Editorial

The Goldilocks principle: when to remove Foley catheter after robotic radical prostatectomy

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Historically, urinary catheters were kept in place for 2–3 weeks following open radical prostatectomy (1). However, since the early 2000s, with the advent of robotic radical prostatectomy and improvements in anastomotic proficiency, various catheterization protocols have been trialed, with recent studies reporting removing catheters as early as postoperative day (POD) 2 (2-4). Each additional day of catheterization carries with it an increasing risk of bacterial infection (5-7), is associated with patient discomfort (8,9), and may have implications for early return of continence (10,11). Though many studies have investigated the timing of catheter removal, there is no recommendation from professional societies regarding optimal timing of catheter removal, and variability persists among urologists.

The study by Hao *et al.* offers a retrospective review of 432 consecutive patients who underwent catheter removal at 7, 10, and ≥14 days (n=124, 88, and 220, respectively) following robot-assisted radical prostatectomy (RARP) (12). The authors compared continence rates and overactive bladder symptom score (OABSS) between these groups. Patients' continence (defined as ≤1 pad used or ≤20 g of urine leakage) and OABSS were reported at 48 hours and 1, 4, 12, and 24 weeks after catheter removal. There were no significant differences in continence or OABSS between the groups, with two exceptions. First, the continence rate at 4 weeks was significantly lower for the ≥14-day group [70.5% *vs.* 83.0% (10-day group) and 86.3% (7-day group), P=0.001). Second, the mean OABSS at 24 weeks was significantly lower in the 7-day group [1.66 *vs.* 3.21 (10-day group) and 3.73 (≥14-day group), P<0.001]. These findings are demonstrated in *Tab. 4* and *Tab. 8* of the paper. Taken together, the results from this study show that the effect of catheter removal at 7 days, compared to 10 or 14 days, on urinary symptoms is small, but nonetheless beneficial. Though this effect may be minor, the bother to patients with additional days of catheterization should not be overlooked—nearly 50% of men report "moderate to severe bother" due to urinary catheter after prostatectomy (8). For this reason, if a catheter can be safely removed early, urologists should strive to do so. Thus this study provides another piece of evidence that catheter removal is safe at 7 days.

With that said, the study has its weaknesses, including retrospective design and non-randomized patient intervention assignment. Patients were able to select their own day for catheter removal and it is not clear how they chose that or if they were counseled to do so. Though there were no significant differences in the clinical characteristics such as age, body mass index (BMI), prostate-specific antigen (PSA), baseline international prostate symptom score (IPSS), baseline OABSS, and prostate volume between the groups, patients may have pursued different catheterization timelines based on features not captured in the data including presence of a median lobe/larger bladder neck during surgery, pelvic lipomatosis, "tenuous" anastomosis, urinary leak requiring placement of additional stitches to ensure watertight anastomosis, etc., which would

surely affect continence and OABSS outcomes after surgery and would also be associated with a longer Foley duration. Hence, the non-randomized study design remains a major limitation of this study.

This study is generally consistent with other studies that have examined the effects of catheterization time. Tilki *et al.* reported that short- and intermediate-term continence was worse in patients with catheterization time >1 week, but this disappeared at one year after radical prostatectomy (11). Notably, the Tilki cohort was predominantly open prostatectomy (62.4%), compared to RARP in the current study. In a randomized controlled trial, Lista *et al.* reported that early catheter removal after RARP (POD 3, compared to POD 5) had no negative effect on continence and did not increase complications (13). More recently, Develtere *et al.* reported their retrospective experience with very early catheter removal (POD 2), however, reported a 13% re-catheterization rate (4). While patient comfort should always be a guiding principle, it should not compete with patient safety. In patients who are resistant to the idea of a penile urinary catheter, using a percutaneous suprapubic tube (SPT) has been shown to be feasible and safe, with reports showing that it is less bothersome than urethral catheterization (14-16). Additionally, SPT facilitates anterior suspension of the bladder, which helps with early continence recovery (17). Finally, SPT is an important tool in a urologist's armamentarium for patients with prostate cancer that have history of urethral reconstruction or a prosthetic device placement.

In summary, the timing of catheter removal following RARP should aim to strike an appropriate balance between (I) allowing the urethrovesical anastomosis adequate time to heal and (II) mitigating negative effects of catheterization including patient discomfort. Ultimately, the urology community, just like Goldilocks, will find the timeframe for urethral catheterization after RARP that is "just right". For now, in our practice, we will continue to remove catheters on POD 7, and have done so for close to 10,000 patients without incident.

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