

Patient-Reported Impotence and Incontinence After Nerve-Sparing Radical Prostatectomy

James A. Talcott, Patricia Rieker, Kathleen J. Propert, Jack A. Clark, Kenneth I. Wishnow, Kevin R. Loughlin, Jerome P. Richie, Philip W. Kantoff*

Background: The age-adjusted rate of radical prostatectomy, the most common treatment of early (nonmetastatic) prostate cancer, increased almost sixfold between 1984 and 1990. This increase was due in part to reported improvements in postoperative sexual potency after the use of newly developed “nerve-sparing” procedures. However, published estimates from physicians of impotence following various types of radical prostatectomy may be low, since not all patients may report treatment-related complications accurately and completely to their doctors. In contrast, direct surveys of patients indicate much higher rates of postoperative sexual and urinary dysfunction. One problem with most physician and patient surveys is that they have been performed retrospectively, and pretreatment impotence and incontinence prevalent in older men cannot be assessed accurately in retrospective studies. **Purpose:** This study was initiated in a cohort of men before they underwent radical prostatectomy to assess treatment-related effects on impotence and incontinence. **Methods:** The study population consisted of 94 men enrolled in a cohort study of treatment for early prostate cancer. The patients completed questionnaires about sexual and urinary functions before surgery and at 3 and 12 months after surgery and had adequate information to assess the type of surgical technique used (non-nerve-sparing, unilateral nerve-sparing, or bilateral nerve-sparing). Because items assessing sexual function were inadvertently omitted from the questionnaire in the initial months of the study, information on sexual function for all time periods was available for only 49 men. **Results:** Compared with men who had not been treated with a nerve-sparing procedure, men who underwent nerve-sparing radical prostatectomy, particularly of the bilateral type, were younger and had better prognostic features, indicating less advanced cancers. Before surgery, nine (75%) of 12 men not treated with a nerve-sparing procedure reported erections that were usually inadequate for sexual intercourse compared with six (33%) of 18 men and one (5%) of 19 men who underwent unilateral and bilateral nerve-sparing prostatectomies, respectively. At 12 months after surgery, most men reported inadequate erections, including 15 (79%) of the 19 men who had bilateral nerve-sparing surgery; unilateral nerve preservation provided no apparent benefit. In general, nerve-sparing surgery was associated with more use of absorbent pads at 3 and 12 months following treatment, and this approach was associated with substantial urinary incontinence at 3 months but not at 12 months following surgery. **Conclusions:** Nerve-sparing prostatectomy, particularly when performed unilaterally, improves postoperative sexual function to a lesser

extent than previously reported. Because men with preoperative impotence and more advanced cancers receive nerve-sparing surgery less often, some of the previously reported benefit of nerve preservation may be the result of patient selection and not of the technique per se. [J Natl Cancer Inst 1997;89:1117-23]

Prostate cancer is the most common non-skin cancer diagnosis in the United States (1). The age-adjusted rate for radical prostatectomy, the most common treatment for nonmetastatic cancer, increased almost sixfold between 1984 and 1990 (2), and new diagnoses of prostate cancer have more than tripled since 1990. The preference for surgery rather than radiation therapy (3,4) depends in part on reports of better postoperative sexual potency after the “nerve-sparing” or “anatomic” technique compared with nearly universal impotence observed previously (5,6). Because of the long natural history of early prostate cancer, men with any permanent postoperative complications will likely experience them for many years. Therefore, the expectation of preserved sexual function after the nerve-sparing technique may weigh heavily in the patient’s treatment choice.

That some patients who would like nerve-sparing surgery will not get it complicates the preoperative estimation of possible postoperative erectile dysfunction. In the nerve-sparing approach, the surgeon identifies for potential preservation one or both of the neurovascular bundles that lie adjacent to the prostate capsule inferolaterally on either side (7). Since attempting to preserve these structures may result in a narrower surgical resection margin for prostatic tissue, which may contain cancer, the surgeon must make an intraoperative judgment for each neurovascular bundle that prostate cancer does not closely approach it before attempting to preserve it. Patients with large or bilateral cancers are often not offered nerve-sparing prostatectomy, especially not bilateral nerve preservation. Therefore, the operation that the patient receives—bilateral nerve-sparing, unilateral nerve-sparing, or non-nerve-sparing prostatectomy—is in some cases unpredictable prior to surgery.

*Affiliations of authors: J. A. Talcott, P. Rieker, J. A. Clark, P. W. Kantoff, Dana-Farber Cancer Institute and Harvard Medical School, Boston, MA; K. J. Propert, Dana-Farber Cancer Institute and Harvard School of Public Health, Boston; K. I. Wishnow, New England Deaconess Hospital and Harvard Medical School; K. R. Loughlin, J. P. Richie, Brigham and Women’s Hospital and Harvard Medical School.

Correspondence to: James A. Talcott, M.D., Center for Outcomes Research, Massachusetts General Hospital, B75 230, 55 Fruit St., Boston, MA 02114-2696. See “Notes” following “References.”

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Published estimates of impotence after various radical prostatectomy techniques may be inaccurately low, since they come largely from surgery case series data collected and reported by treating medical physicians (5,7-12), to whom not all patients may accurately and completely report treatment-related complications (13). The much higher postoperative sexual and urinary dysfunction rates reported in recent direct surveys of patients who have been previously treated with radical prostatectomy (13-15) support that concern. Because pretreatment incontinence and impotence, prevalent in older men, cannot be assessed in retrospective surveys, we performed a cohort study beginning prior to surgery to assess treatment-related impotence and urinary incontinence reported by patients. The main results of this study will be reported elsewhere (Talcott JA, Rieker PP, Clark J, Probert K, Kalish L, Weeks J, et al.: manuscript submitted for publication). We report the effects of surgical technique on patient outcomes in this study.

Patients and Methods

Patient Population

Men with early (nonmetastatic) prostate cancer were recruited to the study from August 29, 1990, through May 31, 1994, at a consultation for advice on primary therapy at a participating urology, radiotherapy, or multidisciplinary clinic. Eligibility requirements included pathologically confirmed adenocarcinoma of the prostate, a radionuclide bone scan free of apparent metastatic cancer [or occasionally, a pretreatment serum prostate-specific antigen (PSA) level of 8.0 ng/mL or less, for whom positive scans are rare (16)], and no prior primary therapy for prostate cancer. Abdominopelvic-computed tomography scans or magnetic resonance imaging to identify extraprostatic extension and metastasis to pelvic lymph nodes was recommended but not required. Because this questionnaire-only study was considered to be a limited risk study, the Institutional Review Boards at each study site approved "implied consent" procedures: patients who did not return the postage-paid, preaddressed "option out" postcard refusing the study, which accompanied the letter inviting them to participate, and who also filled out baseline questionnaires were enrolled. Study materials given to patients did not mention any urologists or radiation therapists. The patient chose both his therapy and his treatment provider. As a result, while all patient enrollment occurred at major teaching hospitals of Harvard Medical School, treatment could occur elsewhere. We classified treatment sites as "academic" if they had a urology residency training program. By this criterion, the surgery of 75 patients was performed at academic sites and 19 at nonacademic sites.

Data Collection and Instruments

Data collection. A completed pretreatment questionnaire was required for study entry. Enrolled patients were sent follow-up questionnaires at 3 and 12 months after therapy or observation began, and medical records were examined to collect medical information about clinical cancer stage (T1 = nonpalpable; T2 = palpable nodule; and T3 = extraprostatic spread) (17), other medical comorbidity (significant medical diseases other than prostate cancer), and prostate cancer treatments.

Study instruments. The main data collection instruments were patient-completed questionnaires addressing symptoms and quality of life. The clinical data were abstracted using a modification of the American College of Surgeons Patterns of Care Study instrument (18) and a measure of medical comorbidity, the Index of Co-Existent Disease (ICED) by Greenfield et al. (19).

Bowel and urinary symptom report items developed by Moinpour et al. (20) assessed the level of function or the incidence and severity of symptoms, including urine dribbling or leaking, and whether absorbent pads for urinary incontinence were used. Subjects rated each symptom in the preceding week according to a five-point ordinal scale. The items described by Moinpour et al. were validated in patients who had undergone radical prostatectomy (21). We assessed sexual function with two questions. One, which assessed whether the man experienced any erections (including morning erections) in the last 4 weeks, was also developed by Moinpour et al. (20). We formulated the second question

to assess patients' perceptions of the quality of erections, that is, whether the erections they experienced were usually adequate for intercourse. The wording of this question has high face validity, and Litwin et al. (15) included a nearly verbatim item in the sexual function scale they developed in surveys of previously treated patients with prostate cancer.

Surgical technique. Two urologists who did not perform the operation reviewed in a blinded manner surgical reports with patient and surgeon identifiers removed to determine whether the surgeon had attempted to preserve none, one, or both neurovascular bundles or to conclude that the report contained insufficient information for judgment. If the reviewers disagreed on the technique used, a third surgeon made a tie-breaking decision. If both reviewers indicated that the report contained inadequate information, the report was sent to the operating urologist for judgment. Surgery was performed by 35 different surgeons, although six surgeons performed the surgeries of 63 of the 94 patients reported here.

Statistical methods. Baseline and sociodemographic characteristics were compared between the primary treatment groups with the use of exact methods for categorical measures and Wilcoxon rank-sum tests for the continuous measures of age or PSA value. For all symptom measures, symptom items were dichotomized a priori and compared between treatment groups at each follow-up timepoint using Fisher's exact test. All the reported *P* values are two-sided.

Results

Baseline Patient Characteristics

During the enrollment period, 287 (72%) of the 398 eligible patients offered the study completed their baseline questionnaire and were thus enrolled in the study. Eight patients dropped out of the study before providing further information on their treatment choice or permission to examine their medical records. Of the remaining 279 patients, 125 chose radical prostatectomy. Because of cancer involving pelvic lymph nodes, the planned prostatectomy was aborted for two patients who received only lymph node dissection and 17 patients who received hormonal ablation, postoperative radiotherapy, or both. Although some patients choosing radical prostatectomy would be expected to receive these additional treatments and because such treatments may importantly affect sexual potency and incontinence, we studied only the 106 patients who received radical prostatectomy alone.

Surgical reports were unavailable for three patients. Of the 103 patients for whom a determination could be made, 33 (32%) patients did not undergo nerve preservation, and 70 (68%) patients underwent either unilateral (41 [40%] patients) or bilateral (29 [28%] patients) nerve-sparing surgery. Of these patients, 98 completed and returned follow-up questionnaire forms at 3-months and 94 returned questionnaire forms at 12 months. Of the five patients who did not complete 3-month forms and the later 12-month forms, three had undergone non-nerve-sparing and two had undergone nerve-sparing surgery (one unilateral and one bilateral), and of the remaining four patients with missing 12-month follow-up forms, two had undergone non-nerve-sparing and two had undergone nerve-sparing surgery (one unilateral and one bilateral). We report on the 94 patients who completed questionnaires at all three time points.

Baseline characteristics of the surgery patient groups are shown in Table 1. The patients who did not receive nerve preservation surgery were on average 3 years older than those who did (median, 64.5 years versus 61.5 years; *P* = .01). Other demographic characteristics, including income, education, and

Table 1. Patient characteristics

Characteristic	Non-nerve-sparing prostatectomy	Nerve-sparing prostatectomy		
		Any	Unilateral	Bilateral
No. of patients	28	66	38	28
Median age, y*	64.5	61.5	62.0	61.0
Medical comorbidity (Index of Co-Existent Disease) (ICED), No. of patients (%)				
0 (none)	12 (43)	34 (52)	18 (47)	16 (57)
1 (asymptomatic)	14 (50)	27 (41)	16 (42)	11 (39)
2, 3 (symptomatic or life-threatening)	1 (4)	1 (2)	1 (3)	0 (0)
Missing	1 (4)	4 (6)	3 (8)	1 (4)

* $P = 0.01$, non-nerve-sparing versus nerve-sparing prostatectomy; $P = .023$, non-nerve-sparing versus unilateral nerve-sparing versus bilateral nerve-sparing prostatectomy.

marital status, were similar in the two groups (data not shown). Study patients had little comorbid disease, but the patients who received non-nerve-sparing surgery tended to have more additional asymptomatic diseases (ICED = 1).

Fewer patients receiving non-nerve-sparing prostatectomy had very early stage tumors (Table 2). Only 14% had stage T1, or nonpalpable tumors, compared with 23% of all patients receiving nerve-sparing surgery and 36% of the subset who received bilateral nerve preservation surgery. Patients receiving non-nerve-sparing prostatectomy also had higher PSA values than those who had nerve-sparing surgery, with a median of 9.5 ng/dL versus 6.7 ng/dL ($P = .026$), and fewer low-grade tumors (Gleason score, 2-4), 7% versus 30%, respectively ($P = .05$).

In summary, patients receiving nerve-sparing radical prostatectomy, particularly those who underwent bilateral nerve preservation, were younger and tended to have fewer comorbid diseases and less advanced cancers, as determined by tumor stage, PSA values, and Gleason score.

Patient-Reported Symptoms

Sexual symptoms. Primarily because sexual function questions were added 5 months after the study began, but also be-

cause patients occasionally chose not to answer these questions, complete information on sexual potency at baseline, 3 months, and 12 months was available for only 49 patients. Of these, 12 patients underwent non-nerve-sparing surgery and 37 underwent nerve-sparing surgery (Tables 3 and 4). However, the sexual potency rates reported at 12 months for the 42 additional patients whose presurgical potency status was unknown were nearly identical to those with known presurgical status. Because the power of these analyses increases when all patients are included, we also noted the results of all patients, whether or not their baseline potency status was known.

Because the nerve-sparing procedure entails a narrower and potentially inadequate margin between the prostate capsule and the surgical excision line, the attempt at nerve preservation has little rationale for men who are impotent preoperatively. Evidence of an appropriate selection process for nerve-sparing surgery is apparent in differences in preoperative potency status by the surgical technique received: one fourth of men who received non-nerve-sparing surgery were completely impotent (no erections, including morning erections, for 4 weeks) (Table 3), and three fourths had erections usually inadequate for sexual intercourse (Table 4). In contrast, only 8% of patients who received

Table 2. Staging, prostate-specific antigen (PSA), and Gleason score

Characteristic	Non-nerve-sparing prostatectomy	Nerve-sparing prostatectomy		
		Any	Unilateral	Bilateral
Tumor stage, No. of patients (%)*				
T1 (nonpalpable)	4 (14)	15 (23)	5 (13)	10 (36)
T2 (palpable nodule)	21 (75)	47 (71)	31 (82)	16 (57)
T3 (extraprostatic)	3 (11)	1 (2)	1 (3)	0 (0)
Missing	0 (0)	3 (5)	1 (3)	2 (7)
Median pretreatment PSA, ng/mL†	9.5	6.7	7.7	6.2
Gleason score, No. of patients (%)‡				
2-4 (low grade)	2 (7)	20 (30)	10 (26)	10 (36)
5-7 (moderate grade)	21 (75)	40 (61)	24 (63)	16 (57)
8-10 (high grade)	2 (7)	3 (5)	2 (5)	1 (4)
Missing	3 (11)	3 (5)	2 (5)	1 (4)

* $P = .12$, non-nerve-sparing versus nerve-sparing prostatectomy; $P = .04$, non-nerve-sparing versus unilateral nerve-sparing versus bilateral nerve-sparing prostatectomy.

† $P = .026$, non-nerve-sparing versus nerve-sparing prostatectomy; $P = .043$, non-nerve-sparing versus unilateral nerve-sparing versus bilateral nerve-sparing prostatectomy.

‡ $P = .05$, non-nerve-sparing versus nerve-sparing prostatectomy; $P = .12$, non-nerve-sparing versus unilateral nerve-sparing versus bilateral nerve-sparing prostatectomy.

Table 3. Complete impotence, including morning erections, in the past 4 weeks for patients reporting pretreatment potency, at 3 and 12 months

	Non-nerve-sparing	Nerve-sparing prostatectomy			<i>P</i> value (Fisher's exact)	
		Any	One	Both	2-way*	3-way†
No. of patients	12	37	18	19		
No. (%) of patients reporting symptom						
Pretreatment	3 (25)	3 (8)	3 (17)	0 (0)	.15	.07
3 mo	12 (100)	31 (84)	17 (94)	14 (74)	.31	.10
12 mo	10 (83)	23 (62)	15 (83)	8 (42)	.29	.014

*Non-nerve-sparing versus nerve-sparing prostatectomy.

†Non-nerve-sparing versus unilateral-nerve-sparing versus bilateral-nerve-sparing prostatectomy.

nerve-sparing surgery were completely impotent before surgery, and 19% had erections usually inadequate for intercourse.

Despite some improvement between 3 and 12 months, more than two thirds (33 of 47) of the study group who reported all data (irrespective of treatment) reported complete impotence at 12 months after surgery. Of the men who underwent nerve-sparing surgery, only 11% (4 of 37) were fully potent 12 months later. The nominally lower rates of complete impotence (62% versus 83%, respectively; $P = .29$) and inadequate erections (89% versus 100%, respectively; $P = .56$) at 12 months in patients who underwent nerve preservation compared with those receiving non-nerve-sparing surgery appeared largely to reflect better pretreatment erectile function. Patients who received unilateral nerve-sparing surgery had high rates of complete impotence (83%) and inadequate erections (100%) identical to those of men who received non-nerve-sparing surgery. Patients with bilateral nerve preservation less often reported complete postoperative impotence, but few had erections firm enough for intercourse. While 11 (58%) of 19 patients with preoperative erections who received bilateral nerve preservation reported erections at 12 months, only four (21%) patients reported that their erections were usually adequate for intercourse.

When patients for whom baseline potency was unknown were included (data not shown), the results for both complete impotence and for inadequate erections were unchanged. Nearly all of the men (62 of 64 with two missing) who did not receive bilateral nerve preservation reported erections inadequate for intercourse, including 26 (96%) of 27 patients who received no nerve preservation and 36 (97%) of 37 receiving unilateral nerve preservation who reported inadequate erections. Those with bilateral nerve-sparing surgery less often reported complete impotence (13 [46%] of 28 patients), but the benefit shrank when impo-

tence was defined as erections usually inadequate for intercourse (23 [82%] of 28 patients).

One university-based urologist performed 34 of the 66 nerve-sparing operations in our study. When his patients were excluded, the rates of both complete impotence and inadequate erections for the remaining patients were unchanged.

Urinary symptoms. Before surgery, the frequency of substantial urinary incontinence, defined either as a patient report of leaking or dribbling urine "a lot" or more or of wearing absorbent pads was low in all patients. Both indicators of incontinence were more frequent after nerve-sparing surgery than non-nerve-sparing, although the differences occurred at different times for the two measures (Table 5): substantial incontinence at 3 months after surgery (36% versus 11%; $P = .013$), but not at 12 months, and wearing pads over threefold more often at 12 months (50% versus 14% for the non-nerve-sparing group; $P = .001$), but not significantly more often at 3 months (65% versus 50%; $P = .25$). By both measurements (urinary incontinence and wearing absorbent pads), the patients receiving bilateral nerve-sparing surgery reported fewer postoperative problems than those with unilateral nerve preservation (Table 5). When the surgeon who performed the most procedures was excluded, the differences persisted.

Discussion

In our cohort study of self-reported sexual and urinary dysfunction beginning prior to treatment in relatively young, healthy men, patients receiving nerve-sparing radical prostatectomy had little evidence of better-preserved postoperative sexual function, despite younger age, better preoperative sexual function, and favorable clinical prognostic factors. Despite some improvement between 3 and 12 months after surgery, few

Table 4. Erections inadequate for intercourse in the past 4 weeks for patients reporting pretreatment potency, at 3 and 12 months

	Non-nerve-sparing	Nerve-sparing prostatectomy			<i>P</i> value (Fisher exact)	
		Any	One	Both	2-way*	3-way†
No. of patients	12	37	18	19		
No. (%) of patients reporting symptom						
Pretreatment	9 (75)	7 (19)	6 (33)	1 (5)	.0002	.0007
3 mo	12 (100)	36 (97)	18 (100)	18 (95)	1.0	1.0
12 mo	12 (100)	33 (89)	18 (100)	15 (79)	.56	.035

*Non-nerve-sparing versus nerve-sparing prostatectomy.

†Non-nerve-sparing versus unilateral nerve-sparing versus bilateral nerve-sparing prostatectomy.

Table 5. Symptoms of urinary incontinence and absorptive pad use

Complaint	Procedure	Total No. of patients	No. of patients (%) with symptom		
			Baseline	3 mo	12 mo
Leak or dribble "a lot"	Non-nerve-sparing	28	2 (7)	3 (11)*	3 (11)†
	Nerve-sparing (any)	66	0 (0)	24 (36)	9 (14)
	Nerve-sparing (one)	38	0 (0)	17 (45)	6 (16)
	Nerve-sparing (both)	28	0 (0)	7 (25)	3 (11)
Pads	Non-nerve-sparing	28	1 (4)	14 (50)§	4 (14)¶
	Nerve-sparing (any)	66	2 (3)	43 (65)	33 (50)
	Nerve-sparing (one)	38	0 (0)	29 (76)	21 (55)
	Nerve-sparing (both)	28	2 (7)	14 (50)	12 (43)

* $P = .013$, non-nerve-sparing versus any nerve-sparing prostatectomy; $P = .008$, non-nerve-sparing versus unilateral nerve-sparing versus bilateral nerve-sparing prostatectomy (Fisher exact test).

† $P = 1.0$, non-nerve-sparing versus any nerve-sparing prostatectomy; $P = .8$, non-nerve-sparing versus unilateral nerve-sparing versus bilateral nerve-sparing prostatectomy.

§ $P = .25$, non-nerve-sparing versus any nerve-sparing prostatectomy; $P = .034$, non-nerve-sparing versus unilateral nerve-sparing versus bilateral nerve-sparing prostatectomy.

¶ $P = .001$, non-nerve-sparing versus any nerve-sparing prostatectomy; $P = .002$, non-nerve-sparing versus unilateral nerve-sparing versus bilateral nerve-sparing prostatectomy.

men reported erections adequate for intercourse at 12 months, regardless of surgical technique. We found no evidence of any benefit in postoperative erectile function after unilateral nerve preservation, which comprised most of the nerve-sparing procedures in this cohort. Unexpectedly, patients who underwent nerve-sparing radical prostatectomy more often reported substantial urinary incontinence at 3 months after surgery, but not at 12 months, and wore absorbent pads more often.

Our findings of little apparent potency-sparing benefit from nerve-sparing prostatectomy, particularly when unilateral, are surprising given surgical series reporting frequent preservation of full erectile function following bilateral (5,7-9,22) and unilateral nerve-sparing prostatectomy (8). Much of the difference between our findings and earlier results may be due to our data collection technique. This study is unique in combining a cohort design beginning from before treatment with direct patient symptom reports using standardized questionnaire items collected by independent observers rather than the treatment providers. Because patients reported their symptoms prior to therapy, we could distinguish the effects of treatment from pre-treatment dysfunction, important since sexual potency itself is a major criterion for attempted nerve preservation. Third-party data collection protects against the potential bias to minimize symptoms arising when treating physicians question patients directly.

In addition to sexual function, other patient selection factors for nerve-sparing surgery, such as younger age and smaller, less-advanced tumors, which may interfere less with sexual function and require less complicated surgery, have been reported to result in better postoperative function (5,13,23,24). Younger patients are more likely to be offered nerve-sparing surgery (23), and the surgeon's intraoperative judgment that the risk of leaving residual cancer is low despite attempted nerve preservation is more likely when patients have smaller, less-advanced tumors (5,13). Our data confirm the association between nerve-sparing prostatectomy, particularly bilateral preservation, and both younger age and less-advanced cancers. This

association may explain some of the differences in postoperative sexual function between series: a more selective surgeon may have patients with less-advanced tumors and thus a better prognosis for sexual function regardless of surgical technique.

We do not believe it likely that these patients' results are worse than those of other surgical series because of worse pre-treatment prognosis or worse care. The median age of patients in our study was 62 years, which was similar to that of patients in the large surgical series of Steiner et al. (9) and Walsh (25) and Catalona and Bigg (26) and the proportion of more advanced tumors no greater than those of Catalona and Bigg (26). Medical comorbidity, not reported in other surgical case series, was low. With high average income and education, and with at least one consultation with prostate cancer specialists affiliated with a major medical school, these patients had access to competent medical advice and care. While such advantages are no guarantee against substandard care, few unselected patient groups would be expected to receive better care on average. Furthermore, when we excluded the patients whose operations were performed by the surgeon who performed the most surgeries, the sexual function and urinary incontinence outcomes changed little. However, we cannot be certain that the nerve-sparing surgery was not inadequately performed by the surgeons of our study's patients.

The higher rates of sexual dysfunction and incontinence reported by patients in this study compared with prior surgical series are consistent with recent retrospective surveys (13-15). Whether surgery was nerve-sparing or not was unavailable to Fowler et al. (14), who surveyed Medicare patients. Litwin et al. (15), who surveyed patients in a large Southern California HMO, found no significant benefit from nerve preservation in the sexual function scale they developed, although the trend favored nerve-sparing patients. However, the findings of these surveys may be less representative of current practice than this report, since their patients were treated in the mid-1980s and averaged at least 8 years older than these patients. They could not document preoperative potency differences. Geary et al. (13)

directly surveyed patients in a large Stanford University radical prostatectomy series retrospectively with results comparable to these: only 16% of the patients who received bilateral nerve preservation reported "good erections" as did 6% of the men who received unilateral nerve-sparing surgery and 1% of those without nerve-sparing surgery (27). Thus, while at variance with many prostatectomy case series, these results are consistent with more recent independent surveys of previously treated patients.

Our finding of worse urinary incontinence and greater pad use in patients who underwent nerve preservation was unexpected and inconsistent over time. Furthermore, Eastham et al. (28), with the use of chart reviews, treating physician interviews, and questionnaires, recently reported that nerve-sparing prostatectomy independently predicted better postoperative incontinence (defined as "dry with moderate activity") in their patients. They note that reported incontinence varies both by definition of incontinence and, most important, by data collection technique (28). Therefore, our observation requires confirmation and, if confirmed, explanation. We can only speculate that unidentified factors associated with nerve-sparing surgery, such as longer operative duration or greater periurethral instrumentation, may contribute to poorer postoperative urinary control. The extent of cancer may also be a factor, since bilateral nerve-sparing patients, with less-advanced tumors, had less postoperative incontinence.

Our study has several limitations. First, it was not randomized. However, pretreatment sexual function and other clinic prognostic factors tended to favor the patients who received nerve-sparing prostatectomy, particularly bilateral nerve preservation. Therefore, our results probably overstate the benefit of nerve-sparing surgery. Second, our study has relatively few patients, consistent with its design as a feasibility study of longitudinal collection of detailed, highly personal quality of life information from older men. However, while our estimates of complications may be imprecise, they make large benefits in sexual function due to nerve-sparing surgery unlikely, particularly for the unilateral nerve-sparing procedure. Nonetheless, our results require confirmation in additional large, prospective studies.

That some impotent men received nerve preservation in this study lacked an obvious rationale. It may have occurred because patients were reluctant to report impotence to their urologists or because patient or doctor may have hoped that impaired sexual function was reversible and could improve, although we found no man with better sexual function postoperatively. The lesser preoperative impotence and less-advanced tumors of those who received the nerve-sparing procedure, especially bilateral, represents careful selection of patients for the procedure and thus good practice, but could account for an important part of their better postoperative sexual function reported elsewhere. Given the limited evidence of better sexual function seen despite generally favorable prognostic factors, we conclude that nerve-sparing prostatectomy, particularly when unilateral, improves postoperative sexual function less than previously thought. Given its apparently limited efficacy in sparing potency and the potential risk of a narrower surgical resection margin, we believe nerve-sparing prostatectomy should be used judiciously, particularly if only the unilateral procedure appears feasible.

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Notes

Present address: J. A. Talcott, Center for Outcomes Research, Massachusetts General Hospital, Boston, MA.

Present address: K. J. Propert, University of Pennsylvania School of Medicine, Philadelphia.

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