

## PREDICTION OF URINARY INCONTINENCE AFTER ROBOT-ASSISTED RADICAL PROSTATECTOMY

### Hypothesis / aims of study

Radical prostatectomy represents one of the most commonly used first-line treatment modalities in patients with prostate cancer, especially in men with clinically localized disease and a life expectancy of at least 10 years. Most of these patients have favourable cancer control outcomes after surgery. However, a considerable proportion of them may suffer from long-term surgical sequelae, such as urinary incontinence (UI) and sexual dysfunction. Postoperative UI and sexual dysfunction can significantly affect quality of life and result in both physical and psychosocial burdens. Multiple demographic, disease-specific, or surgical technique-related risk factors have been implicated in impacting the recovery of continence. Recently, robot-assisted radical prostatectomy (RARP) has become widely used around the world. Although RARP has been shown to have higher postoperative continence rates than retropubic or laparoscopic radical prostatectomy in a recent systematic review and meta-analysis [1], UI has remained one of the most bothersome postoperative complications, even after RARP. There are currently a few preoperative tools that are used to quantify the postoperative UI risk after radical prostatectomy [2]. However, we have found no preoperative tool in the literature that quantifies the postoperative UI risk after RARP utilizing patient characteristics including urodynamic and magnetic resonance imaging (MRI) data. The aim of this study is to develop a novel preoperative risk classification tool aimed at estimating postoperative UI risk after RARP.

### Study design, materials and methods

We identified 131 men who underwent RARP at our institution between May 2011 and August 2013. A total of 14 patients were excluded from study due to incomplete urodynamic studies. Of the remaining 117 patients, men who received neoadjuvant therapy (8) or adjuvant therapy (1) were excluded, leaving 108 subjects eligible for analysis. All subjects were continent before surgery. All patients admitted to the hospital scheduled for RARP were asked to join a prospective data collection protocol. All patients signed an institutional ethical committee-approved informed consent form. All patients were informed that data would be used anonymously for the purpose of clinical research. On acceptance, preoperative clinical and functional data were prospectively collected for each participant. However, data analyses for the purpose of the present study were performed retrospectively. At baseline, patient-related variables included age at surgery, body mass index, serum prostate-specific antigen (PSA) value, clinical stage, National Comprehensive Cancer Network classification, biopsy-determined Gleason score, preoperative filling cystometry and pressure-flow study (PFS) results, preoperative MRI, International Index of Erectile Function - Erectile Function domain (IIEF-EF) score, and type of nerve sparing. Filling cystometry and PFS were performed by a single examiner according to the standard methods of the International Continence Society. In the filling cystometry and PFS, maximum cystometric capacity, bladder compliance, voided volume, detrusor pressure at maximum flow rate, and the presence of detrusor overactivity were measured. Preoperative MRI was used to evaluate membranous urethral length, urethral width, levator thickness, and prostate volume. UI was assessed at 1, 3, and 6 months after RARP. Patients who used no pad were considered urinary continent, and those who used one or more security liner pads per day were considered urinary incontinent. Initially, all preoperative factors were studied with univariate logistic regression analysis. By univariate logistic regression analysis, we identified factors associated with recovery of postoperative continence at 1, 3, and 6 months. These factors were then subjected to multivariate logistic regression analysis. Kaplan-Meier curve estimates were used to assess UI risk in each subgroup at 1, 3 and 6 months after RARP. All statistical tests were two-sided with a significance level set at  $p < 0.05$ .

### Results

At 1, 3, and 6 months, UI rates were 59.3%, 37.0% and 26.9%, respectively. Uni- and multivariate logistic regression analysis revealed significant associations between membranous urethral length or levator thickness and UI at 3 and 6 months. This process resulted in two UI risk groups: high (membranous urethral length  $< 9.5$  mm or levator thickness  $< 9.0$  mm) and low (membranous urethral length  $\geq 9.5$  mm and levator thickness  $\geq 9.0$  mm). One-month UI rates in these groups were 89.8% and 33.8%, 3-month UI rates were 71.4% and 8.5%, and 6-month UI rates were 57.1% and 1.7%, respectively. The observed differences in UI rate between groups were significant (log-rank test,  $p < 0.001$ ).

### Interpretation of results

The UI rates across these groups were statistically significantly different. These results are crucial because preoperative individualized predictions of UI would allow for accurate patient counselling aimed at delivering realistic expectations based on baseline patient status. This would in turn optimize patient satisfaction and contribute to maintaining a satisfactory quality of life after RARP. Membranous urethral length and levator thickness were significantly associated with the recovery of continence. The male sphincteric complex consists of the proximal sphincter unit, bladder neck, prostate and prostatic urethra while the distal sphincter unit consists of rhabdosphincter, paraurethral skeletal musculature and supporting fascial investments [3]. After radical prostatectomy, bladder control is likely determined by the integrity of the remaining distal sphincteric unit, of which paraurethral support by the levator ani and its voluntary contractile pressure are suggested to have the most important effect. Our study has several limitations. First, MRI was performed preoperatively while MRI measurements were performed retrospectively. Second, not all RARP candidates underwent a preoperative urodynamic evaluation. Finally, our cohort represents data from a single institution. Moreover, our cohort might not be sufficiently large enough to show small differences in outcomes. Further testing will be required to determine whether our findings are applicable to other cohorts. Therefore, a multicentric or a population-based validation of our model is warranted to confirm our results.

### Concluding message

We developed a novel risk classification tool based on preoperative patient data that allows accurate estimation of postoperative UI rates in patients with prostate cancer treated with RARP. Our data analysis demonstrates that membranous urethral length and levator thickness on preoperative MRI are independent predictors of continence recovery after RARP. This risk classification tool may significantly help surgeons provide improved patient counselling and may optimize patients' expectations about their functional status after RARP.

### References

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### Disclosures

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