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Original Article

Changes of lower urinary tract function after robot-assisted radical prostatectomy: An urodynamic follow-up within 1 year

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Abstract

Objectives: This study investigated the changes of lower urinary tract function after robot-assisted radical prostatectomy (RaRP) with 1-year urodynamic follow-up. **Materials and Methods:** Clinically localized prostate cancer patients receiving RaRP were prospectively enrolled. We analyzed their clinical symptoms, stress urinary incontinence (SUI) and urge urinary incontinence (UUI) status, and videourodynamic studies (VUDSs) during the postoperative 1st year. **Results:** In total, 74 patients were enrolled with a mean age of 69.4 ± 8.1 years, a mean total prostate volume of 34.7 ± 15.9 mL, a ≥pT3 stage proportion of 37.8%, and a positive surgical margin rate of 18.9%. The International Prostate Symptom Score significantly reduced from 7.3 ± 6.0 before surgery to 4.1 ± 4.1 at postoperative 1 year. Significantly increased full sensation, reduced detrusor voiding pressure, increased maximal urinary flow rate, and decreased bladder outlet obstruction index were noted at 1-year VUDS follow-up. The changes of VUDS parameters were significantly different between the patients with and without preoperative bladder outlet obstruction. At postoperative 1 year, 8.1% and 6.8% of patients experienced SUI and UUI, respectively. In multivariate analysis, the factors of T stage ≥3, preoperative detrusor overactivity (DO), and positive surgical margin were the independent predictors of immediate SUI and SUI at 3 and 12 months, respectively. **Conclusion:** During the 1st year after RaRP, patients experienced significant changes of lower urinary tract function demonstrated in VUDS with the improvement in clinical symptoms. Factors of T stage ≥3, preoperative DO, and positive surgical margin were the predictors of postoperative SUI.

Keywords: *Lower urinary tract function, Postprostatectomy incontinence, Robotic-assisted radical prostatectomy, Videourodynamic study*

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Introduction

Over the past decade, the incidence of prostate cancer has increased with a sharp rise in Asia [1]. Radical prostatectomy (RP), through either open retropubic (ORP), laparoscopic (LRP), or robot-assisted (RaRP) approach, is the definitive treatment for localized prostate cancer showing survival benefits [2]. One recent meta-analysis reported that RaRP offered better outcomes than LRP and ORP in respect of perioperative blood loss, transfusion rate, nerve sparing, and urinary continence recovery [3]. The changes of bladder and urethral function after ORP had been proposed [4]; however, the data in RaRP were limited currently. In recent years, more and more patients received RaRP, and the postoperative changes of lower urinary tract function need more considerable attention.

Patients receiving ORP would experience the worsening of lower urinary tract symptoms (LUTS) at 3 months, but LUTS significantly improved between 3 months and 2 years [5]. Bladder and urethral sphincter function may change with the development of detrusor hypocontractility, decreased bladder compliance, and intrinsic sphincter deficiency in about 30% of patients receiving ORP [4]. However, a recent study reported that although detrusor pressure at maximum flow decreased after RP, maximum Watts factor did not change significantly [6]. RP might restore the normal detrusor contractility pattern rather than impaired contractility.

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In post-RP-related LUTS, postprostatectomy incontinence (PPI) is a common long-term complication with a negative impact on quality of life [7,8]. The cause of PPI is multifactorial, including the negative impacts from biological/preoperative factors, perioperative extensive dissection and damage, and postoperative fibrosis and the positive effects from the sparing of the bladder neck and anterior fixation of the vesicourethral anastomosis [9]. In the previous study with urodynamic assessments, patients with PPI had significantly lower bladder capacity, lower detrusor pressure, and lower maximum urethral closure pressure than patients without PPI [10].

The changes of LUTS and various types of urinary incontinence after RaRP had been reported [8]. However, the evidence of urodynamic investigation of the lower urinary tract function after RaRP is limited. This study aimed to investigate the changes of lower urinary tract function with videourodynamic study (VUDS) in prostate cancer patients receiving RaRP.

Materials and methods

Patients

From August 2015 to April 2020, we prospectively enrolled 74 patients who underwent RaRP for localized prostate cancer and completed the lower urinary tract function follow-up program in one medical center. All the surgeries were performed in a standard transperitoneal approach with both anterior and posterior reconstruction by a single surgeon (Y. H. J). This study was approved by the Research Ethics Committee of Hualien Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation (No. IRB107-38-A). All study patients were informed of the rationale and procedures of this study and signed the informed consent form.

All patients had thorough preoperative clinical workup of prostate cancer including digital rectal examination, measurement of serum prostate-specific antigen (PSA), transrectal sonography of the prostate to measure total prostate volume (TPV), prostate magnetic resonance imaging, and whole-body bone scan. In addition, they received preoperative lower urinary tract function workup, including the International Prostate Symptom Score (IPSS) (including total score [IPSS-T], voiding [IPSS-V], and storage [IPSS-S] subscores) and VUDS. The perioperative parameters included operation time, console time, blood loss, and the preservation of neurovascular bundles. The recorded pathologic findings included the positive surgical margin, pathological cancer stage, and Gleason's score of prostate cancer.

Clinical investigation and follow-up

We routinely performed cystography on postoperative day 6 and removed the urethral catheter on the next day, if there was no major complication or abnormal finding in the cystography. Pelvic floor muscle training exercise was also routinely instructed after the removal of the urethral catheter.

We recorded urinary incontinence status and IPSS at postoperative 1 week (just after the removal of the urinary catheter), 1 month, 3 months, 6 months, 9 months, and 12 months. The evaluations of VUDS for follow-up were conducted at postoperative 3–6 and 12 months.

The documented parameters of urinary incontinence status included stress urinary incontinence (SUI), urgency urinary incontinence (UUI), and the use of pads. Both SUI and UUI were defined according to the International Continence Society terminology [11] and our previous study [12].

The evaluations of VUDS

The definitions and the interpretation of the VUDS results were based on the recommendations of the International Continence Society (ICS) [11,13]. The documented parameters of VUDS included the first sensation of bladder filling, full sensation (FS), cystometric bladder capacity, maximal urinary flow rate (Qmax), detrusor pressure at maximum flow (PdetQmax), voided volume, postvoid residual urine volume, and the presence of detrusor overactivity (DO). The bladder outlet obstruction index (BOOI, defined by PdetQmax – 2 × Qmax) and bladder contractility index (defined by PdetQmax + 5 × Qmax) were calculated. Bladder outlet obstruction was diagnosed in patients presenting with a high BOOI (>40) and the concurrent radiologic evidence of urethral obstruction on real-time fluoroscopy during voiding.

Statistical analysis

Continuous variables were presented as means ± standard deviations, and categorical data were presented as numbers and percentages. The changes of IPSS and VUDS parameters from baseline values to follow-up values were analyzed using paired *t*-tests. VUDS parameters and their changes from baseline values to follow-up values between the patient groups with and without preoperative BOO were analyzed using Mann–Whitney *U*-tests. Univariate and multivariate logistic regression analyses were performed to determine the predictor of the risk of SUI. All calculations were done using SPSS Statistics for Windows, version 25.0 (Armonk, NY, USA: IBM Corp.). The difference was considered statistically significant if $P < 0.05$.

Results

In total, 74 patients were enrolled with a mean age of 69.4 ± 8.1 years, a mean TPV of 34.7 ± 15.9 mL, and initial PSA 27.21 ± 36.47 ng/mL [Table 1]. The preservation of neurovascular bundles was performed in 29 patients (39.2%). In pathological findings, the positive margin rate was 18.9%, 37.8% of patients were pT3 stage, and Gleason's score ≥8 was in 14.9% of patients. During 1-year follow-up, 24.3% of patients received adjuvant radiotherapy.

Before the surgery, the mean IPSS-T was 7.3 ± 6.0 [Figure 1a]. After the surgery, IPSS-T significantly reduced to 5.2 ± 4.8 and 4.1 ± 4.1 at 6 months and 12 months, respectively (both $P < 0.05$). Nevertheless, IPSS-S significantly increased at postoperative 1 month (from 3.4 ± 3.1 to 4.8 ± 3.2, $P < 0.05$) and decreased gradually.

At postoperative 1 week, after the removal of the urinary catheter, 47.3% and 36.5% of patients experienced SUI and UUI, respectively, and the pad-free rate was 41.9% [Figure 1b]. Both SUI and UUI rates were gradually

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reduced at 3 months (18.9%, 16.2%), at 6 months (6.8%, 5.5%), and at 12 months (8.1%, 6.8%). The largest degree of urinary continence recovery developed during the first 3 months.

In comparison with the preoperative VUDS parameters, significantly reduced PdetQmax, increased Qmax, and decreased BOOI were noted at both postoperative 3–6-month and 12-month follow-ups [Table 2 and Figure 2]. In addition, significantly increased FS was noted at postoperative 12-month follow-up. Figure 2 demonstrates detrusor voiding pressure and maximal urinary flow rate as assessed by ICS nomogram in patients observed before RaRP, at postoperative 3–6 months, and at postoperative 12 months. The presentations of ICS nomogram changed after the surgery. The proportions of patients with DO did not differ between baseline and at postoperative 12 months. After RaRP, the development of *de novo* DO and the remission of DO were noted in 4 (5.4%) and 9 (12.2%) patients, respectively. The patients without preoperative BOO (n = 28, 37.8%) did not have significant change of VUDS parameters at 1-year follow-up, except decreased PdetQmax. The patients with preoperative BOO had more significant changes of VUDS parameters, including decreased PdetQmax, increased Qmax, and decreased BOOI than those without preoperative BOO.

Table 1: Demographics and perioperative parameters of patients receiving robot-assisted radical prostatectomy

Variable	Total
Number	74
Preoperative variables, mean ± SD	
Age (years)	69.4±8.1
TPV (mL)	34.7±15.9
PSA (ng/mL)	27.21±36.47
BMI (kg/m^2)	25.81±3.25
MUL (mm)	12.63±2.5
Preoperative TURP (%)	18 (24.3)
Perioperative parameters, mean ± SD	
Operation time (min)	191.78±30.92
Console time (min)	150.89±32.87
Blood loss (mL)	113.99±73.41
NVB preservation, n (%)	29 (39.2)
Pathologic findings, n (%)	
Positive surgical margin	14 (18.9)
Pathologic stage	
pT2	46 (62.2)
pT3	28 (37.8)
Gleason's score, n (%)	
≤6	33 (44.6)
7	30 (40.5)
8-10	11 (14.9)
Postoperative radiotherapy, n (%)	17 (24.3)

BMI: Body mass index, MUL: Membranous urethral length (assessed through magnetic resonance imaging), NVB: Neurovascular bundle, PSA: Prostate-specific antigen, TPV: Total prostate volume, TURP: Transurethral resection of prostate

Table 3 reports the univariate and multivariate logistic regression analyses of the risk of SUI at different time points after RaRP. The factor of T stage ≥3 (odds ratio [OR]: 3.231, P = 0.021) was an independent predictor of immediate SUI after the removal of urinary catheter in multivariate analysis. Preoperative DO (OR: 4.617, P = 0.037) was an independent predictor of SUI at 3 months in multivariate analysis. The factors of TPV (OR: 1.047, P = 0.027) and positive surgical margin (OR: 11.6, P = 0.008) were the predictors of SUI at 12 months in univariate analysis, and only positive surgical margin (OR: 7.767, P = 0.036) was the independent predictor in multivariate analysis.

Discussion

This study demonstrated the significant changes of LUTS and lower urinary tract function during the 1st year after RaRP. After surgery, LUTS, SUI, and UUI all improved with time. At postoperative 6 months, significant reduction of LUTS was noted, and the rates of either SUI or UUI were <10%. All of these conditions lasted till the end of 1-year follow-up. Significantly increased FS, reduced PdetQmax, increased Qmax, and decreased BOOI in VUDS were noted at 1 year. The changes of VUDS parameters were significantly different between the patients with and without preoperative BOO. In the multivariate analysis, the factors of T stage ≥3, preoperative DO, and positive surgical margin were the independent predictors of immediate SUI and SUI at 3 and 12 months, respectively. The advanced extent of prostate cancer, preoperative bladder dysfunction, and perioperative outcome might affect the postoperative urinary continence recovery.

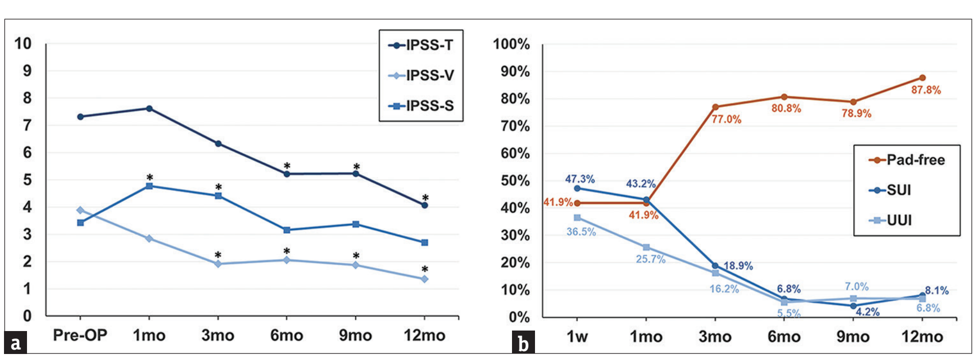

Figure 1: The changes of clinical symptoms assessed with IPSS (a) and urinary incontinence status (b) in patients receiving RaRP during 1-year follow-up. IPSS: International Prostate Symptom Score, IPSS-T: IPSS total score, IPSS-V: IPSS voiding subscore, IPSS-S: IPSS subscore, RaRP: Robot-assisted radical prostatectomy, SUI: Stress urinary incontinence, UUI: Urgency urinary incontinence. *: P value of the change (versus baseline) < 0.05

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Table 2: Changes of preoperative and postoperative videourodynamic study parameters in patients receiving robot-assisted radical prostatectomy

VUDS parameters	Without preoperative BOO (*n*=28)	With preoperative BOO (*n*=46)	Total (*n*=74)	*P*
FSF (mL)				
Baseline	150.2±50.2	122.1±70.6	132.5±64.9	0.021
Δ at 3-6 months	6.8±68.4	−0.9±62.3	2.1±64.3	0.840
Δ at 12 months	11.8±71.9	22.6±86.7	18.9±81.4	0.572
FS (mL)				
Baseline	248.1±70.4	176.6±100.9	203.6±96.6	0.001
Δ at 3-6 months	−9.8±85.8	26.4±71.0*	12.5±78.4	0.052
Δ at 12 months	7.7±91.5	43.0±101.3*	30.8±98.7*	0.180
Bladder compliance (mL/cmH_2O)				
Baseline	77.1±71.3	47.5±44.9	58.7±57.7	0.003
Δ at 3-6 months	−4.4±118.7	5.8±77.7	1.9±94.8	0.230
Δ at 12 months	−21.1±101.9	4.6±57.2	−4.3±75.7	0.137
CBC (mL)				
Baseline	332.6±115.9	266.2±122.3	291.3±123.4	0.022
Δ at 3-6 months	−5.1±169.5	15.3±99.2	7.4±129.9	0.352
Δ at 12 months	20.5±162.8	21.9±120.4	21.4±135.1	0.413
PdetQmax (cmH_2O)				
Baseline	29.4±13.8	50.7±17.1	42.6±18.9	<0.001
Δ at 3-6 months	−8.0±19.2	−29.9±18.5*	−21.9±21.4*	<0.001
Δ at 12 months	−10.7±12.5*	−29.5±18.3*	−23.1±18.7*	<0.001
Qmax (mL/s)				
Baseline	9.8±5.8	9.4±4.3	9.5±4.9	0.907
Δ at 3-6 months	0.4±7.1	4.8±7.0*	3.1±7.3*	0.032
Δ at 12 months	2.2±6.2	4.2±6.2*	3.5±6.2*	0.363
Voided volume (mL)				
Baseline	289.2±147.6	236.5±122.8	256.4±134.3	0.124
Δ at 3-6 months	−28.4±159.7	26.7±101.5	5.5±128.7	0.078
Δ at 12 months	38.9±192.0	29.9±80.4	33.0±128.5	0.974
PVR (mL)				
Baseline	43.4±71.7	29.7±87.2	34.9±81.4	0.277
Δ at 3-6 months	23.3±141.8	−11.5±82.6	1.9±109.5	0.653
Δ at 12 months	−18.4±100.0	−8.0±84.4	−11.6±89.4	0.292
BCI				
Baseline	78.1±33.3	97.4±26.6	90.1±30.6	0.008
Δ at 3-6 months	−1.7±26.7	−6.0±34.8	−4.4±31.9	0.475
Δ at 12 months	3.4±29.0	−9.4±31.6	−5.1±31.1	0.137
BOOI				
Baseline	9.9±17.1	32.0±19.7	23.6±21.5	<0.001
Δ at 3-6 months	−10.5±27.4	−39.4±26.2*	−28.8±29.9*	<0.001
Δ at 12 months	−16.3±18.8*	−37.6±24.8*	−30.4±24.9*	0.002
DO, *n* (%)				
Baseline	10 (35.7)	33 (71.7)	43 (58.1)	0.002
At 3-6 months	9 (32.1)	31 (67.4)	40 (54.1)	0.005
At 12 months	10 (35.7)	28 (60.9)	38 (51.4)	0.081
De novo DO at 12 months	3 (10.7)	1 (2.2)	4 (5.4)	
Remission of DO at 12 months	3 (10.7)	6 (13.0)	9 (12.2)	

Δ: Change from baseline value; positive and negative values indicate increasing and decreasing values, respectively, **P* value of the change (versus baseline) <0.05. Data are expressed as mean±SD. SD: Standard deviation, VUDS: Videourodynamic study, BOO: Bladder outlet obstruction, TPV: total prostate volume, FSF: First sensation of bladder filling, FS: Full sensation, CBC: Cystometric bladder capacity, PdetQmax: Detrusor pressure at maximum flow, Qmax: Maximal urinary flow rate, PVR: Post-void residual, BCI: Bladder contractility index, BOOI: Bladder outlet obstruction index, DO: Detrusor overactivity

The operation of ORP might cause not only urethral sphincter but also substantial detrusor dysfunctions, which were probably resulting from neurosurgical damage to external urethral sphincter and the bladder wall [14]. *De novo* decreased bladder compliance, detrusor hypocontractility, and intrinsic sphincter deficiency were noted in 32.3%, 59.3%, and 74% of patients at 8-month follow-up after ORP [4]. In our previous study with a small number of subjects receiving LRP or RaRP, reduced PdetQmax, increased Qmax, and reduced BOOI were detected at 1-year follow-up. The current study has the similar urodynamic changes, which reflected the impact of surgical removal prostate gland on the reduction of bladder

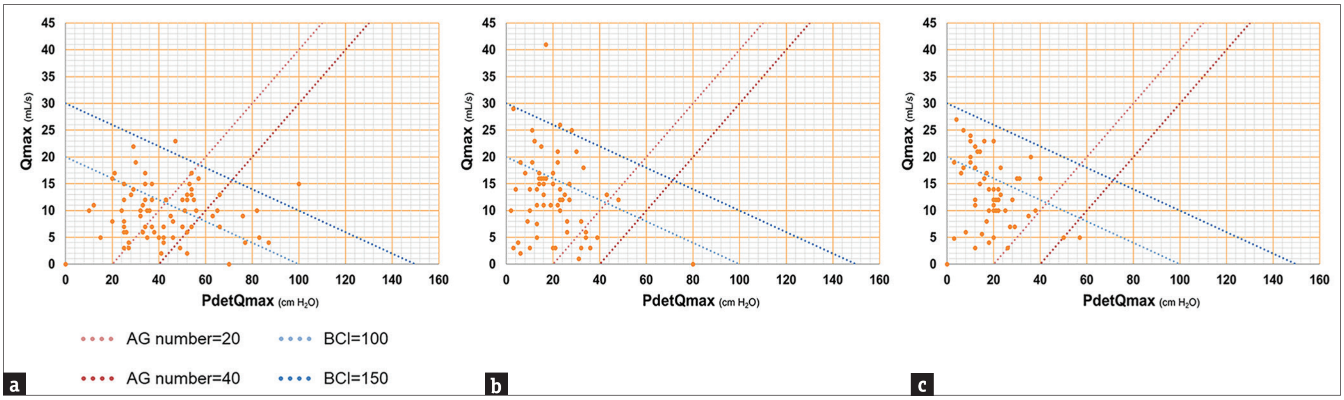

Figure 2: Detrusor voiding pressure and maximal urinary flow rate as assessed by ICS nomogram in patients observed before RaRP (a), at postoperative 3–6 months (b), and at postoperative 12 months (c). ICS: International Continence Society, RaRP: Robot-assisted radical prostatectomy, PdetQmax: Detrusor pressure at maximum flow, Qmax: Maximal urinary flow rate, AG number (=bladder outlet obstruction index): Abrams-Griffiths number, BCI: bladder contractility index

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outlet resistance. Progressive bladder tissue remodeling would develop under chronic bladder outlet obstruction [15]. The issue of the reversibility of bladder dysfunction after the treatment of bladder outlet obstruction is worth discussing but inconclusive under current limited evidence [16]. This study reported the additional urodynamic finding of increased FS at 1-year follow-up, which might reflect the possible reversal of bladder dysfunction after RaRP.

Benign prostatic hyperplasia, prostate gland-related pathology, is the most common cause of male LUTS [17]. After RP, the American Urological Association symptom index (same 7 items as IPSS questionnaire, but without the item of quality of life) significantly increased at 3 months and subsequently decreased through 2 years [5]. The study hypothesized that the negative effect of PPI contributed to the aggravated symptoms in the first 3 months, and RP might impede the natural progressive course of LUTS from a long-term perspective. In our study, IPSS-S significantly increased during the first 1–3 months and then decreased gradually. We hypothesized that perioperative perivesical inflammation might cause postoperative short-term bladder irritative symptoms, and the inflammation as well as its related storage symptoms improved with time. In addition, we observed the significant reduction of IPSS-V since postoperative 3 months. It might be attributed to the reduction of bladder outlet resistance after the surgical removal of the prostate gland, which was also compatible with the urodynamic finding of decreased BOOI. In sum, IPSS-T did not increase in the first 3 months but significantly decreased in 6 months. The differences of the reported changes of postoperative LUTS between this study and the previous study [5] were probably affected by the different surgical methods (i.e., robotic surgery or not). Robotic surgery might provide the benefits of more precise dissection, less anatomical trauma, and less tissue inflammation in RP.

The cause of PPI is multifactorial [9]. The predictors of urinary incontinence after RaRP included aging [18], high Charlson comorbidity index [18], short membranous urethral length [19], increased prostate volume [20], preoperative LUTS [21], increased body mass index [22], a less experienced surgeon [23], more integrity of nerve sparing [24], and extensive perioperative surgical dissection [25]. The maintenance of male continence involves urethral sphincteric and supportive mechanisms [12,26,27]. During RaRP procedures, intraoperative techniques could improve early return of urinary continence including preservation, reconstruction, and reinforcement of the related anatomical structures in the pelvis [27]. Postoperative residual functions of the urethral sphincteric and supportive systems determined the new continence status. With the advancement of techniques in robotic surgery, the impact of the above-reported factors might decrease and change with time. In this study, the factors of T stage ≥3, preoperative DO, and positive surgical margin were the independent predictors of immediate SUI and SUI at 3 and 12 months, respectively. It suggested that more advanced oncological factor, preoperative bladder dysfunction, and perioperative outcome might affect the continence recovery at different time points after RaRP.

There are several limitations in this study. First, in the current study, only 14 and 6 patients had SUI at 3 and 12 months, respectively. It wound affect further statistical analysis (including multivariate analysis). Second, the data were from a single surgeon and a single center. The experience of the surgeon and the clinical team of care might affect the reported functional outcomes. Third, this study provided the evidence of the functional changes of lower urinary tract, but without the evidence from the anatomical aspect. Finally, in this study, we defined SUI and UUI by ICS terminology. In comparison with the general definition of PPI used in most studies (i.e., ≤1 safety pad per day), the definition we used is more strict. Therefore, there might be some small variation of SUI and UUI during the follow-up. In future, a more integrated study with the comprehensive evaluation of the anatomical and functional changes of lower urinary tract after RaRP could be conducted to provide more solid evidence.

Conclusions

At 1 year after RaRP, patients experienced significant changes of lower urinary tract function demonstrated in VUDS, including increased FS, reduced PdetQmax, increased Qmax, and decreased BOOI. After surgery, LUTS, SUI, and UUI all improved with time. Factors of T stage ≥3, preoperative

Table 3: Univariate and multivariate logistic regression analysis of the risk of stress urinary incontinence after robot-assisted radical prostatectomy

	Immediate SUI after the removal of catheter				SUI at 3 months				SUI at 12 months			
	Univariate		Multivariate		Univariate		Multivariate		Univariate		Multivariate	
	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P
Preoperative												
Age	0.993 (0.938-1.051)	0.811	0.982 (0.924-1.043)	0.549	1.011 (0.94-1.088)	0.766	0.997 (0.918-1.083)	0.937	1.032 (0.927-1.149)	0.566	1.023 (0.918-1.14)	0.684
TPV	1.023 (0.992-1.055)	0.150			1.024 (0.991-1.058)	0.156			1.047 (1.005-1.091)	0.027	1.034 (0.986-1.084)	0.172
PSA	1.004 (0.991-1.017)	0.554			0.998 (0.982-1.015)	0.850			1.007 (0.989-1.026)	0.420		
MUL	0.82 (0.572-1.176)	0.281			0.818 (0.558-1.2)	0.305			0.236 (0.014-4.005)	0.317		
Preoperative TURP	0.333 (0.105-1.061)	0.063			0.458 (0.092-2.276)	0.340			0.600 (0.065-5.503)	0.651		
Preoperative VUDS												
CBC	1.003 (0.999-1.007)	0.148			0.996 (0.991-1.002)	0.177			0.998 (0.991-1.005)	0.518		
PdetQmax	0.999 (0.975-1.023)	0.928			1.005 (0.956-1.056)	0.837			1.04 (0.972-1.112)	0.257		
Qmax	1.036 (0.943-1.139)	0.460			1.046 (0.968-1.13)	0.258			0.958 (0.836-1.098)	0.535		
DO	0.742 (0.294-1.875)	0.528			4.571 (1.107-18.872)	0.036	4.617 (1.094-19.485)	0.037	2.077 (0.35-12.325)	0.421		
BCI	1.004 (0.989-1.019)	0.591			1.013 (0.996-1.031)	0.135			0.998 (0.971-1.025)	0.862		
BOOI	0.995 (0.974-1.017)	0.677			0.986 (0.956-1.018)	0.386			1.024 (0.979-1.069)	0.300		
Perioperative												
Operation time	0.993 (0.978-1.008)	0.345			1.009 (0.989-1.028)	0.376			0.997 (0.97-1.024)	0.806		
Console time	0.989 (0.975-1.004)	0.139			1.005 (0.987-1.023)	0.614			1.002 (0.976-1.027)	0.900		
Blood loss	1.001 (0.994-1.007)	0.834			1.001 (0.993-1.009)	0.810			1.004 (0.993-1.014)	0.502		
NVB preservation	0.421 (0.16-1.106)	0.079			0.357 (0.09-1.41)	0.142			0 (0–0)	0.998		
Pathological results												
T stage												
2	Ref	Ref	Ref	Ref	Ref	Ref			Ref	Ref		
≥3	3.071 (1.155-8.163)	0.025	3.231 (1.191-8.765)	0.021	1.857 (0.574-6.009)	0.302			3.667 (0.625-21.499)	0.150		
Pathological Gleason's score												
6	Ref	Ref			Ref	Ref			Ref	Ref		
7	2 (0.729-5.484)	0.178			2.207 (0.575-8.468)	0.249			4.923 (0.518-46.783)	0.165		
≥8	3.062 (0.741-12.651)	0.122			2.719 (0.502-14.723)	0.246			3.2 (0.183-55.95)	0.426		
Positive surgical margin	1.63 (0.504-5.274)	0.415			3.148 (0.856-11.584)	0.084			11.6 (1.87-71.969)	0.008	7.767 (1.14-52.906)	0.036
Postoperative radiotherapy	Not applicable				Not applicable				0.766 (0.08-7.358)	0.817		

SUI: Stress urinary incontinence, OR: Odds ratio, TPV: Total prostate volume, PSA: Prostate-specific antigen, MUL: Membranous urethral length (assessed via magnetic resonance imaging), TURP: Transurethral resection of prostate, CBC: Cystometric bladder capacity, PdetQmax: Detrusor pressure at maximum flow, Qmax: Maximal urinary flow rate, DO: Detrusor overactivity, BCI: Bladder contractility index, BOOI: Bladder outlet obstruction index, NVB: Neurovascular bun, CI: Confidence interval, VUDS: Videourodynamic study

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DO, and positive surgical margin were the predictors of postoperative SUI at different time points after RaRP.

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Conflicts of interest

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