hazard, which may carry meaningful clinical relevance. Finally, in 196 PC-eligible patients, the graphical depiction of the relationship between LN count and CSM did demonstrate that an increasing number of LNs removed at PLND is associated with decreasing CSM. However, in MCR models, this relationship failed to reach independent predictor status. The lack of statistical significance in PC-eligible patients may reflect limited sample size, but equally may indicate a genuinely attenuated PLND benefit in patients with lower tumor burden, in whom locoregional nodal involvement is less likely to drive CSM. Based on this uncertainty, additional studies should ideally reassess this relationship. However, it may be difficult to identify sufficiently large samples of PC patients treated with PLND to accomplish this. It should also be noted that lymph node count alone cannot define the anatomical extent of dissection, and the debate surrounding "quality versus quantity" of

14422042, 2026, 5, Downloaded from https://onlinelibrary.wiley.com/doi/10.1111/iju.70483 by CochraneItalia, Wiley Online Library on [06/11/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

lymphadenectomy remains unresolved [13]. As the SEER database does not capture template-level data, the present findings cannot be used to advocate for a specific anatomical dissection template at PC.

Taken together, these findings highlight important discrepancies between NCCN-endorsed recommendations and real-world practice of PC eligibility and PLND. While comprehensive PC with PLND is more frequently performed in patients who do not fully meet eligibility criteria, the extent of PLND appears inconsistent with these criteria. Encouragingly, the number of LNs removed has increased over time, particularly in eligible patients, yet it remains suboptimal compared to RC standards. This is particularly important, as higher LN count was associated with improved CSM after comprehensive PC. Future efforts should therefore focus on standardizing patient selection and PLND templates at the time of PC, given emerging evidence that PLND does not meaningfully increase perioperative morbidity and may offer oncologic benefit when performed adequately [11]. Finally, as PC becomes increasingly integrated into multimodal bladder-preserving frameworks, the role of extensive PLND may warrant reassessment. Whether the oncologic contribution of PLND extent is maintained in the context of potent systemic agents—such as immune checkpoint inhibitors and antibody-drug conjugates—remains an open question that should be specifically addressed in upcoming studies.

Despite the novelty of our findings, several limitations must be acknowledged. First, the retrospective nature of the study introduces inherent selection biases, including potential healthy candidate bias, whereby fitter patients may be more likely to undergo extensive PLND while simultaneously carrying a more favorable baseline prognosis. As SEER does not capture performance status, frailty, or comorbidity, this cannot be accounted for in the multivariable models, and a causal interpretation of our findings should be avoided [18–21]. Ideally, future studies should assess use of PC versus RC in muscle-invasive bladder cancer patients while accounting for comorbidities, organ function, and other relevant factors [22]. Third, we were not able to validate the present results after controlling for specific inclusion criteria regarding tumor focality and/or the presence of carcinoma in situ, as recommended by NCCN guidelines [1, 9]. Fourth, the SEER database does not capture recurrence data, precluding assessment of recurrence-free survival or the distinction between local and systemic relapse, and thus whether the observed survival benefit reflects improved locoregional control or more accurate pathological staging remains unknown. Last but not least, while radiotherapy administration is recorded in SEER, the absence of data on timing, sequencing, and dose precluded its meaningful inclusion as a covariate in the multivariable models. Despite these important limitations that the current study shares with all previous reports [23–27], analysis assessing compliance to PC recommendations based on available patient and tumor characteristics remains essential, as rejecting such methodology would leave no viable alternatives for evaluating PC use in clinical practice. In conclusion, in patients treated with comprehensive PC that includes PLND, a higher number of LNs removed predicted lower CSM rates. Although this association was not observed in patients eligible for PC based on fulfillment of all three NCCN PC-eligibility criteria, the relationship between LN count and CSM illustrated a downwards slope where the lowest CSM was recorded in patients with the highest number of LNs removed. Therefore, the urologic community requires sensitization and encouragement aimed at increasing the use and the extent of PLND when PC is performed.

Author Contributions

Mattia Longoni: conceptualization, data curation, formal analysis, methodology, investigation, visualization, writing – original draft, writing – review and editing, validation. **Andrea Marmiroli:** investigation, writing – review and editing, validation. **Fabian Falkenbach:** investigation, validation, writing – review and editing. **Quynh Chi Le:** investigation, writing – review and editing, validation. **Michele Nicolazzini:** validation, investigation, writing – review and editing. **Calogero Catanzaro:** investigation, validation, writing – review and editing. **Federico Polverino:** investigation, writing – review and editing, validation. **Jordan A. Goyal:** writing – review and editing. **Markus Graefen:** validation, writing – review and editing, supervision. **Gennaro Musi:** validation, writing – review and editing, supervision. **Felix K. H. Chun:** validation, writing – review and editing, supervision. **Carlotta Palumbo:** validation, writing – review and editing, supervision. **Riccardo Schiavina:** validation, writing – review and editing, supervision. **Nicola Longo:** validation, supervision, writing – review and editing. **Fred Saad:** resources, supervision, writing – review and editing. **Shahrokh F. Shariat:** supervision, validation, writing – review and editing. **Marco Moschini:** validation, supervision, writing – review and editing. **Giorgio Gandaglia:** validation, supervision, writing – review and editing. **Francesco Montorsi:** validation, supervision, writing – review and editing. **Alberto Briganti:** supervision, validation, writing – review and editing. **Pierre I. Karakiewicz:** conceptualization, methodology, validation, supervision, visualization, resources, writing – review and editing, writing – original draft.

Funding

The authors have nothing to report.

Ethics Statement

The study was conducted using de-identified data from the Surveillance, Epidemiology, and End Results (SEER) database. As SEER is a publicly available, anonymized dataset, institutional review board approval was not required in accordance with local regulations.

Consent

The authors have nothing to report.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available in SEER Databases at https://seer.cancer.gov/data-software/documentation/seerstat/. These data were derived from the following resources available in the public domain: SEER 1975-2021, https://seer.cancer.gov/data-software/documentation/seerstat/nov2024/.

References

1. National Comprehensive Cancer Network, "NCCN Clinical Practice Guidelines in Oncology: Bladder Cancer—v6.2024," (2024).

2. C. Klose, O. Gordon, A. Sparks, and M. Whalen, "Trends of Lymph Node Outcomes in Partial Cystectomy for Muscle-Invasive Urothelial

14422042, 2026, 5, Downloaded from https://onlinelibrary.wiley.com/doi/10.1111/iju.70483 by CochraneItalia, Wiley Online Library on [06/11/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

Carcinoma of the Bladder," *Clinical Genitourinary Cancer* 21 (2023): 703–709, https://doi.org/10.1016/j.clgc.2023.05.020.

3. S. Gupta, P. J. Hensley, R. Li, et al., "Bladder Preservation Strategies in Muscle-Invasive Bladder Cancer: Recommendations From the International Bladder Cancer Group," *European Urology* 89 (2026): 18–28, https://doi.org/10.1016/j.eururo.2025.03.017.

4. J. Schmidt, K. Furlano, P. Kellmer, et al., "Retrospective Analysis of Partial Cystectomy in Patients With Muscle-Invasive Urothelial Carcinoma: A German Single-Center Experience," *Urologic Oncology: Seminars and Original Investigations* 43 (2025): 188.e1–188.e8, https://doi.org/10.1016/j.urolonc.2024.11.021.

5. G. Long, Z. Hu, Z. Liu, et al., "Partial and Radical Cystectomy Provides Equivalent Oncologic Outcomes in Bladder Cancer When Combined With Adequate Lymph Node Dissection: A Population-Based Study," *Urologic Oncology: Seminars and Original Investigations* 41 (2023): 327.e1–327.e8, https://doi.org/10.1016/j.urolonc.2023.02.004.

6. J. Holzbeierlein, B. R. Bixler, D. I. Buckley, et al., "Treatment of Non-Metastatic Muscle-Invasive Bladder Cancer: AUA/ASCO/SUO Guideline (2017; Amended 2020, 2024)," *Journal of Urology* 212 (2024): 3–10, https://doi.org/10.1097/JU.0000000000003981.

7. B. K. Hollenbeck, D. A. Taub, R. L. Dunn, and J. T. Wei, "Quality of Care: Partial Cystectomy for Bladder Cancer—A Case of Inappropriate Use?," *Journal of Urology* 174 (2005): 1050–1054, https://doi.org/10.1097/01.ju.0000169477.30477.3d.

8. J. M. Holzbeierlein, E. Lopez-Corona, B. H. Bochner, et al., "Partial Cystectomy: A Contemporary Review of the Memorial Sloan-Kettering Cancer Center Experience and Recommendations for Patient Selection," *Journal of Urology* 172 (2004): 878–881, https://doi.org/10.1097/01.ju.0000135530.59860.7d.

9. National Comprehensive Cancer Network, "NCCN Clinical Practice Guidelines in Oncology: Bladder Cancer—v2.2012," (2012).

10. B. R. Konety, S. A. Joslyn, and M. A. O'Donnell, "Extent of Pelvic Lymphadenectomy and Its Impact on Outcome in Patients Diagnosed With Bladder Cancer: Analysis of Data From the Surveillance, Epidemiology and End Results Program Data Base," *Journal of Urology* 169 (2003): 946–950, https://doi.org/10.1097/01.ju.0000052721.61645.a3.

11. K. Kaczmarek, B. Małkiewicz, and A. Lemiński, "Adequate Pelvic Lymph Node Dissection in Radical Cystectomy in the Era of Neoadjuvant Chemotherapy: A Meta-Analysis and Systematic Review," *Cancers* 15 (2023): 4040, https://doi.org/10.3390/cancers15164040.

12. M. Longoni, Q. C. Le, F. Falkenbach, et al., "The Effect of Pelvic Lymph Node Dissection on Cancer-Specific Mortality in Partial Cystectomy According to Eligibility Criteria," *Annals of Surgical Oncology* 33 (2025): 3680–3687, https://doi.org/10.1245/s10434-025-18821-5.

13. M. Von Deimling, M. Furrer, L. S. Mertens, et al., "Impact of the Extent of Lymph Node Dissection on Survival Outcomes in Clinically Lymph Node-Positive Bladder Cancer," *BJU International* 133 (2024): 341–350, https://doi.org/10.1111/bju.16210.

14. M. Longoni, A. Marmiroli, F. Falkenbach, et al., "Cancer-Specific Mortality of Partial Cystectomy Versus Radical Cystectomy in T2N0M0 Urothelial Bladder Cancer," *Annals of Surgical Oncology* 32 (2025): 6133–6140, https://doi.org/10.1245/s10434-025-17488-2.

15. Y.-X. Yang, G.-C. Ye, J.-C. Xiang, K.-D. Luo, S.-G. Wang, and Q.-D. Xia, "Differential Analysis of Surgical Treatment Modalities in T2N0M0 Bladder Cancer Patients: A Novel Propensity Score-Based Cohort Study," *Clinical Genitourinary Cancer* 23 (2025): 102257, https://doi.org/10.1016/j.clgc.2024.102257.

16. E. Zaffuto, M. Bandini, S. Gazdovich, et al., "Contemporary Rates of Adherence to International Guidelines for Pelvic Lymph Node Dissection in Radical Cystectomy: A Population-Based Study," *World Journal of Urology* 36 (2018): 1–6, https://doi.org/10.1007/s00345-018-2306-7.

17. M. Kosiba, L. F. Stolzenbach, C. Collà Ruvolo, et al., "Contemporary Trends and Efficacy of Pelvic Lymph Node Dissection at Radical Cystectomy for Urothelial and Variant Histology Carcinoma of the Urinary Bladder," *Clinical Genitourinary Cancer* 20 (2022): 195.e1–195.e8, https://doi.org/10.1016/j.clgc.2021.10.010.

18. M. Longoni, F. Di Bello, N. Rodriguez Peñaranda, et al., "Survival After Trimodal Therapy in Octogenarians With Organ-Confined Urothelial Bladder Cancer," *BJU International* 135 (2024): 828–834, https://doi.org/10.1111/bju.16622.

19. N. Rodriguez Peñaranda, F. Di Bello, A. Marmiroli, et al., "Urinary Diversion Versus Adverse In-Hospital Outcomes After Radical Cystectomy," *Annals of Surgical Oncology* 32 (2024): 2233–2240, https://doi.org/10.1245/s10434-024-16644-4.

20. M. Longoni, P. Scilipoti, C. Re, et al., "Use of 18F-Fluoro-2-Deoxy-D-Glucose (18F-FDG) PET/CT for Lymph Node Assessment Before Radical Cystectomy in Bladder Cancer Patients," *BJU International* 134 (2024): 636–643, https://doi.org/10.1111/bju.16363.

21. M. Longoni, N. Rodriguez Peñaranda, A. Marmiroli, et al., "Survival Outcomes and Temporal Trends of Non-Surgical Management vs Radical Cystectomy in Non-Organ-Confined Urothelial Bladder Cancer," *Urology* 200 (2025): 107–113, https://doi.org/10.1016/j.urology.2025.02.051.

22. E. Mazzone, F. Preisser, S. Nazzani, et al., "The Effect of Age and Comorbidities on Early Postoperative Complications After Radical Cystectomy: A Contemporary Population-Based Analysis," *Journal of Geriatric Oncology* 10 (2019): 623–631, https://doi.org/10.1016/J.JGO.2019.04.011.

23. S. Luzzago, C. Palumbo, G. Rosiello, et al., "Survival After Partial Cystectomy for Variant Histology Bladder Cancer Compared With Urothelial Carcinoma: A Population-Based Study," *Clinical Genitourinary Cancer* 18 (2020): 117–128.e5, https://doi.org/10.1016/j.clgc.2019.10.016.

24. U. Capitanio, H. Isbarn, S. F. Shariat, et al., "Partial Cystectomy Does Not Undermine Cancer Control in Appropriately Selected Patients With Urothelial Carcinoma of the Bladder: A Population-Based Matched Analysist," *Urology* 74 (2009): 858–864, https://doi.org/10.1016/j.urology.2009.03.052.

25. F. A. Mistretta, S.-J. Cyr, S. Luzzago, et al., "Partial Cystectomy With Pelvic Lymph Node Dissection for Patients With Nonmetastatic Stage pT2-T3 Urothelial Carcinoma of Urinary Bladder: Temporal Trends and Survival Outcomes," *Clinical Genitourinary Cancer* 18 (2020): 129–137.e3, https://doi.org/10.1016/j.clgc.2019.09.008.

26. M. Longoni, A. Marmiroli, F. Falkenbach, et al., "Oncological Outcomes After Non-Surgical Management Versus Radical Cystectomy in Non-Organ-Confined Non-Urothelial Bladder Cancer," *International Urology and Nephrology* 57 (2025): 3639–3646, https://doi.org/10.1007/s11255-025-04566-3.

27. M. Longoni, F. Falkenbach, A. Marmiroli, et al., "Development and External Validation of a Nomogram Predicting Cancer-Specific Mortality-Free Survival After Trimodal Therapy in Muscle-Invasive Bladder Cancer," *World Journal of Urology* 44 (2026): 111, https://doi.org/10.1007/s00345-026-06217-3.

14422042, 2026, 5, Downloaded from https://onlinelibrary.wiley.com/doi/10.1111/iju.70483 by CochraneItalia, Wiley Online Library on [06/11/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License