

Investigating Urinary Conditions Prior to Robot-assisted Radical Prostatectomy in Search of a Desirable Method for Evaluating Post-prostatectomy Incontinence

YOSHIFUMI KADONO, TAKAHIRO NOHARA, SUGURU KADOMOTO, KAZUFUMI NAKASHIMA, MASASHI IJIMA, KAZUYOSHI SHIGEHARA, KAZUTAKA NARIMOTO, KOUJI IZUMI and ATSUSHI MIZOKAMI

*Department of Integrative Cancer Therapy and Urology,
Kanazawa University Graduate School of Medical Science, Kanazawa, Japan*

Abstract. *The aims of the study were to investigate desirable evaluation methods for post-prostatectomy incontinence (PPI) by analyzing the urinary status before robot-assisted radical prostatectomy (RARP). Questionnaires were evaluated from 155 patients prior to operation. The 24-h pad test before RARP revealed a weight of 1.1 g. The mean scores were as follows: total International Consultation on Incontinence Questionnaire-Short Form (ICIQ-SF) score, 1.2; total International Prostate Symptom Score (IPSS), 10.0; IPSS quality of life, 2.7; Overactive Bladder Symptom Score (OABSS), 2.9; and Expanded Prostate Cancer Index Composite urinary summary, 92.8. The abdominal leak point pressure test in 111 patients before RARP was negative in all cases. Desirable evaluation methods for PPI should be based on a combination of subjective and objective evaluations and comparisons between pre- and post-RP. ICIQ-SF is considerably convenient for evaluating incontinence, and the 24-h pad test enables evaluation of the incontinence volume in a highly objective manner.*

Incontinence following radical prostatectomy (RP) is a major complication and can significantly affect the patient's quality of life (QOL) (1). Although various methods of evaluating post-prostatectomy incontinence (PPI) have been reported, there is currently no standardized evaluation method. Many reports utilized counts of daily incontinence pads, primarily

because of the convenience of this method (2); however, other reports have claimed that pads are not accurate and do not show the exact incontinence status (3-5). Pad weight tests were represented as an objective method of evaluation, while the 24-h pad test was a more desirable evaluation method for PPI (3, 4). Several questionnaires have been developed for the subjective evaluation of PPI. The International Consultation on Incontinence Questionnaire-Short Form (ICIQ-SF) has been used as an incontinence-specific questionnaire (6). Expanded Prostate Cancer Index Composite (EPIC) is a tool used specifically to evaluate QOL for patients with localized prostate cancer (7). Urodynamic studies are also used for the objective evaluation of lower urinary tract function (8). In addition, preoperative urinary function appears to influence the urinary conditions that become evident post-surgery. However, only a small number of reports have investigated the detailed evaluation of preoperative urinary function and incontinence status in both subjective and objective manners (9, 10). PPI evaluations should be performed in comparison with the urinary conditions before RP. Thus, the evaluation of PPI appears to be impossible without obtaining detailed information of the urinary conditions prior to RP.

The present study, therefore, aimed to investigate optimized evaluation methods for PPI and identified a cohort of patients destined for robot-assisted RP (RARP). These patients were sent questionnaires, regarding urinary function and QOL, which were filled out before surgery. The patients also performed a 24-h pad test and abdominal leak point pressure (ALPP) test preoperatively.

Materials and Methods

Patients with clinically localized prostatic cancer undergoing RARP at Kanazawa University Hospital between November 2012 and November 2015 were included in this study, which had the approval of the Institutional Ethics Committee (Approval No.798). All patients provided informed written consent. Patients were taught

Correspondence to: Yoshifumi Kadono, MD, Ph.D., Department of Integrative Cancer Therapy and Urology, Kanazawa University Graduate School of Medical Science, 13-1 Takara-machi, Kanazawa, Ishikawa 920-8640, Japan. Tel: +81 762652393, Fax: +81 762226726, Ee-mail: yskadono@yahoo.co.jp

Key Words: International Consultation on Incontinence Questionnaire-Short Form, pad test, questionnaire, radical prostatectomy, urinary incontinence.

pelvic floor muscle exercises, and these exercises were begun 1 month preoperatively. Exercises were continued postoperatively until urinary continence was recovered. Prostate size was estimated using transrectal ultrasound a few days before surgery. Prostate-specific antigen level was measured before prostate biopsy and Gleason score was determined at prostate biopsy.

ICIQ-SF (6), International Prostate Symptom Score (IPSS) (11), overactive bladder symptom score (OABSS) (12), EPIC (13), and questions regarding daily pad use were provided for subjective evaluation. The pad weights from 24-h pad tests were obtained for objective evaluation. ALPP tests were performed in 111 patients preoperatively. The 24-h pad test was performed as follows. Firstly, we provided patients with a platform scale and asked them to weigh the pad before and after use. Subsequently, we determined the difference in weights. The 24-h pad test was performed three times prior to their operation. The overall 24-h pad test result was defined as the average increase in pad weight over the three tests. ALPP was measured at a volume of 150 ml (or half bladder capacity if the capacity was ≥ 300 ml) using a rectal monitor with urethral catheter removal. The cough or Valsalva maneuver was performed at least five times, and ALPP was defined as the lowest pressure inducing visible incontinence. If no incontinence was observed with an abdominal pressure of >100 cm H_2O , then ALPP was defined as 'negative'. Questionnaires and tests were performed within 1 month of surgery.

The ICIQ-SF consists of four questions. The first three questions relate to the following: i) the frequency of incontinence; ii) the volume of incontinence; and iii) the impact of incontinence. These questions generate scores from 0 to 5, 0 to 6, and 0 to 10 points, respectively. The total score is generated by adding these scores (range from 0 to 21 points), with a higher score indicating a greater severity of urinary incontinence. Question 4 evaluates the occurrence of urinary incontinence (*i.e.* under what circumstances leakage occurred) (6). The first seven questions on the IPSS target incomplete emptying, frequency, intermittence, urgency, weak urinary stream, hesitancy, and nocturia (14). The voiding scores represent the sum of each score from question 1, 3, 5, and 6, whereas storage scores represent scores from questions 2, 4, and 7. The maximum score of the OABSS, consisting of four questions, was defined as 2, 3, 5 and 5 for daytime frequency, night time frequency, urgency, and urgency incontinence, respectively (12). The total score of OABSS (from 0-15) was reported to be greater in patients with overactive bladder (12). To evaluate urinary QOL, urinary summary score (US) and urinary function subscale (UF), urinary bother subscale (UB), urinary incontinence subscale (UIN), and urinary irritation/obstruction subscale (UIR) of EPIC were used (15).

Categorical variables used to calculate the incidence and percentage of each factor, and all continuous variables are provided as the mean \pm standard deviation (SD). Correlations within each variable were calculated by Spearman's rank correlation. The guidelines proposed by Cohen were used to interpret correlation coefficients: a weak correlation was 0.1-0.3, medium was 0.3-0.5, and strong was 0.5-1.0 (16). All data analyses were performed using SPSS for Windows (SPSS Inc., Chicago, IL, USA). In all analyses, a *p*-value less than 0.05 was considered to be statistically significant.

Results

In total, 155 patients were recruited and given questionnaires regarding daily pad use, ICIQ-SF, IPSS, OABSS, EPIC, and a 24-h pad test prior to RARP. The demographics of the

recruited patients are shown in Table I. Table II shows the results of the 24-h pad test, daily pad use, and mean ICIQ, IPSS, OABSS, EPIC score prior to RARP. The proportion of those with 0 points and with more than 0 points on the pad count along with total ICIQ-SF score is shown in Table II. Only two patients (1.3%) used pads, and the total ICIQ-SF score from 44 patients (28.4%) was more than 0 points prior to RARP. Analysis revealed weak correlation between the 24-h pad test and ICIQ-SF, between the 24-h pad test and IPSS voiding score, and between the 24-h pad test and IPSS QOL score. No correlations were revealed between the 24-h pad test and other questionnaires (Table III). Medium negative correlations of EPIC US, UF and UIN with the total ICIQ-SF score were apparent (Table IV). Strong negative correlations were evident for EPIC US, UB and UIR with total IPSS and IPSS QOL (Table IV). Medium negative correlations were also detected of EPIC US, UB and UIR with OABSS (Table IV). A medium positive correlation was evident for total ICIQ-SF with IPSS QOL and OABSS (Table IV).

The 24-h pad test from 148 patients (95%) gave a weight of 0-2 g prior to RARP (Table V). Among 111 patients with a total ICIQ-SF score of 0, 108 patients (97%) gave a pad weight of 2 g or less in the 24-h pad test, whereas three patients reported weights of 4-12 g (Table V). These three patients informed us of perspiration during the test and were not aware of urinary incontinence. Conversely, the total ICIQ-SF scores of 40 patients (27%) from among the 148 patients with a weight of 0-2 g in the 24-h pad test were not 0 points (Table V).

The proportion of patients with a total ICIQ-SF score of 0 and weights of 0 g, 1 g, or 2 g in the 24-h pad test was 81% (59 cases), 66% (39 cases), and 63% (10 cases), respectively (Table V). Of the 44 cases checking the "urinary incontinence" box on question 4 of the ICIQ-SF, two patients checked two boxes, one patient checked three boxes, and the other 37 patients checked only one box. The predominant answer was "Leaks when you have finished urinating" and was checked by 21 cases (48%). The second most frequent answer was "Leaks before you can get to the toilet" and was checked by 17 cases (39%) (Table V). One patient checked the box marked "Leaks when you cough or sneeze" or "Leaks when you are physically active/exercising," and this patient also checked the "Leaks before you can get to the toilet" box. The weights from each 24-h pad test in two patients using pads daily were 15 g and 30 g (Table V). ALPP tests conducted in 111 patients prior to RARP were all negative.

Discussion

Depending upon the definition of urinary incontinence, the proportion of continence tends to vary. Although pad counts for continence definition are convenient, this definition has been reported to be insufficient for evaluation (3-5). In the

Table I. Demographics of the study population.

Variable	Mean (\pm SD) or n (%)
Total number of patients	155
Age, years	65.5 (\pm 5.4)
Body mass index, kg/m ²	23.7 (\pm 2.8)
PSA, ng/ml	8.1 (\pm 4.9)
Prostate size, ml	38.7 (\pm 13.6)
Biopsy Gleason score	
6	53 (34.2%)
7	69 (44.5%)
8-10	33 (21.3%)
Clinical stage	
T1	38 (24.5%)
T2	107 (69.0%)
T3	10 (6.5%)
D'Amino risk group	
Low	45 (29.0%)
Intermediate	59 (38.1%)
High	51 (32.9%)
Nerve-sparing procedure	
Not performed	30 (19.4%)
Unilateral	97 (62.6%)
Bilateral	28 (18.1%)

PSA, Prostate-specific antigen; SD, standard deviation.

Table II. Preoperative results of the 24-h pad weight test and different questionnaires.

Parameter	Mean (\pm SD) or n (%)
24-h pad weight test, g	1.1 (\pm 3.0)
Number of patients using no pads	153 (98.7%)
Number of patients using a pad/day	2 (1.3%)
Total ICIQ-SF score	1.2 (\pm 2.2)
0 point	111 (71.6%)
>1 point	44 (28.4%)
ICIQ-SF Question 1 score	0.5 (\pm 1.0)
ICIQ-SF Question 2 score	0.4 (\pm 0.8)
ICIQ-SF Question 3 score	0.3 (\pm 0.7)
Total IPSS score	10.0 (\pm 5.9)
IPSS voiding score	5.8 (\pm 4.1)
IPSS storage score	4.3 (\pm 2.7)
IPSS QOL score	2.7 (\pm 1.7)
Total OABSS score	2.9 (\pm 2.0)
EPIC urinary summary score	92.8 (\pm 7.0)
Urinary function subscale	97.3 (\pm 6.2)
Urinary bother subscale	89.6 (\pm 10.4)
Urinary incontinence subscale	97.0 (\pm 8.1)
Urinary irritative/obstructive subscale	91.7 (\pm 8.3)

SD, Standard deviation; IPSS, International Prostate Symptom Score; QOL, quality of life; OABSS, Overactive Bladder Symptom Score; EPIC, Expanded Prostate Cancer Index Composite.

present study, two patients using pads daily leaked more urine in the 24-h pad test than patients who did not use pads daily. Therefore, pad count may simply be an approximate indication of urinary continence if the comparison is made between pad use and no-pad use. A 24-h pad test seems to be objective and accurate compared to pad count; however, the pad test is a complicated method. In previous reports utilizing the 24-h pad test, patients were usually asked to place each pad into a sealed container immediately after use to minimize evaporation before its return to the clinic for analysis (3, 5, 17). In our study, we provided patients with a platform scale and asked them to weigh the pad before and after use. All participants in our study showed good understanding and decided upon their treatment themselves with sufficient informed consent. Consequently, patients were able to perform our pad test without any problems.

In our study, the mean preoperative total IPSS score was 10.0, whereas the mean ICIQ-SF total score was 1.2. According to a Japanese epidemiological survey of urinary symptoms in men aged 60-69 years, the mean total IPSS score was 6.63, whereas the mean total ICIQ-SF score was 0.88 (18). The total IPSS and ICIQ-SF scores arising from our study were worse than the scores reported in this previous Japanese survey, despite the age of participants being similar. It is possible that this was not because the cancer directly affected urinary function, but rather because in our study

population, some patients with urinary dysfunction underwent prostate biopsy soon after visiting a clinic or a hospital because the size of their prostate was considerably large.

In our study, only two patients (1.3%) used a pad regularly before RARP, and this proportion was similar to that of the previous report (1.2%) (10). Weights of the test pads from the two patients who used pads regularly were more than those of patients with no prior experience of pads. Patients producing a test pad weight of around 10 g appeared to sweat easily and it is possible that in such cases, the pads could have gained weight without urinary incontinence. Conversely, the pads of patients with only minor leakage could potentially have become dry. The proportions of patients with a total ICIQ-SF score of 0 and urine leakage of 0 g, 1 g, and 2 g were 81% (59 cases), 66% (39 cases), and 63% (10 cases), respectively (Table V). Even if urine leakage was considerably small, the more urine leakage increased, the greater the proportion of patients with a feeling of urinary incontinence became. Therefore, even a small volume of urine leakage could potentially affect subjective symptoms. Conversely, there were patients who checked boxes on the questionnaire relating to a complaint or trouble with urinary incontinence even if their pad weight was 0 g in the 24-h pad test. There appears to be individual differences in patients with regard to the feeling of urinary incontinence. The definition of urinary continence in pad

Table III. Spearman's rank correlation between 24-h pad weight test and each questionnaire result.

	ICIQ-SF		IPSS			OABSS		EPIC			
	Total score	Total score	Voiding score	Storage score	QOL score	Total score	US	UF	UB	UIN	UIR
24-h Pad weight test	0.22**	0.08	0.11	0.07	0.17*	0.08	-0.09	-0.06	-0.09	-0.05	-0.04

ICIQ-SF, International Consultation on Incontinence Questionnaire-Short Form; IPSS, International Prostate Symptom Score; QOL, quality of life; OABSS, Overactive Bladder Symptom Score; EPIC, Expanded Prostate Cancer Index Composite; US, urinary summary; UF, urinary function subscale; UB, urinary bother subscale; UIN, urinary incontinence subscale; UIR, urinary irritative/obstructive subscale. Significant at * $p < 0.05$, ** $p < 0.01$.

Table IV. Spearman's rank correlation between different questionnaires.

EPIC	ICIQ-SF				IPSS				OABSS
	Total score	Question 1	Question 2	Question 3	Total score	Voiding score	Storage score	QOL score	Total score
US	-0.33**	-0.35**	-0.30**	-0.22**	-0.64**	-0.50**	-0.57**	-0.63**	-0.48**
UF	-0.30**	-0.34**	-0.24**	-0.15	-0.18*	-0.11	-0.23**	-0.29**	-0.23**
UB	-0.27**	-0.27**	-0.24**	-0.22**	-0.64**	-0.50**	-0.57**	-0.60**	-0.46**
UIN	-0.40**	-0.43**	-0.32**	-0.26**	-0.15	-0.07	-0.16*	-0.23**	-0.24**
UIR	-0.17*	-0.18*	-0.15	-0.15	-0.61**	-0.48**	-0.57**	-0.52**	-0.42**
ICIQ-SF total score					0.27**	0.19*	0.26**	0.36**	0.37**

ICIQ-SF, International Consultation on Incontinence Questionnaire-Short Form; IPSS, International Prostate Symptom Score; QOL, quality of life; OABSS, Overactive Bladder Symptom Score; EPIC, Expanded Prostate Cancer Index Composite; US, urinary summary; UF, urinary function subscale; UB, urinary bother subscale; UIN, urinary incontinence subscale; UIR, urinary irritative/obstructive subscale. Significant at * $p < 0.05$, ** $p < 0.01$.

tests have differed between previous reports (9,19). In the current study, 153 patients did not regularly use pads. Of these, 148 patients (97%) had 0-2 g of urine leakage in the 24-h pad test. Of these 148 patients, 111 patients (75%) answered "Never leak urine" in question 4 on the ICIQ-SF. Therefore, one possible objective definition of continence is 0-2 g in the 24-h pad test. However, 25% of patients with 0-2 g of urine leakage in the 24-h pad test reported some sort of complaint or trouble with urinary incontinence. Therefore, it is possible that urinary continence status can be judged inappropriately by the pad test.

With respect to the correlation between the 24-h pad test results and the questionnaire scores, the 24-h pad test did not correlate with the IPSS survey, but did correlate with the ICIQ-SF (9, 17, .020). In our study, the 24-h pad test showed a weak correlation with each questionnaire. Previous reports showing correlation between pad tests and ICIQ-SF included a number of patients with significant urine leakage. In cases of patients with little or no urine leakage, such as the majority of our study population, individual differences in feelings of slight urinary incontinence, such as infinitesimal terminal dribbling, possibly led to bias in the evaluation compared to the population of patients with greater levels of urine leakage. In PPI evaluations, it is possible that the questionnaire results were scattered with patients with only small amounts of urine

leakage. Therefore, only subjective evaluations, such as questionnaires or pad counts, appear to pose problems in the appropriate evaluation of continence status.

Each questionnaire aims to evaluate urinary condition. The IPSS survey aims to investigate lower urinary tract symptoms, OABSS is for OAB, ICIQ-SF is for urinary incontinence, whereas EPIC is for QOL evaluation in patients with localized prostate cancer. The EPIC urinary domain includes many unique questions regarding hematuria and painful urination, whereas EPIC features several items that are similar to those on other questionnaires. The correlations among questionnaires featuring considerably similar items are naturally believed to be great. In the present study, UF and UIR were highly negatively correlated with IPSS, as seen in previous reports (7). EPIC features many question items, and the scores arising from EPIC cannot be assessed immediately because of the necessity to use a scoring program to obtain specific EPIC scores. Consequently, the EPIC survey is useful for research, but is rather inconvenient for use as an outpatient service to provide immediate feedback to patients. On the other hand, the IPSS, OABSS, and ICIQ-SF can be presented on a single piece of paper and can be completed swiftly. Consequently, these forms may be a convenient way to evaluate urinary status in an outpatient clinic.

Table V. Total International Consultation on Incontinence Questionnaire-Short Form (ICIQ-SF) score, answers to question 4, and pad use by 24-h pad test weight.

	24-hPad test weight, g									Total number
	0	1	2	3	4	11	12	15	30	
Total ICIQ-SF score, n										
0	59	39	10	0	1	1	1	0	0	111
1	1	4	0	1	0	0	0	0	0	6
2	2	0	1	0	0	0	0	0	0	3
3	3	6	0	0	0	0	0	0	0	9
4	3	5	1	0	0	0	0	0	0	9
5	3	2	1	1	0	0	0	0	0	7
6	0	1	2	0	0	0	0	0	0	3
7	2	1	1	0	0	0	0	0	1	5
8	0	1	0	0	0	0	0	0	0	1
11	0	0	0	0	0	0	0	1	0	1
Total number	73	59	16	2	1	1	1	1	1	155
Answer to ICIQ-SF question 4 [#] , n										
Never, urine doesn't leak	62	39	10	1	1	1	1	0	0	115
Leaks before you can get to the toilet	4	10*	2*	0	0	0	0	0	1	17
Leaks when you cough or sneeze	0	0	0	0	0	0	0	0	0	0
Leaks when you are asleep	1	0	0	1*	0	0	0	0	0	2
Leaks when you are physically active/exercising	0	0	1*	0	0	0	0	0	0	1
Leaks when you have finished urinating and are dressed	6	10*	3	1*	0	0	0	1*	0	21
Leaks for no obvious reason	0	1	0	1*	0	0	0	1*	0	3
Leaks all the time	0	0	0	0	0	0	0	0	0	0
Use pads, n	0	0	0	0	0	0	0	1	1	2

[#]When does urine leak? *One person ticked double or triple boxes.

In our study population, there was no patient with pure stress incontinence before RARP, although one patient who complained of incontinence when squatting down also checked the “Leak before you can get to the toilet” box on the questionnaire. In addition, all patients were negative in the ALPP test prior to RARP. Of the 44 patients complaining of urinary incontinence with an ICIQ-SF score more than 0, 21 patients (48%) checked “Leaks when you finished urinating and are dressed” in question 4, indicating that dribbling after urination was a dominant condition, whereas 17 patients (39%) checked the “Leaks before you can get to the toilet” box, indicating that urge incontinence was the second most common condition (Table V). Urinary condition changes significantly following RP compared to the urinary condition before RP. Consequently, comparing urinary condition before and after RP is crucial.

This study had several limitations. Firstly, the sample size was not large enough to draw definitive conclusions. Of the 115 patients checking the “Never - urine doesn't leak” box for question 4 on the ICIQ-SF (Table V), 109 patients (95%) had a total ICIQ-SF score of 0. However, six patients (5%) checked boxes in questions 1–3 with a score greater than 0. These six patients answered “No urine leakage” for some questions and “Urine leakage” or “Leaking urine interferes

with life” in others. Consequently, it appears that some patients answered the form in an inconsistent manner. Missing data are unavoidable in questionnaires. A previous ICIQ-SF survey reported an average 1.6% of missing data (21). As the number of questions increases, the possibility of missing data also increases. In the present study, seven patients (4.5%) had missing data on their EPIC, ICIQ-SF, IPSS, and OABSS forms, whereas seven patients were asked to check missing boxes afterwards. Therefore, there appeared to be bias in the way patients answered some questions but not others.

Conclusion

Urinary status was evaluated prior to RARP. Desirable evaluation methods for PPI should be based on a combination of both subjective and objective evaluations. ICIQ-SF represents a convenient questionnaire consisting of four questions targeting incontinence situations. Combining the ICIQ-SF with a 24-h pad test enabled us to evaluate incontinence volume in an objective manner. However, in order to evaluate individual differences of incontinence feeling or inconvenience, it is important to compare the urinary condition before and after surgery. IPSS appears to

be a convenient method to evaluate voiding. A combination of the ICIQ-SF and IPSS includes question items for most voiding and incontinence eventualities and is convenient for practical use in outpatient services.

Conflicts of Interest

The Authors declare no conflicts of interest in regard to this study.

References

- 1 Litwin MS, Pasta DJ, Yu J, Stoddard ML and 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* 164: 1973-1977, 2000.
- 2 Ficarra V, Sooriakumaran P, Novara G, Schatloff O, Briganti A, Van der Poel H, Montorsi F, Patel V, Tewari A and Mottier A: Systematic review of methods for reporting combined outcomes after radical prostatectomy and proposal of a novel system: the survival, continence, and potency (SCP) classification. *Eur Urol* 61: 541-548, 2012.
- 3 Dylewski DA, Jamison MG, Borawski KM, Sherman ND, Amundsen CL and Webster GD: A statistical comparison of pad numbers versus pad weights in the quantification of urinary incontinence. *Neurourol Urodyn* 26: 3-7, 2007.
- 4 Tsui JF, Shah MB, Weinberger JM, Ghanaat M, Weiss JP, Purohit RS and Blaivas JG: Pad count is a poor measure of the severity of urinary incontinence. *J Urol* 190: 1787-1790, 2013.
- 5 Haga N, Yanagida T, Yabe M, Akaiha H, Hata J, Sato Y, Ogawa S, Ishibashi K and Kojima Y: Timing of urinary pad exchanges was the most important factor affecting quality of life in the early postoperative period after robot-assisted laparoscopic radical prostatectomy. *J Endourol* 29: 1044-1051, 2015.
- 6 Gotoh M, Homma Y, Funahashi Y, Matsukawa Y and Kato M: Psychometric validation of the Japanese version of the International Consultation on Incontinence Questionnaire-Short Form. *Int J Urol* 16: 303-306, 2009.
- 7 Kakehi Y, Takegami M, Suzukamo Y, Namiki S, Arai Y, Kamoto T, Ogawa O and Fukuhara S: Health related quality of life in Japanese men with localized prostate cancer treated with current multiple modalities assessed by a newly developed Japanese version of the Expanded Prostate Cancer Index Composite. *J Urol* 177: 1856-1861, 2007.
- 8 Kadono Y, Ueno S, Iwamoto D, Takezawa Y, Nohara T, Izumi K, Mizokami A and Namiki M: Chronological urodynamic evaluation of changing bladder and urethral functions after robot-assisted radical prostatectomy. *urology* 85: 1441-1447, 2015.
- 9 Moore K, Allen M and Voaklander DC: Pad tests and self-reports of continence in men awaiting radical prostatectomy: establishing baseline norms for males. *Neurourol Urodyn* 23: 623-626, 2004.
- 10 Holm HV, Fossa SD, Hedlund H, Schultz A and Dahl AA: How should continence and incontinence after radical prostatectomy be evaluated? A prospective study of patient ratings and changes with time. *J Urol* 192: 1155-1161, 2014.
- 11 Yoshimura A, Niimi M, Akaza H, Takeshima H, Otani M, Noguchi R, Ishikawa S and Ohashi Y: Assessment of reproducibility and unidimensionality of International Prostate Symptom Score Japanese version. *Nihon Hinyokika Gakkai zasshi* 88: 1013-1020, 1997 (in Japanese).
- 12 Homma Y, Yoshida M, Seki N, Yokoyama O, Kakizaki H, Gotoh M, Yamanishi T, Yamaguchi O, Takeda M and Nishizawa O: Symptom assessment tool for overactive bladder syndrome--overactive bladder symptom score. *Urology* 68: 318-323, 2006.
- 13 Takegami M, Suzukamo Y, Sanda MG, Kamoto T, Namiki S, Arai Y, Ogawa O, Fukuhara S and Kakehi Y: [The Japanese translation and cultural adaptation of Expanded Prostate Cancer Index Composite (EPIC)]. *Nihon Hinyokika Gakkai zasshi* 96: 657-669, 2005.
- 14 Barry MJ, Fowler FJ, Jr., O'Leary MP, Bruskewitz RC, Holtgrewe HL, Mebust WK and Cockett AT: The American Urological Association symptom index for benign prostatic hyperplasia. The Measurement Committee of the American Urological Association. *J Urol* 148: 1549-1557, 1992.
- 15 Wei JT, Dunn RL, Litwin MS, Sandler HM and Sanda MG: Development and validation of the expanded prostate cancer index composite (EPIC) for comprehensive assessment of health-related quality of life in men with prostate cancer. *Urology* 56: 899-905, 2000.
- 16 Cohen J. The effect size. In: Cohen J (ed.): *Statistical Power Analysis for the Behavior Science*. Second Edition. Lawrence Erlbaum Associates, Hillsdale, NJ, pp. 77-83, 1988.
- 17 Mungovan SF, Huijbers BP, Hirschhorn AD and Patel MI: What makes men leak? An investigation of objective and self-report measures of urinary incontinence early after radical prostatectomy. *Neurourol Urodyn* 35: 225-229, 2016.
- 18 Osuga Y, Okamura K, Ando F and Shimokata H: Prevalence of lower urinary tract symptoms in middle-aged and elderly Japanese. *Geriatr. Gerontol Int* 13: 1010-1017, 2013.
- 19 Van Kampen M, De Weerd W, Van Poppel H, De Ridder D, Feys H and Baert L: Effect of pelvic-floor re-education on duration and degree of incontinence after radical prostatectomy: a randomised controlled trial. *Lancet* 355: 98-102, 2000.
- 20 Twiss CO, Fischer MC and Nitti VW: Comparison between reduction in 24-hour pad weight, International Consultation on Incontinence-Short Form (ICIQ-SF) score, International Prostate Symptom Score (IPSS), and Post-Operative Patient Global Impression of Improvement (PGI-I) score in patient evaluation after male perineal sling. *Neurourol Urodyn* 26: 8-13, 2007.
- 21 Avery K, Donovan J, Peters TJ, Shaw C, Gotoh M and Abrams P: ICIQ: a brief and robust measure for evaluating the symptoms and impact of urinary incontinence. *Neurourol Urodyn* 23: 322-323, 2004.

Received May 16, 2016

Revised June 10, 2016

Accepted June 13, 2016