

## Original Article

# Preoperative risk factors for early postoperative urinary continence recovery after non-nerve-sparing radical prostatectomy in Chinese patients: a single institute retrospective analysis

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**Abstract:** Urinary incontinence (UI) remained a significant complication after radical prostatectomy and led to impaired quality of life. Early continence is a goal to take into consideration for better patient satisfaction after radical prostatectomy. To identify the independent preoperative risk factors associated with UI after radical prostatectomy (RP), we evaluated 446 patients treated with non-nerve-sparing RP between 2010 and 2013 at our institution. The incontinence rate was 98.7% and 46.6% after catheter removal and 3 months after surgery, respectively. We examined several preoperative factors including age, smoking, body mass index (BMI), comorbidities such as hypertension and diabetes, preoperative prostate-specific antigen (PSA) level, Gleason score, and preoperative pelvic floor muscle exercise (PFME). The results suggested preoperative PFME was the only independent protective risk factor for immediate continence after catheter removal. At 3 month following surgery, age at surgery represented a risk factor for delayed continence, while BMI and preoperative PFME were the protective risk factors for postoperative UI. Our results supported that age and preoperative PFME were predictive factors for early continence after RP. These findings could help clinicians to counsel men and their partners about postoperative incontinence.

**Keywords:** Prostatic neoplasms, prostatectomy, risk factors, urinary incontinence

## Introduction

Radical prostatectomy (RP) represents the standard therapy for clinically localized prostate cancer (PCa). Despite improvements in surgical techniques, which allow a detailed dissection and a watertight vesical-urethral anastomosis, urinary incontinence (UI) remains a significant problem in many men [1]. UI has a spontaneous recovery in most men, but it may take as long as 1-2 year after RP, and dramatically worsen the quality of life (QoL) of a patient who has been successfully cured of PCa [2, 3].

Different risk factors, involving preoperative factors, surgical technique and postoperative factors, might influence the restoration of continence after RP [4]. Preoperative individualized risk assessment would allow for patient counselling aimed at delivering realistic expecta-

tions based on baseline patient status. Several predictors have been investigated, such as age, prostate volume, disease stage, body weight, comorbidities, and history of previous lower urinary tract dysfunctions [5-7], but most reports on the recovery of postoperative urinary continence focus on data acquired from western countries, and no studies have described the risk factors for Chinese patients after RP. In the present study, we evaluated the UI rate after catheter removal and 3 months after surgery, and investigated the preexisting factors that might predict early postoperative continence recovery in this group of men.

## Materials and methods

Between July 2010 and November 2013, a total of 493 consecutive patients were treated with radical retropubic prostatectomy at our institu-

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**Table 1.** Univariate and multivariate analyses predicting urinary incontinence rates after catheter removal

	Univariate analysis			Multivariate analysis		
	Continence	Incontinence	P value	OR	95% CI	P value
Age (year)	61.3 ± 6.6	67.0 ± 6.8	0.04	1.13	1.00-1.28	0.06
BMI (kg/m <sup>2</sup> )	23.5 ± 2.6	23.3 ± 2.9	0.09	1.09	0.78-1.51	0.63
Smoking						
No	5	282				
Yes	1	158	0.33	3.39	0.37-31.41	0.28
Hypertension						
No	4	279				
Yes	2	161	0.87	0.80	0.13-4.93	0.81
Diabetes						
No	5	407				
Yes	1	33	0.40	0.42	0.04-4.29	0.47
PSA (ng/ml)	8.9 ± 5.5	18.6 ± 18.8	0.21	1.11	0.95-1.31	0.20
Gleason score	6.7 ± 0.5	7.0 ± 0.9	0.42	1.31	0.45-3.83	0.62
Preoperative PFME						
No	3	372				
Yes	3	68	0.02	0.19	0.04-0.94	0.04

BMI: body mass index; CI: confidence interval; OR: odds ratio; PFME: pelvic floor muscle exercise.

**Table 2.** Univariate and multivariate analyses predicting urinary incontinence rates at 3 month after radical prostatectomy

	Univariate analysis			Multivariate analysis		
	Continence	Incontinence	P value	OR	95% CI	P value
Age (year)	65.7 ± 6.6	68.4 ± 6.8	< 0.001	1.05	1.01-1.09	0.003
BMI (kg/m <sup>2</sup> )	23.7 ± 2.8	22.9 ± 2.9	0.007	0.89	0.82-0.97	0.006
Smoking						
No	147	140				
Yes	91	68	0.22	0.85	0.54-1.34	0.48
Hypertension						
No	152	131				
Yes	86	77	0.85	1.03	0.64-1.63	0.91
Diabetes						
No	219	193				
Yes	19	15	0.76	0.86	0.37-1.96	0.71
PSA (ng/ml)	18.5 ± 19.1	18.4 ± 18.2	0.92	1.00	0.98-1.01	0.37
Gleason score	6.9 ± 0.8	7.0 ± 1.0	0.16	1.23	0.96-1.57	0.10
Preoperative PFME						
No	175	200				
Yes	63	8	< 0.001	0.13	0.06-0.29	< 0.001

BMI: body mass index; CI: confidence interval; OR: odds ratio; PFME: pelvic floor muscle exercise.

tion for clinically localized PCa. The patients who had undergone transurethral resection of the prostate or neoadjuvant hormonal block-

ade were excluded from the analysis. The patients who received nerve-sparing radical prostatectomy were also excluded. At last, a total of 446 patients were enrolled in this study. Open radical retro-pubic prostatectomy was performed by 1 of 8 urologists (198 subjects), and laparoscopic radical prostatectomy (LRP) was performed by 1 of 2 urologists (248 subjects). Some patients started pelvic floor muscle exercise (PFME) 3 to 4 weeks before surgery, and the PFME was given to all the patients three times per day after catheter removal until they regained continence.

Urinary incontinence after RP was assessed by a single research nurse. The continence state was assessed after catheter was removed, and at follow-up visits or by telephone interviews at 3 months after surgery. Patients were considered as having continence if they occasionally leaked a few drops with abdominal straining and if they needed to use only one protective pad a day.

We investigated a number of preoperative factors, including patient age, smoking, body mass index, comorbidities such as hypertension and diabetes, pre-operative PSA level, Gleason score, and preoperative PFME. No patient received adjuvant radiation

therapy before continence was regained or any surgical therapy for incontinence during follow-up.

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In a first step, risk factors for incontinence were examined univariate using Chi-squared tests and 2-tailed t tests as appropriate. The multivariate logistic regression was applied in a stepwise backward manner to verify the independent risk factors with a significance level of  $P < 0.05$ . All analyses were conducted using the SPSS software (version 16, SPSS Inc.).

### Results

The mean age of 446 patients was 66.9 years (range 41-82). Mean PSA was 18.5 ng/ml (range 0.17-150.4 ng/ml). Mean BMI was 23.3 kg/m<sup>2</sup> (range 16.3-40.9 kg/m<sup>2</sup>). Clinical stage was T1 in 135 (30.3%) patients, T2 in 301 (67.5%) and T3 in 10 (2.2%). The incontinence rate after catheter removal was 98.7% (440 patients). At 3 months the rate of incontinence had decreased to 46.6% (208 patients).

The univariate and multivariate statistical results for the comparison between patients of continence and incontinence after catheter removal are shown in **Table 1**. In univariate analysis, age at surgery was significantly associated with increased incontinence rate, while preoperative PFME indicated a decreased risk. In multivariate analyses, the only significant predictor of UI was preoperative PFME. **Table 2** showed the comparison between patients of continence and incontinence at 3 months following surgery. Again, Statistical significance was suggested in the univariate analyses for age and preoperative PFME, while higher BMI was also associated with lower UI rate. The three factors above maintained significance in multivariable regression. Notably, preoperative PFME was a strong protective risk factor for postoperative incontinence (odds ratio = 0.13, 95% confidence interval 0.06-0.29). No significant association was noted for smoking, hypertension, diabetes, PSA level and Gleason score.

### Discussion

Today prostate cancer is the one of most common malignancy in China. Despite many improvements in surgical techniques, UI following RP is a major surgical complication significantly affecting the quality of life of the patients [2, 3]. In the present study, we mainly focused on the early continence recovery. The continence was achieved in only 1.3% of patients after removal of catheter. A possible explanation may be that

all the included patients received non-nerve-sparing surgery. More than half of patients had regained continence at 3 month with a UI rate of 46.6%, which is lower than previously published data [8, 9]. The relatively high continence rate at 3 month might be attributed to postoperative PFME performed by all of our patients. It is possible that variations in how continence is defined the methodology used to collect the data may also lead to the discrepancy between studies in UI rates.

Identification of risk factors preoperatively would enable clinicians to counsel patients about the risk of incontinence following surgery, and aid in treatment decision-making for both patient and physician. A number of preoperative factors have been investigated in the literature, including age, body mass index, prostate size, previous endoscopic or open prostatic surgery and preoperative urinary symptoms, each with contradictory results [5-8, 10]. In our study, age, BMI and preoperative PFME are independent predictors of postoperative UI at 3 month after surgery. All other factors, such as smoking, diabetes, hypertension, PSA level, Gleason score, and clinical stage, were not significantly related to the duration of incontinence after radical prostatectomy. To our knowledge, this is for the first time a study investigating the effect of preoperative risk factor on the restoration of continence after radical prostatectomy in Chinese men.

Age is consistently one of the strongest predictors related to UI. Campodonico et al. [5] found that patients younger than 65 years were shown to achieve continence sooner than older patients, and Catalona et al. [11] established that the incidence of incontinence increased with age. In contrast, Steiner et al. [12] did not find older age was a delaying factor in reaching continence. In our study, young patient was associated with early continence at 3 month after RP, suggesting that age was a predisposing factor for early incontinence.

Obesity may place pressure on the pelvic floor muscles and bladder and interfere with its blood and nerve supply, and obese men have been found to be more likely to suffer from incontinence [13]. High BMI has also been linked with higher rates of UI after RP. Anast et al. [14] have found that BMI is indeed associated with worse urinary function, but not overall

health-related quality of life. Similarly, Ahlering et al. [15] noted in a study of 100 patients undergoing robotic RP that obese patients had delayed return of urinary continence. However, our observations suggested that BMI was a positive predictor of continence at 3 month after RP. This finding was consistent with a prior study by Freedland et al. [16], while the authors believed that this was likely a chance finding. Therefore, additional studies, particularly larger prospective studies with rigorous methodology, are needed to confirm this.

Our results showed that the most significant risk factor responsible for early continence is the preoperative PFME. Despite the popularity of PFME as conservative treatment for postoperative UI, there still exists no consensus about the effect of preoperative PFME on the duration of incontinence, although most studies have shown a positive relation [17-20]. It may make sense that if the patients start PFME preoperatively, they can gain motor skills earlier and be more prepared to exercise and use the pelvic floor muscles immediately after catheter withdrawal. A recent meta-analysis pointed out that it did not improve the rate of reestablishment of continence [21], however, this finding should be interpreted with caution due to the significant heterogeneity among included studies. Our study showed that the preoperative PFME was the only independent predictor of immediate continence, and patients who performed preoperative PFME had a 0.19-fold lower risk of being incontinent after catheter withdrawal and a 0.13-fold lower risk of being incontinent 3 month after RP, suggesting that preoperative action may improve early continence.

Our study has several limitations. First, the relatively small number of patients coming from a single tertiary center and retrospective nature of this study might have had some impact on our results. Second, we only included patients who underwent non-nerve-sparing surgery, because the nerve-sparing technique was adopted only in a small proportion of patients in our institute as in China, where most patients of organ-confined prostate cancer received non-nerve-sparing RP, and some surgeons had not accomplished their learning curve for nerve-sparing surgery yet. Third, the preoperative incontinence or urinary symptoms, which

has been documented to be a risk factor for postoperative urinary incontinence [7, 22], was not assessed. Last, patients were operated on by eight different surgeons with two surgical approaches, and there is no doubt that the surgeon and the surgical technique have an important role in the functional outcomes [23, 24].

In conclusion, the present study suggested that age and preoperative PFME are independent risk factors of UI after RP. This finding may help in improving patient counselling as well as in optimizing patients' expectations about postoperative UI.

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### Disclosure of conflict of interest

None.

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