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Original Article

The 5-year functional outcomes after radical prostatectomy: a real-life experience in Korea

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Abstract

We investigated the functional outcomes regarding erectile function and urinary continence up to 5 years following radical prostatectomy (RP) in a cohort of Korean men. We retrospectively analyzed the clinicopathologic data of 85 Korean men who received open uni- or bilateral nerve-sparing RP for clinically localized prostate cancer and were followed up for at least 5 years postoperatively. From medical records, patients' status regarding urinary and erectile function at baseline and postoperative followups after RP was assessed. At 24 and 60 months after RP, proportions of subjects continent (no pads used) were 89.4% and 97.6%, respectively ($P = 0.007$). Excluding subjects ($n = 24$) who preoperatively reported having severe erectile dysfunction or lacked relevant informations, proportions of subjects capable of having vaginal intercourse regardless of erectile aid usage were 47.5% and 37.7% at 24 and 60 months from RP, respectively ($P = 0.022$). Patient's age at surgery ($P = 0.047$) and salvage radiation therapy ($P = 0.026$) were observed to be significant predictors of having erections sufficient for intercourse at 60 months from RP in multivariate analysis. Our results showed that while patients' postoperative status regarding urinary continence at 2 years from RP is generally maintained or improved at 5 year point, erectile function was observed to significantly declined from 2 years to 5 years following RP. Such decline in erectile function following RP may be more significant among men who were relatively older at surgery or those who received salvage therapy during postoperative follow-ups.

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1 Introduction

Radical prostatectomy (RP) remains a standard treatment for clinically localized prostate cancer (PCa). Reported data have shown that cancer-specific survival approaches 90% at 15 years after RP [1]. Regardless of this success, it is difficult to deny the fact that a significant proportion of patients who receive RP today are burdened by postoperative complications that include impotence and urinary incontinence. The potential risks for postoperative erectile dysfunction (ED) and urinary incontinence continue to be regarded as important issues in the decisions surrounding treatment for PCa.

Although many have reported on the adverse effects of RP, most of the reported data have been from relatively short follow-up or cross-sectional analyses [2–6]. In the literature, most reports from relevant

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studies have described functional outcomes regarding erectile function and urinary continence for only up to 2 years after RP. In addition, data on long-term outcomes in functional status after RP among Asian patients are scarce. Because the number of men diagnosed with clinically localized prostate cancer who subsequently undergo RP is rapidly increasing in Korea and other Asian countries, the potentially adverse effects from RP have gained considerable attention in Asia as well [7, 8]. With these concerns in mind, we investigated the functional outcomes regarding erectile function and urinary continence for up to 5 years after open RP in a cohort of Korean men.

2 Materials and methods

2.1 Subjects

Between November 2003 and September 2004, 94 patients received open unilateral or bilateral nerve-sparing radical retropubic prostatectomy for clinically localized prostate cancer by a single surgeon at our institution. Before undergoing RP and during postoperative follow-up visits to our clinic, patients were asked about their status regarding erectile function and urinary continence. All the men completed International Index of Erectile Function (5-item) (IIEF-5) and International Prostate Symptom Score (IPSS) questionnaires routinely before the surgery. In some of these patients, a phosphodiesterase type 5 (PDE-5) inhibitor or intracavernosal injection was prescribed for usage as needed postoperatively.

Excluding patients who underwent hormonal or radiation therapy preoperatively and those who were not followed up until 60 months after RP, we retrospectively analysed the clinicopathological data of 85 patients who were followed up for at least 60 months after RP on receiving approval from our institutional review board.

2.2 Analytic method

From medical records, the patients' status regarding urinary and erectile function at baseline and postoperative follow-ups after RP was assessed by the number of pads used per day and the return of erections sufficient for penetrative (vaginal) intercourse regardless of the use of erectile aids, respectively. Those who did not use pads were considered continent. Patients who responded as using pads occasionally were not classified as having urinary continence.

2.3 Statistical analyses

The SPSS software package version 15.0 (SPSS Inc., Chicago, IL, USA) was used for statistical analysis. Continuous variables were compared using paired *t*-tests and categorical variables were compared by Fisher's exact test. Repeated measures analysis of variance was applied to assess functional changes according to time after surgery. The potential correlation of various preoperative variables with the capability of achieving erections sufficient for penetrative intercourse at postoperative 60 months were analysed through univariate and multivariate logistic regression models. A two-tailed $P < 0.05$ was considered significant for all analyses.

3 Results

The mean age of patients included in our study was 65.3 ± 5.5 years. The mean age at follow-up was 66.2 ± 5.7 months. At surgery, the comorbidities of diabetes and hypertension were present in 10 (11.7%) and 27 (31.8%) patients, respectively. Of our patients, four underwent unilateral and 81 underwent bilateral nerve-sparing RP. Pathological stage was T2 in 63 (74.1%) and ≥ T3 in 22 (25.9%) patients (Table 1). During the 60 postoperative months, 18 (21.2%) underwent salvage radiation therapy for biochemical recurrence. Among these 18 patients, four also received androgen-deprivation therapy. The mean duration of time to biochemical recurrence after RP was 24.2 ± 24.7 months.

At 12, 24 and 60 months after RP, the proportions of the 85 men who were continent (using no pads) were 82.4%, 89.4% and 97.6%, respectively (Table 2). Thus, the proportion of men reporting urinary continence improved slightly from 24 to 60 months after RP ($P = 0.007$). The 18 men who received salvage radiation therapy showed no significant difference in continence rate at 60 months from RP compared with those not receiving the therapy ($P = 0.453$). Among patients with relevant pre- and postoperative data available ($n = 80$), the mean IPSS decreased from 11.4 ± 6.7 before surgery to 9.0 ± 5.9 at 60 months from RP ($P = 0.065$).

Regarding erectile function, we excluded those ($n = 24$) who preoperatively reported experiencing severe ED in terms of the baseline IIEF-5 score (≤ 7) and those lacking relevant information from the analysis assessing postoperative erectile function [9]. Of the 61 men evaluated, the proportions of subjects who reported being capable of having penetrative intercourse

Table 1. Characteristics of subjects.

Parameters	Total subjects
No. of patients	85
Median age (years)	65
Median PSA (ng mL^{-1})	7.8
Median prostate volume (mL)	38
Clinical stage (*n,* %)	
T1	52 (61.2)
≥ T2	33 (38.8)
Biopsy Gleason score (*n,* %)	
≤ 6	45 (52.9)
≥ 7	40 (50.1)
Extracapsular extension (*n,* %)	22 (25.9)
Seminal vesicle invasion (*n,* %)	6 (7.0)
Pathological Gleason score *(n,* %)	
≤ 6	30 (35.3)
≥ 7	55 (64.7)
Positive surgical margin (*n,* %)	22 (25.9)

Abbreviation: PSA, prostate-specific antigen.

regardless of erectile aid usage were 55.7%, 47.5% and 37.7% at 12, 24 and 60 months from RP, respectively. As these data show, the proportion of patients reporting erections sufficient for penetrative intercourse decreased within a period of 24 to 60 months from RP (P = 0.022). Those patients who underwent salvage radiation therapy at any point during the 60 postoperative months (n = 15) embodied a lower proportion of those who reported having erections sufficient for penetrative intercourse when compared with those who did not receive the therapy (6.7% *vs.* 47.8%; P = 0.005). When the 46 men who did not undergo salvage radiation therapy were analysed exclusively, the proportions of patients who reported experiencing erections sufficient for penetrative intercourse were 28/46 (60.9%), 25/46 (54.3%) and 22/46 (47.8%) at 12 months, 24 months and 60 months after RP, respectively. These numbers showed a decreasing trend from 12 to 60 months though not statistically significant (P = 0.183).

Among the 61 patients whose postoperative erectile function was evaluated, 43 (70.5%) took a PDE-5 inhibitor as needed during the postoperative follow-ups. The mean duration of PDE-5 inhibitor usage among these 43 men was 10.5 ± 5.5 months. Of the 43 who received these inhibitors, 31 men reported having experienced erections firm enough for at least transiently penetrative intercourse in the postoperative follow-ups. Meanwhile, of the 18 men who did not use a PDE-5 inhibitor, nine reported having experienced erections sufficient for at least transiently penetrative intercourse in the postoperative follow-ups. This is to say that PDE-5 inhibitor treatment at any point during postoperative follow-ups resulted in a higher rate of functional erection, but only one approaching statistical significance (P = 0.098). Meanwhile, at 60 months from RP, 17 (39.5%) of the aforementioned 43 men who took a PDE-5 inhibitor at any time during the 60 months after RP reported experiencing erections sufficient for intercourse, compared with six (33.3%) out of 18 among those who did not take the medication postoperatively (P = 0.649). At 60 months from RP, only six of 43 (13.9%) patients were observed to still use a PDE-5 inhibitor as an erectile aid. Regarding intracavernosal injection therapy, four men received the treatment after PDE-5 inhibitor therapy and all reported experiencing erections firm enough for intercourse. However, none were observed to have used intracavernosal injections for more than 6 months.

With regard to the experience of erections firm enough for intercourse at 60 months from RP, patient's age at surgery (P = 0.001), estimated blood loss during RP (P = 0.028) and implementation of postoperative salvage radiation therapy (P = 0.005) were observed in univariate analyses to be significant predictors. The patient's age at surgery (P = 0.047) and salvage radiation therapy (P = 0.026) were also observed to be significant predictors of erections firm enough for penetrative intercourse at 60 months from RP in multivariate analysis (Table 3). As most men, for whom relevant data were available, were found to be continent at 5 years from RP, we did not try to identify predictors for achieving

Table 2. Patients' urinary continence status during follow-ups after radical prostatectomy, analysed by assessing the number of pads used per day at given time points following surgery.

No. of pad used per day	Baseline (%)	6 months (%)	12 months (%)	24 months (%)	36 months (%)	60 months (%)
0	100	74.1	82.4	89.4	94.1	97.6
1–2	0	16.5	15.3	9.4	4.7	1.2
≥ 3	0	9.4	2.3	1.2	1.2	1.2

urinary continence at 5 years from surgery.

4 Discussion

In our contemporary series of patients who underwent open RP, most of the patients preoperatively continent recovered their urinary continence at 60 months from RP. Despite the fact that some received salvage radiation therapy, the proportion of those who achieved urinary continence was observed to be generally maintained or to steadily increase from 24 to 60 months after surgery. Regarding erectile function, 37.7% of men who did not have preoperative severe ED (in terms of the IIEF-5 score) reported having erections firm enough for penetrative intercourse (regardless of erectile aid used) at 60 months from RP. Such a rate represented a decline of ~50% assessed at postoperative 12–24 months. In addition, patients' age at surgery and the implementation of postoperative salvage radiation therapy were observed to be significant predictors of the capability to achieve erections sufficient for intercourse at 60 months from RP.

As mentioned above, only after studies have reported long-term (≥ 5 years) follow-up data on the postoperative recovery of urinary continence and erectile function after RP. Furthermore, comparative analysis of the available data on long-term follow-up of functional status after RP is difficult, and it is often compounded by differences in study design, criteria applied for defining continence and erection, surgical techniques and surgeons' expertize. Assessing data from the Prostate Cancer Outcomes Study, a large population-based longitudinal cohort study on quality of life and functional outcomes in patients who received RP for PCa diagnosed between 1994 and 1995, Penson *et al*. [10] reported that 10% and 14% of men reported urinary incontinence (frequent leakage or no control) at 2 and 5 years after RP, respectively. This suggests that urinary function remains stable in the majority of surgical patients after the second year, as we have observed in our own study. The apparent difference in the observed proportion of patients showing urinary continence between Penson *et al*. [10]. and our own results may be owing to differences in the subject populations, as well as in the definitions applied in the analysis. In contrast to our subjects, ~10% of the patients in the study by Penson *et al*. [10] reported preoperative urine leakage. Regarding erectile function, 28% of the men had erections firm enough for intercourse at 60 months after RP compared with 22% at 24 months in the Penson *et al.* study [10]. Although this does not represent a large increase, such unexpected improvement in erectile function at 5 years might have been due to the introduction of sildenafil during the study period, a possibility the authors themselves acknowledged. Overall, they mentioned that a majority of men had relatively stable sexual function between 2 and 5 years after RP. In contrast, we observed, in our study, a significant decline in erectile function at the 5-year time point in comparison with function at 1–2 years after RP. Given the fact that impotence is widely

Table 3. Multivariate analysis assessing the potential predictors for achieving erections sufficient for intercourse at 60 months from radical prostatectomy.

Variable	OR (95% CI)	*P*-value
Age at surgery	0.804 (0.648–0.997)	0.047
Body mass index	1.382 (0.915–2.086)	0.124
Prostate volume	1.004 (0.958–1.052)	0.873
Comorbidity	3.083 (0.421–22.559)	0.268
Preoperative PSA level	1.045 (0.884–1.235)	0.604
Preoperative IIEF-5 score	1.091 (0.864–1.377)	0.464
Operative time	0.992 (0.963–1.021)	0.573
Estimated blood loss during RP	0.994 (0.987–1.000)	0.059
Pathological Gleason score	0.217 (0.029–1.636)	0.138
Pathological stage	0.955 (0.050–18.086)	0.976
Salvage radiation therapy	0.037 (0.002–0.670)	0.026
Erectile aid usage	1.180 (0.122–11.445)	0.886

Abbreviations: CI, confidence interval; OR, odds ratio; PSA, prostate-specific antigen; ILEF-5, International Index of Erectile Function (5-item); RP, radical prostatectomy.

associated with aging, we believe that our finding is valid [11]. The fact that PDE-5 inhibitors were widely available for the clinical use of our subjects at the time of surgery may also support our results. Although it is not examined in the study by Penson *et al*., [10] salvage radiation therapy was identified through multivariate analysis as having a deleterious effect on postoperative erectile function in our study. We therefore believe that our data regarding postoperative erectile function after RP is likely to have shown a real-life situation rather accurately.

Among our patients, the usage of erectile aids (primarily sildenafil) was also shown to have declined with time after RP. Such a phenomenon may signify that patients' compliance is not as high at long-term follow-ups after RP as it was earlier in the postoperative period. In addition, as Penson *et al*. [10] reported, although sildenafil can be effective in patients with prostate cancer who have been treated with RP, patients may not perceive it to be as helpful at long-term follow-ups as at previous follow-ups [10]. In a prospective study by Salonia *et al*. [12], ~73% of men who received PDE-5 inhibitor treatment after nerve-sparing RP were found to have discontinued the therapy at the 18-month follow-up. A treatment effect below patient expectation was observed to be the main reason for treatment discontinuation in that study. Another potential interpretation of observed declines in postoperative erectile function and usage of erectogenic aids at 5 years from RP is that patients may accept and adjust to the declined erectile function and discontinue relevant treatments at these later time points after RP. As sildenafil is relatively expensive, the economic burden of continuous oral treatment may also have had a role.

Some researchers have reported that cultural differences may have contributed to the different patterns of recovery of sexual function between Asian and Western patients after RP. In a study comparing the recovery of sexual function and bother after RP between American and Japanese men, it was observed that American men were more likely to regain their baseline sexual function by 24 months after RP than Japanese men [13]. In contrast, American men were less likely to return to baseline sexual bother than Japanese men. Although Asian men's views on sexual dysfunction have evolved considerably in recent years, the discussion of sexual topics continues to be uneasy and repressed in Asian patient–doctor encounters. In fact, it has been reported that Asian men are less likely to seek treatment for impotence because of a belief that it is not a medical issue. The most commonly cited reason among Asian men for not self-referring to a doctor has been reported to be that they consider sexual problems as normal side effects of cancer treatment and a natural part of aging [14]. Although we could not perform a comparative analysis, our Korean patients may have been less active in taking action for the management of sexual dysfunction after RP when compared with Western patients. Such a tendency may have, at least partly, contributed to the observed decline in erectile function with time after surgery. Accordingly, our results should be interpreted with a consideration for potential cultural discrepancies.

The current study is limited by the relatively small number of patients included. However, the number of patients followed up for 5 years after RP in our study should not be considered too small for a single institutional study from Asia, especially considering the difference in prostate cancer incidence between Asian and Western countries [7, 8]. Meanwhile, owing to the retrospective nature of our study, we could not assess the functional status of postoperative patients using validated tools such as IIEF and quality-of-life-related questionnaires. Although the IIEF questionnaire is a part of routine preoperative evaluation for patients undergoing RP at our institution, it could not be applied regularly in all our patients during postoperative follow-ups. Another potential limitation of our study is the fact that medical records cannot provide accurate data on the quality of individual nerve-sparing procedures, as others have mentioned [10]. Nevertheless, as our study was based on RPs performed by a single experienced surgeon, consistency in surgical technique or expertize may be regarded as higher than in other studies that incorporate data from multiple institutions or surgeons.

Our results showed that patients' postoperative urinary continence status at 2 years from RP is generally maintained or slightly improved by the 5-year time point. On the other hand, ED was observed to have significantly declined from the 2-year time point to 5 years after RP. Such a decline in erectile function may be more significant among men who were older at surgery or among those who received salvage radiation therapy during follow-ups after RP. Our results may prove useful in counselling patients before and during the follow-ups to RP.

Conflict of interest

The authors declare no conflict of interest.

References

1 Bianco FJ Jr, Scardino PT, Eastham JA. Radical prostatectomy: long-term cancer control and recovery of sexual and urinary function ("trifecta"). Urology 2005; 66: 83–94.
2 Tal R, Alphs HH, Krebs P, Nelson CJ, Mulhall JP. Erectile function recovery rate after radical prostatectomy: a meta-analysis. J Sex Med 2009; 6: 2538–46.
3 Steineck G, Helgesen F, Adolfsson J, Dickman PW, Johansson JE, *et al*. Quality of life after radical prostatectomy or watchful waiting. N Engl J Med 2002; 347: 790–6.
4 Walsh PC, Marschke P, Ricker D, Burnett AL. Patient-reported urinary continence and sexual function after anatomic radical prostatectomy. Urology 2000; 55: 58–61.
5 Kao TC, Cruess DF, Garner D, Foley J, Seay T, *et al*. Multicenter patient self-reporting questionnaire on impotence, incontinence and stricture after radical prostatectomy. J Urol 2000; 163: 858–64.
6 Litwin MS, Pasta DJ, Yu J, Stoddard ML, Flanders SC. Urinary function and bother after radical prostatectomy or radiation for prostate cancer: a longitudinal, multivariate quality of life analysis from the Cancer of the Prostate Strategic Urologic Research Endeavor. J Urol 2000; 164: 1973–7.
7 Sim HG, Cheng CW. Changing demography of prostate cancer in Asia. Eur J Cancer 2005; 41: 834–45.
8 Park SK, Saloda LC, Kang D, Chokkalingam AP, Lee E, *et al.* Rising prostate cancer rates in South Korea. Prostate 2006; 66: 1285–91.
9 Rosen RC, Cappelleri JC, Smith MD, Lipsky J, Pena BM. Development and evaluation of an abridged, 5-item version of the International Index of Erectile Function (IIEF-5) as a diagnostic tool for erectile dysfunction. Int J Impot Res 1999; 11: 319–26.
10 Penson DF, McLerran D, Feng Z, Li L, Albertsen PC, *et al*. 5-year urinary and sexual outcomes after radical prostatectomy: results from the Prostate Cancer Outcomes Study. J Urol 2008; 179: S40–4.
11 Jonler M, Moon T, Brannan W, Stone NN, Heisey D, *et al.* The effect of age, ethnicity and geographical location on impotence and quality of life. Br J Urol 1995; 75: 651–5.
12 Salonia A, Gallina A, Zanni G, Briganti A, Dehò F, *et al*. Acceptance of and discontinuation rate from erectile dysfunction oral treatment in patients following bilateral nerve-sparing radical prostatectomy. Eur Urol 2008; 53: 564–70.
13 Namiki S, Kwan L, Kagawa-Singer M, Tochigi T, Ioritani N, *et al.* Sexual function following radical prostatectomy: a prospective longitudinal study of cultural differences between Japanese and American men. Prostate Cancer Prostatic Dis 2008; 11: 298–302.
14 Moreira ED Jr, Brock G, Glasser DB, Nicolosi A, Laumann EO, *et al.* Help-seeking behaviour for sexual problems: the global study of sexual attitudes and behaviors. Int J Clin Pract 2005; 59: 6–16.