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The Impact on Sexual Function after Nerve Sparing and Non-nerve Sparing Radical Retropubic Prostatectomy

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Key Words
impotence;
neoplasm;
potency;
prostate;
prostatectomy

Background. We examine the impact of nerve sparing technique on the sexual function after radical retropubic prostatectomy for localized prostate cancer.

Methods. Between March, 1996 and September 2000, 44 men with clinically localized adenocarcinoma of the prostate who underwent radical retropubic prostatectomy (RRP) were included in this study. The mean age of these patients was 68.7 ± 4.5 years old (range: 57-75). Among them, 8 patients were impotent preoperatively, 18 patients did not undergo nerve sparing surgery due to technical difficulties, and the remaining 18 potent patients underwent nerve sparing RRP. The postoperative sexual function was assessed by the International Index of Erectile Function (IIEF-6) and patient-reported percentage of recovery of sexual function.

Results. Mean length of follow-up was 14.4 ± 2.7 months (range 12-18). The IIEF scores and % recovery of sexual function were significantly higher in nerve sparing surgery when compared to that of non-nerve sparing surgery (15.2 ± 9.0 *vs.* 2.0 ± 3.8 and 55 ± 30% *vs.* 3 ± 10%, respectively, $p < 0.001$). Of the 18 potent patients who underwent nerve sparing surgery, spontaneous erection and successful sexual activity was reported in 4 (22.2%) patients. Eight (44.4%) patients could achieve intercourse either with the aid of sildenafil or intracavernous alprostadil injection. Four (22.2%) patients had partial erection but refused further treatment. Two (11.1%) patients were completely impotent after nerve sparing surgery. Postoperative PSA was 0.10 ± 0.18 (range 0.01-0.59).

Conclusions. After a mean length of 14.4 months' follow-up, a majority of our patients could achieve sexual activity, and the cancer control following nerve sparing surgery was good. Our results suggest that nerve sparing retropubic radical prostatectomy is indicated in selected patients with localized adenocarcinoma of the prostate.

Radical prostatectomy has been used in the management of localized prostate cancer for almost 100 years. However, the side effects of incontinence and impotence have precluded its widespread acceptance. Therefore, an anatomical approach was used to modify the surgical procedure in an effort to decrease complications.[1,2] Using this procedure, experienced surgeons at 3 high-volume academic medical centers reported potency rates of 62-68% and continence rates of 92-95%.[3-6] However, the potency rate was only 10-30% in other series.[7-9] The reason for this discrepancy in results is unclear and may be related to surgical volume and experience or the selection of younger, healthier patients.[10] To date, several ways have been recommended for the treatment of localized prostate cancer, including watchful waiting, radiation therapy (external beam radiation and brachytherapy) and surgery. Weighing the pros and cons of these options can be difficult, and quality of life issues have a major role in the decision-making process.[11] Recently, the incidence and disease-specific mortality of adenocarcinoma of prostate has been increasing in Taiwan. And, similar to the Western countries, there was a steady increase in the annual detection rate, a trend to younger age, earlier stage and

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Table 1. Demographic and clinical characteristics of study subjects

	Impotent patients (n = 8)	Potent patients (nerve sparing, n = 18)	Potent patients (non-nerve sparing, n = 18)
Age (years)	70 ± 4.2	68.1 ± 5.0	68.7 ± 4.2
Gleason score	5.5 ± 1.8	4.6 ± 1.7	4.9 ± 1.5
Preoperative PSA (ng/ml)	25.0 ± 30.0	14.0 ± 6.4[a]	19.7 ± 24.0
Postoperative PSA (ng/ml)	0.15 ± 0.29	0.09 ± 0.19	0.04 ± 0.05

[a] Kruskal-Wallis test, $p < 0.05$; PSA = Prostatic specific antigen.

Table 2. Tumor staging and type of surgery

Staging	Non-nerve sparing (n = 18)	Unilateral nerve sparing (n = 9)	Bilateral nerve sparing (n = 9)
pT1b	3	0	1
pT2a	7	4	4
pT2b	5	2	4
pT3a	1	2	0
pT3b	2	1	0

$p > 0.05$ among the 3 groups, Fischer's exact test.

less aggressive prostate cancer in Taiwan.[12] Thus, the impact of prostate cancer may be enormous in the future. On the other hand, the sexual function and quality of life have major roles in the decision-making process. In this study, we determined the differences in sexual function in patients who had undergone nerve sparing and non-nerve sparing radical retropubic prostatectomy (RRP) for localized prostate cancer.

METHODS

Between March, 1996 and September 2000, a total of 44 consecutive patients who underwent RRP performed by a single surgeon (Y.H.L.) at Kaohsiung Veterans General Hospital were included in this study. The mean age of these patients was 68.7 ± 4.5 years old (range: 57-75). Median preoperative prostatic specific antigen (PSA) was 11.8 (range: 2.61-104). The serum PSA level was determined using the PSA-RIACT assay (CIS Bio International, France). Mean Gleason score was 4.9 ± 1.6 (range 2-7). Patients were counseled regarding erectile function, and a final decision on nerve sparing surgery was advised preoperatively. Eight patients were reported to be impotent before RRP. Non-nerve sparing surgery was routinely performed on these patients. Eighteen potent patients underwent nerve sparing RRP procedure as Walsh described.[13] Because of technical difficulties, the remaining 18 patients did not undergo nerve sparing surgery. The reasons for non-nerve sparing surgery for these patients included blurred operative field due to excessive bleeding or oozing, previous transurethral resection of prostate (TURP)-induced severe tissue adhesion, inadvertent injury of neurovascular bundle and suspicious locally advanced lesion.

The clinical characteristics of all patients are listed in Table 1. The only difference among preoperative impotent patients and potent patients with or without nerve sparing RRP was preoperative PSA. The preoperative PSA was significantly lower in patients who underwent nerve sparing surgery. No significant difference was noted between the pathological tumor staging and types of surgery (Table 2).

We used two methods to evaluate the sexual function after RRP. First was the self-reported percentage of recovery of sexual function when compared to that of original sexual function. Postoperative sexual function recovered to 80-100% was arbitrarily ranked as good, 50-80%: fair, 20-50%: poor, < 10%: none. Second, the International Index of Erectile Function (IIEF-6)[14]

Table 3. Univariate analysis of factors for potency in 36 preoperative potent patients

Variables	Postoperative sexual function		*p* value
	Good + Fair	Poor + Nil	(chi-square test)
Age			
< 64	2	5	0.644
> 65	11	18	
Nerve sparing surgery			
Yes	12	6	0.000
No	1	17	
Unilateral nerve sparing surgery			
Yes	5	4	0.003
No	1	17	
Bilateral nerve sparing surgery			
Yes	7	2	0.000
No	1	17	
Viagra			
Yes	8	4	0.007
No	5	19	
TURP			
Yes	1	7	0.115
No	12	16	

TURP = transurethral resection of prostate.

ranged from 1 to 30 scores which assess the frequency of erection, grading of rigidity, frequency of vaginal penetration, maintenance of erection, difficulty of successful intercourse and confidence of erection.

Statistics

The results are expressed as means ± S.D. The data were analyzed with software package SPSS (Statistical Package for the Social Science, version 8.0) for Windows running on an IBM personal computer system. A comparison among parametric factors was performed using the Kruskal-Wallis test. The comparison between non-parametric factors was carried out using the chi-square test or Fisher's exact test as appropriate. Parameters found to be significantly different on univariate analysis were subsequently assessed by logistic regression to identify the significant prognostic factors. Unconditional logistic regression model was run for odds ratio of nerve-sparing surgery; we calculated 95% confidence intervals (CI). The postoperative sexual function between nerve sparing and non-nerve sparing surgery was compared with Mann-Whitney test. A p value < 0.05 was considered significant.

RESULTS

Bilateral nerve sparing surgery was performed in 9 patients and the remaining 9 patients were treated with unilateral nerve sparing surgery. Mean length of follow-up was 14.4 ± 2.7 months (range 12-18). Using the chi-square test, we evaluated the self-reported sexual function after RRP with patient's age, nerve sparing, unilateral or bilateral nerve sparing surgery, Viagra use and previous TURP (Table 3). Nerve sparing, unilateral or bilateral nerve sparing surgery and Viagra use were independent predictors of the preservation of postoperative sexual function. Multivariate analysis revealed that nerve sparing surgery was the only significant predictors of preservation of postoperative sexual function (Table 4). Compared with non-nerve sparing surgery, the odds ratios (OR) for sexual dysfunction after nerve sparing, unilateral and bilateral nerve sparing surgery were 0.043 (95% confidence interval [CI], 0.004-0.431), 0.074 (95% CI, 0.005-1.067) and 0.021 (95% CI, 0.002-0.291), respectively. Table 5 shows the IIEF-6 scores and the percentage of recovery of sexual function were significantly higher in the nerve sparing surgery group when com-

Table 4. The association between sexual dysfunction and types of surgery

	Sexual dysfunction		OR (95% CI)	*p* value
	Yes	No		
Nerve sparing surgery				
Yes	6	12	0.043 (0.004-0.431)	0.008
No	17	1		
Unilateral nerve sparing surgery				
Yes	4	5	0.074 (0.005-1.067)	0.0559
No	17	1		
Bilateral nerve sparing surgery				
Yes	2	7	0.021 (0.002-0.291)	0.004
No	17	1		

OR = odds ratio; CI = confidence intervals.

Table 5. The impact on sexual function after radical retropubic prostatectomy

	Non-nerve sparing surgery (n = 18)	Nerve sparing surgery (n = 18)
% Recovery of sexual function	3 ± 10%	55 ± 30%[a]
IIEF-6	2.0 ± 3.8	15.2 ± 9.0[a]

IIEF = International Index of Erectile Function; $p = < 0.001$[a], Mann-Whitney test.

pared to that of the non-nerve sparing surgery group (15.2 ± 9.0 *vs.* 2.0 ± 3.8 and 55 ± 30% *vs.* 3 ± 10%, respectively, $p < 0.001$). Spontaneous erection and successful sexual activity was reported in 4 (22.2%) patients. Eight (44.4%) patients could achieve intercourse either with the use of sildenafil citrate (Viagra, Pfizer, U.S. Pharmaceuticals) in 7 patients or intracavernous alprostadil (Pharmacia & Upjohn, N.V./S.A., PUURS, Belgium) injection in 1 patient. Four (22.2%) patients had partial erection but refused further treatment. Two (11.1%) patients were completely impotent after surgery. If potency was defined as the ability to have unassisted intercourse with or without the use of sildenafil or alprostadil, a majority (66.7%) of our patients could preserve potency after RRP. The mean recovery time to stable sexual function was 11.6 ± 4.2 months (range 6-18). The cancer control was also good in the nerve sparing surgery group, the postoperative PSA was 0.10 ± 0.18 (range 0.01-0.59), which was not significantly different from that of non-nerve sparing surgery.

DISCUSSION

The recommended treatments for patients with localized prostate cancer include radical prostatectomy (RP), brachytherapy monotherapy (BTM) and brachytherapy combined with external beam radiation (BTC). The major concerns in choosing treatment modalities are cancer control and quality of life (QOL). Although the debates is continuing, Krupski *et al.* suggested that BTC had an overall lower QOL compared with those treated with RP and BTM, and RP patients reported fewer irritative or obstructive voiding complaints. They concluded that RP remains a well-tolerated and accepted option.[15] However, the potential side effects of incontinence and impotence have precluded its widespread acceptance. Fortunately, an anatomical approach was used to modify the surgical procedure in an effort to decrease complications since the 1980s.[1,2] With the IIEF-6 questionnaire and the self-reported % recovery of sexual function, our results showed that nerve sparing RRP could effectively preserve sexual function. A majority (66.7%) of our patients with nerve sparing surgery were able to achieve successful sexual intercourse. Among them, spontaneous erection and successful sexual activity was reported in 22.2% of patients. This figure is relatively low when compared to that of more experienced surgeons.[3-6] Two factors might contribute to this discrepancy. First, the mean age (68.7 ± 4.5 years) of our patients was older than those in

other series. Due to the limited number of cases of our younger patients, the age factor did not reveal significant influence in our series. However, age was supposed to be an important factor to preserve the sexual function after RRP.[10] Second, our experience using nerve sparing technique is just limited and preliminary. We expect that, after a period of learning, the potency rate might increase in the future.

Sildenafil has been used for the treatment of erectile dysfunction (ED) following RRP. The response rates may reach 80% in men with ED who underwent bilateral nerve sparing procedures, and it was relatively lower in those who underwent a unilateral nerve sparing surgery (maximum response, 50%) and non-nerve sparing surgery (maximum response, 15%).[16-18] Consistent with previous studies, our results showed that sildenafil citrate could effectively improve the ability to achieve and maintain an erection in patients with erectile dysfunction after RRP. The univariate analysis showed that nerve sparing surgery and Viagra were independent predictors of the preservation of postoperative sexual function. Multivariate analysis revealed that nerve sparing surgery was the only significant predictors of preservation of postoperative sexual function (Table 4). Compared with non-nerve sparing surgery, the odds ratios (OR) for sexual dysfunction after nerve sparing, unilateral and bilateral nerve sparing surgery was 0.043, 0.074 and 0.021, respectively. Apparently, the prerequisite of sildenafil effect is nerve sparing surgery.

Whether nerve sparing surgery compromises cancer control has not been definitively determined. Recent evidence suggested that preservation of sexual function did not compromise cancer control.[10,19] After a mean length of 14.4 months' follow-up, our results also showed that there was no significant difference of postoperative PSA between nerve sparing and non-nerve sparing surgery. However, more cases and longer follow-up are still needed to further clarify this issue.

In conclusion, the cancer control and quality of life following nerve sparing RRP are good. A majority of our patients are potent after a mean length of 14.4 months' follow-up. Our results suggest that nerve sparing RRP is feasible in selected patients with localized adenocarcinoma of the prostate.

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