Impact of Unilateral Sural Nerve Graft on Recovery of Potency and Continence Following Radical Prostatectomy: 3-Year Longitudinal Study

Shunichi Namiki,* Seiichi Saito, Haruo Nakagawa, Takehiko Sanada, Atsushi Yamada and Yoichi Arai

From the Departments of Urology (SN, SS, HN, YA) and Plastic Surgery (TS, AY), Tohoku University Graduate School of Medicine, Tohoku, Japan

Purpose: We conducted a 3-year longitudinal study assessing the impact of unilateral sural nerve graft on recovery of potency and continence following radical prostatectomy.

Materials and Methods: A total of 113 patients undergoing radical retropubic prostatectomy were classified into 3 groups according to the degree of nerve sparing, that is unilateral nerve preservation with contralateral sural nerve graft interposition, bilateral nerve sparing and unilateral nerve sparing. Urinary continence and potency were estimated by the UCLA Prostate Cancer Index questionnaire.

Results: Patients in the nerve sparing plus sural nerve graft group were younger than those in the bilateral nerve sparing or unilateral nerve sparing groups. At baseline the unilateral nerve sparing plus sural nerve graft group and the bilateral nerve sparing group reported better sexual function than the unilateral nerve sparing group (62.1 and 61.5 vs 49.9, $p < 0.05$). The bilateral nerve sparing group showed more rapid recovery than the unilateral nerve sparing plus sural nerve graft group after radical retropubic prostatectomy ($p < 0.01$). After 24 months there were no significant differences observed between the bilateral nerve sparing and the unilateral nerve sparing plus sural nerve graft group (28.7 vs 32.9). The bilateral nerve sparing group reported a better sexual function score than the unilateral nerve sparing group throughout the postoperative period ($p < 0.05$). The bilateral nerve sparing group maintained significantly better urinary function at 1 month after radical retropubic prostatectomy than the unilateral nerve sparing plus sural nerve graft group ($p < 0.05$). After 3 months these groups were almost continent. The unilateral nerve sparing group reported lower urinary function scores during the first year compared to the other groups.

Conclusions: The nerve graft procedure may contribute to the recovery of urinary function as well as sexual function after radical retropubic prostatectomy. This finding needs to be validated in a randomized trial.

Key Words: prostatic neoplasms, prostatectomy, sural nerve, urinary incontinence, impotence

Prostate cancer has a significant impact on HRQOL. Although a variety of treatment options are available including external beam radiation, brachytherapy and hormonal ablation, radical prostatectomy is considered a safe and effective treatment for localized prostate cancer.[1] Urinary incontinence and erectile dysfunction represent the principal sources of postoperative adverse events for patients who have undergone RP. Because initiation of penile erection is a neurovascular event, preservation of the cavernous nerves during RP is the most important factor for the recovery of erectile function following RP. Catalona et al reported excellent results with overall postoperative potency rates of 68% and postoperative continence rates of 92%.[2] With low volume and low stage disease nerve sparing does not compromise surgical margins. However, nerve sparing might not be appropriate in men with high grade tumors or palpable disease extending toward the neurovascular bundle. Interposition of sural nerve graft to replace resected cavernous nerves during RP confers a greater chance of recovering erectile function than without grafts. Scardino and Kim reported that with nerve grafting for the side of NVB resection, erectile function of the patients undergoing unilateral nerve sparing returns to a level approximating bilateral nerve sparing.[3] On the other hand, several studies have shown that preservation of the NVB is also associated with improved recovery of urinary control after RP.[4,5]

Although several investigators have reported short-term results with nerve grafting, there is still controversy regarding the long-term outcomes of nerve grafts following RP. We report longer term patterns of HRQOL (ie potency and continence) recovery during the first 3 years after RP using a validated questionnaire.

PATIENTS AND METHODS

Patient Population and Operative Technique

From January 2002 to December 2004 a total of 145 patients with newly diagnosed localized prostate cancer were treated with RP at Tohoku University Hospital. There were 15 patients with nonnerve sparing and 3 with bilateral sural

Submitted for publication November 27, 2006.

* Correspondence and requests for reprints: Department of Urology, Tohoku University Graduate School of Medicine, 1-1 Seiryomachi, Aoba-ku, Sendai, 980-8574, Japan (telephone: 022-717-7278; FAX: 022-717-7283; e-mail: namikin@uro.med.tohoku.ac.jp).

DOI:10.1016/j.juro.2007.03.043

nerve graft excluded from analysis. An additional 14 patients were excluded who received initial hormonal ablation, leaving 113 candidates for this study. These patients were classified into 3 groups according to the degree of nerve sparing, that is unilateral nerve preservation with contralateral sural nerve graft interposition group (UNS plus SNG), a bilateral nerve sparing group and a unilateral nerve sparing group. The indications for nerve sparing procedure depended on preoperative factors (clinical stage, transrectal ultrasound findings, number and Gleason score of positive biopsies, PSA or patient preference) and intraoperative factors, prioritizing cancer control. All patients who had minimal erectile dysfunction and in whom nerve resection was anticipated were offered SNG and counseling regarding the risks, benefit and likely impact on postoperative potency recovery. Patients ultimately decided whether SNG interposition would be performed. In our study preservation of the NVB was assigned based on the results of intraoperative electrostimulation as reported by Kurokawa et al.[6]

Quality of Life Assessment

Urinary continence and potency were estimated using the urinary and sexual function and bother domains of the UCLA PCI, which assesses prostate specific HRQOL.[7] The questionnaire had already been translated into Japanese, and the validity and reliability had been previously tested.[8] All patients were informed of their cancer diagnosis before being asked to fill out the questionnaires. Followup interviews were conducted in person at scheduled study visits of 1, 3, 6, 12, 18, 24 and 36 months after RP. All patients who agreed to participate in this study received a questionnaire, an informed consent form and a prepaid postage envelope for returning the questionnaire. They voluntarily provided the self-reported questionnaire by mail.

Statistical Analyses

At baseline a comparison among the 3 groups was performed using the chi-square test or 1-way analyses of variance (ANOVA). UCLA PCI scores for the various domains are shown as the mean plus or minus standard deviation (SD) on 0 to 100 scales, with higher scores always representing better outcomes. Statistical analyses were performed using repeated ANOVA or the Mann-Whitney U test for groups to compare the effects of each treatment, with $p < 0.05$ considered statistically significant.

RESULTS

Complete demographic and clinical data were available for participants at enrollment. Table 1 compares these data among 3 groups. The age of the UNS plus SNG group was statistically lower than that of the BNS or UNS groups ($p < 0.05$ for each). The 3 groups were comparable in terms of preoperative PSA, Gleason scores and pathological tumor stage. Each group showed similar levels of comorbidities and sociodemographic characteristics. Some patients (50.4%) experienced comorbidities, the most common of which were hypertension (26%), diabetes (7%), gastrointestinal (18%), cardiovascular (9%) disease and other kinds of carcinoma (5%), but these comorbidities have been well controlled. There were 6 patients (5%) who received salvage therapy because of biochemical recurrence. All patients received bicalutamide or radiotherapy. No patients used vacuum erection devices.

TABLE 1. *Demographic and clinical characteristics of study population*

	UNS + SNG	BNS	UNS	p Value
No. pts	19	34	60	
Age at survey:				
Mean ± SD	58.0 ± 5.4	64.1 ± 5.8	65.1 ± 5.7	<0.001*
Median	58	64	65	
Range	48–69	47–73	51–77	
PSA at diagnosis (ng/ml):				
Mean ± SD	8.0 ± 4.7	8.3 ± 8.9	8.8 ± 6.7	0.878†
Median	6.5	6.4	7.3	
Range	3.4–21.8	3.1–53.0	2.1–52.7	
No. clinical tumor stage:				0.046†
T1	14	30	39	
T2	3	4	19	
T3	2	0	2	
No. pathological tumor stage:				0.183†
T2	16	32	48	
T3	3	2	12	
No. Gleason score:				0.857†
6 or Less	8	14	28	
7 or Greater	11	20	32	
No. salvage therapy ablation (%)	1 (5)	2 (5)	3 (5)	0.577†
No. comorbidities:				0.607†
None	12	18	27	
1–2	6	13	29	
3+	1	3	4	
No. working status:				0.461†
Full-time	10	11	29	
Part-time	4	5	6	
Retired/no job	5	14	25	
No. marital or relationship status:				0.842†
Married or living with spouse or partner	17	31	56	
Unmarried or not in significant relationship	2	3	4	

* Mann-Whitney U test.
† Chi-square test.