Urinary Outcomes Are Significantly Affected by Nerve Sparing Quality During Radical Prostatectomy

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OBJECTIVE To assess the effect of nerve sparing (NS) quality on self-reported patient urinary outcomes after radical prostatectomy.

METHODS A total of 102 preoperatively potent men underwent laparoscopic or robotic radical prostatectomy; NS was prospectively graded at surgery using a 0-4 scale/neurovascular bundle. Urinary functional outcomes were measured by validated Expanded Prostate Cancer Index Composite questionnaire at baseline and follow-up time points (1, 3, 6, 9, and 12 months) in 99 men who underwent various degrees of NS. Mixed linear regression was used to analyze the effect of NS quality and other clinical factors on urinary outcomes.

RESULTS Patients with at least 1 neurovascular bundle spared completely, along with its supportive tissues (NS grade 4/4), noted significantly improved Expanded Prostate Cancer Index Composite urinary functional and continence outcomes as early as 1 month postoperatively and up to 12 months. Significantly less urinary bother was also noted in these men by 9-12 months postoperatively. Multivariate analysis revealed that bilateral or unilateral excellent NS (at least 1 bundle graded 4/4), increasing time from surgery, young patient age, and lower body mass index positively and significantly affected urinary functional outcomes, including pad use. Men who received excellent unilateral NS recovered urinary function about as well as men who had both neurovascular bundles spared in similar fashion.

CONCLUSION The quality of NS significantly influences patient-defined urinary functional convalescence. Completely sparing at least 1 neurovascular bundle along with its supportive tissues has a dramatic effect on the recovery of urinary continence and quality of life in preoperatively potent men. UROLOGY 82: 1348–1354, 2013. © 2013 Elsevier Inc.

There will be almost 250,000 men diagnosed with prostate cancer in the United States in 2012, approximately one-third of whom will undergo radical prostatectomy (RP).[1,2] Although effective at cancer eradication, the adverse effects of surgery, most notably urinary incontinence and erectile dysfunction, can severely affect quality of life.[3] Urinary incontinence, by virtue of patients having to suffer multiple times on a daily basis, might have an even greater effect on quality of life than erectile dysfunction. Given the young age at diagnosis of many men today, techniques to minimize urinary morbidity after RP are sorely needed.

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The most frequent type of urinary dysfunction after RP is stress incontinence.[4] Although probable etiologies of stress incontinence include rhabdosphincter insufficiency secondary to surgical trauma, injury to the sphincter's innervations, or prolapse of the vesicourethral anastomosis,[5] underlying detrusor overactivity might also be unmasked by prostate removal. A wide range of post-prostatectomy urinary symptom rates have been cited in published data, relating to differing definitions of urinary continence and bother, methodology of data collection, patient selection, and surgical technique.

Since Walsh revolutionized the RP by introducing the concept of neurovascular bundle preservation,[6] there has been much literature devoted to nerve sparing (NS) and its effect on erectile functional recovery. Indeed, not only the categorical sparing of nerves but also the quality of NS accomplished have been shown to affect potency rates postoperatively.[7,8] There has also been some attention to the effect of NS on the recovery of continence after open and minimally invasive surgical approaches, but with no consensus: Some studies demonstrate a benefit of NS with regard to continence recovery,[9-14] whereas others do

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Table 1. Demographic and comorbidity information in study population, stratified by nerve sparing (NS) status

Variable	Excellent NS Groups (N = 75)	Standard NS Group (N = 24)	*P* Value
Age			
Mean (std)	53.4 (5.8)	55.7 (5.9)	.110
Median (range)	54 (40-64)	55 (44-64)	
NSS			
Mean (std)	7.3 (1.0)	5.2 (1.2)	<.0001
Median (range)	8 (4-8)	6 (2-6)	
BMI			
Mean (std)	27.0 (3.3)	28.3 (3.2)	.080
Median (range)	26.6 (19.8-37.3)	28.3 (22.3-33.7)	
PSA			
Mean (std)	4.8 (2.1)	5.1 (2.0)	.845
Median (range)	4.8 (0.6-14.0)	4.8 (2.2-10.0)	
Prostate volume			
Mean (std)	46.8 (11.6)	53.9 (14.4)	.074
Median (range)	46 (25-78)	49 (39-94)	
Hypertension			
No	54 (62.5)	15 (62.5)	.378
Yes	21 (37.5)	9 (37.5)	
DM			
No	74 (98.7)	24 (100)	1.000
Yes	1 (1.3)	0	
Hyperlipidemia			
No	56 (74.7)	20 (83.3)	.381
Yes	19 (25.3)	4 (16.7)	
Coronary artery disease			
No	74 (98.7)	22 (91.7)	.145
Yes	1 (1.3)	2 (8.3)	

BMI, body mass index; DM, diabetes mellitus; NS, nerve sparing; NSS, nerve sparing score; PSA, prostate-specific antigen.

"Excellent nerve sparing (NS) groups" are men who received 1 or both nerves completely spared (nerve sparing score = 4 on 1 or both sides, bilateral excellent nerve sparing and unilateral excellent nerve sparing). "Standard NS groups" are men who received NS but neither bundle was rated as excellent (nerve sparing score <4 on each side, standard nerve sparing).

not.[15-22] There are little data available on early (<1 year) continence recovery rates using patient-reported quality of life questionnaires, with equally mixed results.[11,12,20] In addition, none of these studies investigated whether, in a cohort of potent men, degrees of NS or NS quality might affect the recovery of urinary continence.

The objective of this study was to prospectively evaluate if the quality of neurovascular bundle preservation as determined by the surgeon at surgery affected the recovery of urinary continence and the different urinary symptom domains over the first postoperative year, as assessed by patient self-reported Expanded Prostate Cancer Index Composite (EPIC) questionnaire.[23]

MATERIALS AND METHODS

This was a single-institution, 3-surgeon institutional review board–approved study of potent men undergoing minimally invasive (laparoscopic or robotic) NS RP for prostate cancer. Informed consent was obtained from 102 prospectively enrolled patients, with NS quality (grade) intraoperatively recorded by each surgeon. Grading ranged from 0 (none) to 4 (excellent) for each neurovascular bundle, providing a composite bilateral NS score (NSS) of 0 to 8, derived from our previous experience[7] and corresponding to others.[13] In brief, a score of 0 corresponded to no NS on that side, with the nerve resected in whole or in part, 1 corresponded to poor NS (bundle appears traumatized or fulgurated in places but without missing segments), 2 corresponded to good NS (good bundle but slightly ragged, with no clear divots or missing pieces, and scant nerve tissue on the resected prostatectomy specimen), 3 corresponded to very good NS (intact nerve bundle with little supportive tissue, no nerve tissue on the resected specimen), and 4 corresponded to excellent NS (intact bundle with significant supportive tissue veil/high release, no nerve visualized on specimen). The patients were subcategorized into 3 groups, a bilateral excellent NS (BENS: both neurovascular bundles spared excellently; NSS = 8), a unilateral excellent NS group (UENS: 1 bundle spared excellently grade 4, other bundle graded <4; NSS range, 4-7), and a standard NS group (SNS: at least 1 bundle spared, but neither bundle spared excellently; each graded 0 to 3; NSS range, 1-6).

Inclusion criteria for NS RP were age <65, normal preoperative erectile function (IIEF-EF ≥26/30[24]), untreated prostate cancer stage cT1c or cT2a, and Gleason grade <8. Exclusion criteria were previous prostate cancer treatment (radiation, hormonal deprivation, and chemotherapy). All patients were prescribed 50 mg sildenafil for postprostatectomy penile rehabilitation on a nightly or on-demand basis after NS RP as part of a clinical trial, with potency data reported in a separate publication[25]; each patient's average monthly phosphodiesterase type 5 inhibitor usage was recorded on follow-up visits and tabulated. The postoperative care pathway of all patients was standardized, and with respect to continence involved written instruction regarding the performance of Kegel exercises.

The EPIC was administered at different time points (presurgery, 1, 3, 6, 9, and 12 months after surgery).[23] The subscales analyzed included all those relating to urinary outcomes, specifically the Urinary Domain Summary Score (USS), Urinary Bother Subscale, Urinary Incontinence Subscale (UIN), Urinary Irritative/Obstructive Subscale (UIR), and Urinary Function Subscale (UFS).

Table 2. Mixed model showing effect on urinary outcome from baseline through study completion, adjusted for age, body mass index, prostate volume, and baseline urinary outcome score

EPIC Interest Variable	Predictor	Slope	*P* Value
Urinary summary	BENS/UENS (excellent NS) vs SNS (standard NS)	11.2	<.0001
	Time point	1.5	<.0001
	Prostate volume	0.05	.587
	BMI	−0.7	.013
	Age	−0.4	.063
	Urinary summary (mo 0)	0.1	.289
Urinary bother	BENS/UENS vs SNS	9.2	.002
	Time point	2.3	<.0001
	Prostate volume	0.08	.464
	BMI	−0.6	.087
	Age	−0.3	.134
	Urinary bother (mo 0)	0.1	.285
Urinary irritative	BENS/UENS vs SNS	2.4	.121
	Time point	0.8	<.0001
	Prostate volume	0.07	.193
	BMI	−0.2	.349
	Age	−0.2	.148
	Urinary irritative (mo 0)	0.3	.001
Urinary incontinence	BENS/UENS vs SNS	17.9	.0001
	Time point	2.9	<.0001
	Prostate volume	−0.01	.943
	BMI	−1.7	.0009
	Age	−0.4	.241
	Urinary incontinence (mo 0)	−0.1	.498
Urinary function	BENS/UENS vs SNS	14.3	<.0001
	Time point	2.1	<.0001
	Prostate volume	−0.03	.816
	BMI	−0.9	.007
	Age	−0.2	.348
	Urinary function (mo 0)	0.1	.503
Pad usage	BENS/UENS vs SNS	−0.6	.0006
	Time point	−0.1	<.0001
	Prostate volume	−0.01	.251
	BMI	0.03	.051
	Age	0.03	.014
	Pad usage (mo 0)	*	*

BENS, bilateral excellent nerve sparing; SNS, standard nerve sparing; UENS, unilateral excellent nerve sparing; other abbreviations as in Table 1.
* All baseline pad usage is 0.

Higher values (1-100) correspond to better function for each EPIC subscale. Comparisons of urinary outcomes were performed between groups using the *t* test or Wilcoxon rank sum test. We also looked specifically at EPIC item 27, "How many pads or adult diapers per day did you usually use to control leakage during the last 4 weeks?" Mixed linear regression was used to analyze the effect of NS across all time points with month 0 scored as a covariate in the model. All statistical calculations were performed with SAS 9.3. *P* values ≤0.05 were considered statistically significant.

RESULTS

The BENS group consisted of 45 men, the UENS group 30 men, and the SNS group 24 men; 3 men received no NS on either side and were excluded from final analysis owing to sample size. Baseline age, body mass index (BMI), prostate volume, and relevant comorbidities were similar ($P > .05$) between men who received at least 1 excellently spared neurovascular bundle and those who did not (Table 1), although as expected mean NSS differed between these groups. There was no difference in baseline EPIC urinary domain scores between the 2 groups. Analyses compared the BENS group, UENS group, and SNS groups, and also the BENS/UENS combined groups with the SNS group.

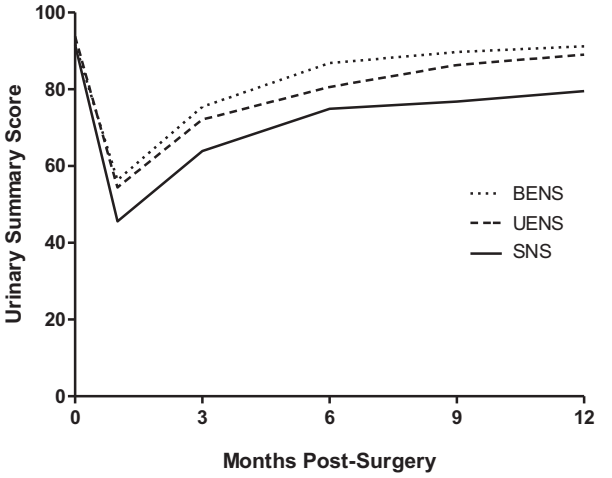

Figure 1. Urinary summary score for standard nerve sparing (SNS) vs unilateral excellent nerve sparing (UENS) vs bilateral excellent nerve sparing (BENS) through 12 months after surgery.

There was significant decline in all urinary parameters from baseline to first postoperative assessment in all groups. As expected, however, all urinary measures, for all groups, improved with increasing time from surgery. As early as 1 month postoperatively, BENS/UENS patients achieved significantly higher scores on the USS, UIN, and UFS ($P < .05$), representing improved function. These statistically significant trends continued over time. By 9 months postoperatively, it was evident that excellent NS of 1 or both neurovascular bundles significantly correlated with improvements in all EPIC urinary domains compared with lesser qualities of NS, primarily the USS, UIN, and UFS (and with the sole exception of the UIR). These differences held up at the 12-month time point for all of the same subscales, including the global USS ($P = .002$). Comparing BENS with UENS groups showed far more subtle differences on EPIC subscales: There were no significant differences in any subscale until month 6 (USS, UIN, and UFS) and month 9 (UIN and UFS), when BENS patients demonstrated improved outcomes. However, these transient differences were no longer apparent by the end-of-study month 12 assessment (data not shown).

On multivariate analysis, excellent NS of 1 or both neurovascular bundles (BENS/UENS) was significantly associated with improvements in all EPIC urinary domains (except for UIR) compared with SNS over the

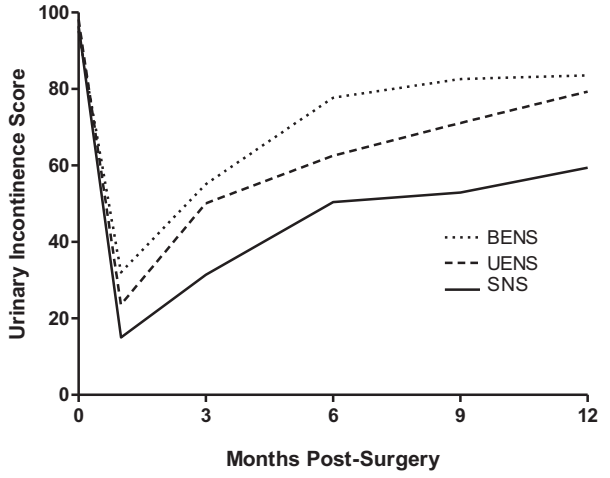

Figure 2. Urinary incontinence subscale score for standard nerve sparing (SNS) vs unilateral excellent nerve sparing (UENS) vs bilateral excellent nerve sparing (BENS) through 12 months after surgery.

first postoperative year (Table 2). Representative USS and UIN convalescence curves resulting from mixed model analysis are shown in Figures 1 and 2. Both the BENS and UENS curves are statistically different from the SNS curve ($P < .05$), but they are not statistically different from each other. Increasing time from surgery was associated with improvements in all EPIC urinary domains. Increasing BMI was a predictor of poorer USS, UIN, and UFS scores, and increasing age was associated with greater pad usage (Table 2). Prostate volume was not associated with differences in outcomes for any of the EPIC urinary domains (Table 2). Phosphodiesterase type 5 inhibitor use/quantity did not alter the effect of NSS on urinary functional outcomes either when the dosage used on a monthly basis was added to the mixed model (data not shown).

BENS and UENS patients used significantly fewer pads than those who received SNS across all time points ($P = .0006$). There was no significant difference in pad usage between men who received excellent sparing of both bundles compared with excellent sparing of just 1 (BENS vs UENS; $P = .154$).

COMMENT

In this study, we demonstrate that higher quality NS significantly improves patients' perception of nearly each category of urinary recovery as measured by EPIC urinary outcome scores and pad usage. Most these differences were noted between 1 and 9 months postoperatively and held up at 12 months, a time by which most patients have more or less plateaued in terms of urinary convalescence. Men who had 1 or both neurovascular bundles spared completely, with a healthy veil of tissue overlying 1 or both nerves, had comparable and excellent urinary recovery, compared with men who received lesser degrees of NS. These findings integrate 3 key components of postprostatectomy continence recovery research, which to our knowledge have not been previously reported simultaneously: recovery at early (starting at 1 month postoperatively) time points, subjective patient-reported quality of life outcomes in various urinary functional domains, and how the quality of NS affects these outcomes. In addition, on multivariate analysis, we found several factors that can predict outcomes in some or all the EPIC urinary domains, namely intraoperative NS quality, increasing time from surgery, age, and BMI.

The literature devoted to the effect of NS on urinary continence outcomes has used various outcome-reporting tools and resulted in mixed findings. Several studies found a positive association between NS and recovery of continence,[9-14] whereas others did not.[15-22] These studies are heterogeneous, with notable differences, including study size, patient demographics, time frame for assessment of continence recovery, definition of NS, definition of continence, tools to assess continence, and surgical approach. In addition to NS status, cited factors which have been found to predict urinary continence recovery include type of NS (bilateral vs unilateral), young age of patients, lower prostate cancer clinical risk status, lower prostate volume, better preoperative urinary function and potency (based on a variety of validated questionnaires), baseline urinary frequency, bladder neck-sparing, BMI, and postoperative pad use. These factors are not unanimous or necessarily inclusive, as a recent meta-analysis also cited patient comorbidity, surgical technique, and surgeon experience as important factors in recovery of urinary continence.[26] The findings of our own multivariate analysis support previously reported risk factors predicting the return of urinary continence.

Studies examining how NS status affects urinary continence using patient-reported quality of life outcomes have also been discordant, but have typically looked at NS as an all-or-none phenomenon. Examples include Wei et al,[12] who conducted a prospective study and found that categorical NS afforded an earlier return to continence (median 5.3 vs 10.9 months) and held up as a predictor of regaining urinary continence on multivariable analysis. Choi et al[11] analyzed a cohort of a single surgeon's patients after robotic RP and also found that as early as 4 months postoperatively, NS was associated with improved mean EPIC urinary function. Other studies, however, have not shown a lasting effect of NS. One group, for example, examined any correlation between NS status and urinary continence recovery by University of California, Los Angeles - Prostate Cancer Index (UCLA-PCI): differences at 3 months in the NS group did not hold up by 36 months postoperatively, and on multivariate analysis, there was no correlation between NS and UCLA-PCI scores.[20]

A critical concern when considering NS status is the subjective nature of not only whether NS was actually carried out, but also the quality or degree of NS. Many studies simply allude to whether NS was performed retrospectively by operative note or prospectively based on surgeon perception. However, some investigators have attempted to define NS quality on the basis of

proportion of the neurovascular bundle intraoperatively preserved.[7,8,11] Even attempts at developing objective NS grading systems leave room for subjective surgeon interpretation. In our previous report,[7] we attempted to more objectively and thoroughly define intraoperative NS status, on the basis of size and continuity of the remnant neurovascular bundles after RP. Interestingly, it has been shown that a surgeon's designation of NS status is significantly correlated with the amount of residual nerve tissue on RP specimens.[27] Two more recent reports describe a standardized NS grading system according to the intraoperative visual cues of the periprostatic tissues and prostatic vasculature, respectively, during robotic RP,[13,28] which might represent the most vigorous attempts at objective NS grading classification to date.

In terms of objective outcome measures, there are multiple methods to assess postprostatectomy urinary continence or function, including daily pad use, validated quality of life questionnaires (including the EPIC, the UCLA-PCI, and the EORTC-QLQ-PR25), and urodynamic evaluation. The most common way of assessing continence recovery appears to be daily pad use. However, this intuitively appealing method has flaws, as patients' tolerance of and bother from a moist pad differs from one individual to the next, which can affect pad change frequency. Defining continence as using 0 or 1 pad/day usage is rather imprecise, and it has even been shown that patients who do not wear pads can still develop significant bother, usually related to urinary leakage, after RP.[29] Validated patient-reported outcome measures best assess the true degree of patient bother. The EPIC questionnaire, used in this study, distinguishes several domains of urinary function and also quantitates pad use. However, the EPIC has many overlapping urinary quality of life domains; we analyzed each individually and found that the USS, UIN, UFS, and pad usage were arguably the continence measures most dramatically affected by excellent sparing of at least 1 neurovascular bundle. It is comforting to note that our 0-1 year postoperative EPIC data complement the recent findings by Srivastava et al[14] who used a zero pads-at-3-months definition of continence and demonstrated a beneficial effect of increasing NS grade on early urinary recovery.

Our study is unique in that we have demonstrated significant differences in EPIC urinary outcome scales at different postprostatectomy time points up to 1 year in men who received varying degrees of NS. We found that there were few differences in urinary recovery and outcome comparing men who had 2 vs 1 neurovascular bundle spared completely with supportive tissues intact (excellent NS). Conversely, men who had bilateral NS performed without sparing of the supportive tissues around the bundle (lesser quality NS) had delayed and less complete urinary convalescence. Our data support the notion that the accessory nerve fibers lateral to the prostate and more anterior than the neurovascular bundles make a significant contribution to male continence.[30]

Our study has several limitations. Quality of NS is rated by the operative surgeon, so that although the grading system used strives for objectivity, bias might nonetheless be introduced. Although prospective, the study is also limited as it only includes 99 patients from 1 institution. In addition, all patients in this study were relatively young and potent preoperatively, and all received varying degrees of NS. Further studies with more surgeons and more expansive entry criteria, and video review by a group of assessors to define the quality of NS, might validate these data in a broader population.

CONCLUSION

Excellent neurovascular bundle preservation, as defined by an intraoperative grading system, was associated with improved postprostatectomy functional urinary outcomes over the first postoperative year. Excellent preservation of 1 or both neurovascular bundles correlated with significant improvement in virtually all EPIC urinary domains compared with lesser degrees of NS that did not spare the supportive tissues overlying the nerve bundles. These data suggest that, at least among potent men in whom NS is oncologically justifiable, judicious attempts to completely spare at least 1 neurovascular bundle and its overlying periprostatic tissues might pay dividends in terms of functional urinary convalescence.

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EDITORIAL COMMENT

Before the description of the anatomic nerve sparing radical prostatectomy by Walsh et al,[1] this surgical procedure was associated with significant intraoperative, perioperative, and long-term complications. Today, experienced open and robotic surgeons perform anatomic radical prostatectomy (RP) with rare technical complications, and the overwhelming majority of men regain continence. Depending on baseline age, sexual function, cardiovascular comorbidities, and the extent of nerve sparing (bilateral, unilateral, or no neurovascular nerve sparing), a significant subset of men regain erectile function.[2]

The decision to perform a nerve sparing procedure must balance potency and oncological control. We reported that the difference in potency rates between men undergoing a bilateral vs unilateral nerve sparing is approximately 15%.[2] We have also published our preoperative criteria for preserving the neurovascular bundle according to factors predictive of unilateral extracapsular extension.[3] Nerve sparing is not a binary decision all vs none in many cases we will attempt to preserve a portion of the neurovascular bundle.

We and others have asked the question whether the extent of nerve sparing affects urinary continence with conflicting conclusions?[4] The present study concludes that nerve sparing enhances urinary continence. There are several methodological issues that are of concern. First, the authors present a small series of only 102 men undergoing RP by 3 surgeons. Second, was it the intent of the surgeons to perform bilateral nerve sparing in all cases? If not, what were the criteria to perform a partial or complete nerve excision? Third, if all men had a numerical score for extent of nerve sparing, why did they not analyze the data as a continuous variable? Fourth, were the 3 subgroups defined preoperatively or were these groups defined posthoc to achieve statistical significance. Fifth, if the study identified 3 subgroups, then the analysis should have compared all 3 groups independently. Sixth, there is a tremendous difference in qualitative nerve sparing between a score of 4 vs 8, yet there is no meaning difference between these 2 groups. Why? Seventh, how many men were evaluable at the different time points. Finally, how many of the men who had excellent nerve sparing developed erectile dysfunction? If these men were not potent, do the authors believe the nerves were spared? The authors should examine whether men who were potent postoperatively exhibited superior continence because this is the group who truly had their nerves spared.

Let us contrast this study to our published series.[4] First, our study involved 1100 men who signed informed consent to participate in a prospective longitudinal study of which 728 were potent preoperatively. The UCLA Prostate Cancer Index and AUASS were administered at baseline, 3, 6, 12, and 24 months. The surgeon was not involved in administration, entry or retrieval or the statistical analysis. Overall, 88% and 12% of men underwent a bilateral vs unilateral nerve sparing RP on the basis of preoperative criteria. Continence was defined as total control/occasional dribbling because we reported that men fulfilling these criteria consider themselves continent after RP.[5] Continence rates at 24 months were not influenced by our preoperative decision to perform bilateral or unilateral nerve sparing. Although we did not intraoperatively qualitatively ascertain nerve sparing, we believe the best indicator of whether nerves were spared was their postoperative potency status. Obviously, if someone with a nerve sparing score of 8 is rendered impotent, then the nerves mediating erectile function were not spared despite the surgeon's optimism. Continence rates in our study were also independent of nerve sparing status.

Although I enjoyed reading and reviewing the present study, I stand by my conclusion that nerve sparing does not influence continence status.

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REPLY

Our relatively small study of the effects of nerve sparing (NS) on urinary convalescence after radical prostatectomy (RP) has several features that distinguish it from others. First, we did not compare NS with non-NS, but rather compared degrees of NS with each other; second, we used a validated prostate-specific health-related quality of life instrument (the Expanded Prostate Cancer Index Composite; EPIC) and analyzed our data using the urinary subscales that are integral to it; third, we reported urinary quality of life outcomes at 3, 6, 9, and 12 months after minimally invasive RP, the time frame during which most urinary convalescence occurs. The use of validated prostate-specific quality of life measures is a comprehensive way of studying urinary convalescence after treatment for prostate cancer.

We appreciate the reviewer's citing of their previous publication and wish to highlight specifically how our series differs from theirs, which might go some way toward explaining the different conclusions. In the study by Marien and Lepor,[1] men who received bilateral or unilateral NS were compared at 24 months using categorical assessments of potency and continence. Although a validated quality of life instrument was administered at 3, 6, 12, and 24 months (the UCLA-PCI, from which the EPIC was subsequently derived), no UCLA-PCI urinary subscale data were reported (eg, urinary function or urinary bother), nor were any 3, 6, or 12 month data. Single-question assessments can indeed be helpful, but categorizing a man as "potent" or "continent" postoperatively is not synonymous with baseline recovery of quality of life in these domains.[2] However, our studies were similar in that we both compared men with varying degrees of NS with each other and achieved similar response rates to our questionnaires (84% in theirs at 24 months, 65%-95% in ours depending on the timepoint, in answer to the reviewer).

The intent of our surgeons was to perform bilateral NS in this cohort of men, with pre- and intraoperative characteristics ultimately governing the surgeons' decision to perform varying degrees (1-4) of NS, or "partial" NS in some cases. We were surprised to note in our study that excellent NS, whether of 1 nerve bundle or both, was a significant predictor of improved urinary quality of life and continence after RP. When NS score (NSS, a subjective measure of NS quality ranging from 0 to 4 per bundle) was initially analyzed as a continuous variable, we found that a 1 unit increase in NSS increased postoperative outcomes on the EPIC Urinary Incontinence Subscale by approximately 4.4 units of 100 (unpublished data). We subsequently analyzed the cohort comparing men who received excellent NS on 1 or both sides with men who received lesser degrees of NS. "Excellent" NS (NSS = 4 on 1 side) was defined as the sparing of an intact neurovascular bundle with a significant veil of supportive lateral and apical tissue. The sparing of 1 bundle in this manner appeared to be as helpful for continence recovery as the sparing of both bundles equally well, suggesting that the fibers that control early continence recovery might be redundant, bilateral, and positioned more anteriorly than those that control potency. Although our series was small, the cohort was intensely studied, and all the principal factors thought to affect continence recovery were controlled for. In addition, the questionnaires were provided to the patients, collected, and analyzed independently of the operating surgeons.

Putting our data in context with previous studies[3,4] and more recent published data on the topic,[5] it appears that sparing at least 1 nerve bundle as meticulously as possible allows for as good an early urinary outcome as if both nerves were spared in the same manner. The lack of a difference in continence outcomes between unilateral and bilateral NS in the study by Marien and Lepor is likely because of the excellent unilateral (and bilateral) NS technique of an experienced surgeon, and/or the longer time (2 years) that elapsed before assessing urinary outcome. If it is oncologically acceptable to perform excellent NS on one side, and excellent NS is subjectively accomplished, our data suggest that resecting somewhat more widely on the other side (as necessary) does not compromise early urinary convalescence.

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