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ARTICLE

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A comparison of urethral catheterization duration - three weeks versus two weeks after bulbar urethroplasty

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ABSTRACT

Objective: To determine the incidence of bacteriuria, urinary tract infections (UTI), and significant extravasation of contrast on initial postoperative pericatheter retrograde urethrogram (pcRUG) after bulbar urethroplasty in relation to duration of urethral catheterization (DUC) of three weeks versus two weeks after surgery.

Methods: Retrospective chart review of 100 bulbar urethroplasty patients between January 2015 and November 2015 were compared with 50 prospective bulbar urethroplasty patients from June 2017 to February 2018 operated at the same university hospital. All patients in the retrospective cohort had catheter removal three weeks after surgery, while patients in the prospective cohort had catheter removal two weeks after surgery. Patient groups were compared using *t*-test and Fischer's exact test.

Results: There was a higher incidence of UTI in patients with a DUC of three weeks after open urethroplasty compared to patients with two weeks DUC ($p = 0.03$). Occurrence of extravasation on initial pcRUG or asymptomatic bacteruria did not differ between the two groups.

Conclusion: The findings in this study suggest that a DUC of two weeks may be more favorable compared to a DUC of three weeks.

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Urethral stricture; urethral catheterization; urethroplasty; retrograde urethrogram

Introduction

Bulbar urethroplasty is performed in many centers around the world, but there is no consensus as to the optimal time for catheter removal after surgery. Published literature shows that the duration of urethral catheterization (DUC) after surgery ranges from 3 days to 28 days [1–3]. Some obvious reasons for a shorter DUC after surgery are increased patient comfort, mobility and decreased inflammatory reaction due to catheter placement [4,5].

In our department we routinely removed the catheter three weeks after bulbar urethroplasty for over a decade. It is interesting to note that although practices differ as to when the catheter should be removed there is, to our knowledge, few studies investigating this question [2,3].

The objective of this study was therefore to investigate whether a reduction in catheter time from three to two weeks would result in differences in the incidence of 1) bacteriuria, 2) urinary tract infection and 3) significant extravasation of contrast on initial pericatheter retrograde urethrogram (pcRUG). As a secondary aim, stricture recurrence rate three months postoperatively in the two groups was also compared.

Materials and methods

Study design

The study was a hospital based retrospective chart review of 100 bulbar urethroplasty patients with operations performed from January 2015 to November 2015 who were compared with 50 prospective bulbar urethroplasty patients from June 2017 to February 2018. All operations were performed at the same urology center and included both urethroplasties with buccal mucosal grafting (BMG) and excision and primary anastomosis (EPA). Patients in both groups had a clinical reassessment two or three weeks after operation depending on DUC, as well as three months after the bulbar urethroplasty. The retrospective cohort had a DUC of three weeks after surgery, while patients in the prospective cohort had a DUC of two weeks after surgery. Patients in both groups performed a postoperative pcRUG at the time of catheter removal (three versus two weeks). Significant extravasation of contrast was subjectively assessed by the attending urologist. If postoperative pcRUG showed significant extravasation of contrast, the catheter was left in place for an additional two weeks, with a repeat clinical assessment including a pcRUG after catheter removal.

All patients received prophylactic antibiotics; Cefalotin 2 g × 2 during the surgery and Cefalexin 500 mg × 4 postoperatively for two days. At the time of discharge from the hospital, Trimetoprim 160 mg × 2 was prescribed for use during DUC unless preoperative urinary culture indicated otherwise. Urine cultures were assessed preoperatively and at the time of clinical reassessment two or three weeks after surgery. At the three-month clinical reassessment patients were asked about clinical signs of urinary tract infections (UTI), but urine cultures were not routinely performed unless indicated. UTI

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was defined as the combination of bacteriuria and clinical signs of UTI. The patients were also examined for stricture recurrence by uroflowmetry and measurement of post void residual urine, and if indicated also by urethrocystoscopy and/or retrograde urethrogram. Stricture recurrence was defined as a urethral stricture in need of a new operative intervention.

Ethics and consent

Approval for this study was obtained from the hospital's Privacy and Data Protection Officer. Informed consent was obtained from all individual prospective participants included in the study.

Statistical analysis

Descriptive statistics are presented using means with standard deviation (SD) or number (%). The characteristics of participants in the retrospective and prospective groups were compared using the *t*-test for continuous variables and Fischer's exact test for discrete variables.

Extravasation at pcRUG and urinary characteristics after catheter removal, as well as reassessment after three months considering the need for intervention and infection, are presented using number (%) and the two groups were compared using Fischer's exact test.

Results

Descriptive statistics of retrospective and prospective cohorts are presented in Table 1. There was a similar distribution of age ($p = 0.47$), diabetes mellitus ($p = 1.00$), previous open operations ($p = 0.30$) and preoperative use of suprapubic catheter ($p = 0.36$), but there were more current smokers in the prospective group ($p = 0.03$). The preoperative result of urine culture, divided into no bacterial growth/contamination ($p = 0.66$), asymptomatic bacteriuria ($p = 0.37$) and urinary tract infection ($p = 0.55$), showed no differences between the groups.

Length of urethral strictures ($p = 0.06$) and type of operation ($p = 0.12$) were also similar when comparing the two groups.

Table 2 shows findings after catheter removal, three weeks in the retrospective cohort and two weeks in the prospective cohort, and a comparison of these two groups. Few patients needed extended DUC due to significant extravasation of contrast on pcRUG and there was no significant difference between the two groups. Four (4%) patients in the three weeks group and four (8.2%) patients in the two weeks group required extended DUC ($p = 0.44$). The results of the urine cultures obtained at time of catheter removal showed

Table 1. Descriptive statistics for retrospective (DUC three weeks) and prospective (DUC two weeks) patient groups.

	DUC three weeks	DUC two weeks	*p* Value*
N	85–100	50	
Preoperative characteristics			
Age, years [mean (SD)]	41.5 (15.7)	43.6 (18.6)	0.47
Diabetes mellitus [*N* (%)]	7 (7)	4 (8)	1.00
Current smoker [*N* (%)]	6 (7)	10 (20)	0.03
Previous open urethroplasty [N (%)]	15 (15)	4 (8)	0.30
Suprapubic catheter [*N* (%)]	15 (15)	11 (22)	0.36
Urine cultures [*N* (%)]			
No bacterial growth/contamination	78 (82.1)	39 (78)	0.66
Bacteriuria	15 (15.8)	11 (22)	0.37
Urinary tract infection	2 (2.1)	0 (0)	0.55
Unknown			
Stricture length, mm [mean (SD)]	20 (13)	16.2 (8.5)	0.06
Type of operation [*N* (%)]			0.12
Excision and end to end anastomosis	22 (22)	12 (24)	
Ventral onlay buccal mucosa graft	38 (38)	27 (54)	
Dorsal onlay buccal mucosa graft	38 (38)	10 (20)	
Augmented end to end anastomosis	2 (2)	1 (2)	

*Comparison of the two groups using the *t*-test for continuous and Fishers exact test for discrete variables.

Table 2. Extravasation on initial pericatheter retrograde urethrogram (pcRUG) after catheter removal two (prospective group) vs. three weeks (retrospective group).

	DUC three weeks	DUC two weeks	*p* Value*
N	91–100	48–49	
Extravasation on initial pcRUG [*N* (%)]			
No extravasation	78 (78)	37 (75.5)	0.84
Small recess, accepted	18 (18)	8 (16.3)	1.00
Prolonged catheter time	4 (4)	4 (8.2)	0.44
Urine cultures [*N* (%)]			
No bacterial growth/contamination	46 (50.6)	31 (64.6)	0.16
Bacteriuria	34 (37.4)	17 (35.4)	0.85
Urinary tract infection	9 (9.9)	0 (0)	**0.03**

*Fishers exact test.

Table 3. Reassessment of patient groups three months after surgery.

	DUC three weeks	DUC two weeks	*p Value**
N	100	49	
Recurrence in need of intervention [*N* (%)]	4 (4)	1 (2)	0.62
Urinary tract infection [*N* (%)]	3 (3)	2 (4)	0.73

*Fischer's exact.

less bacterial growth in the two weeks group compared to the three weeks group; no growth in 50.6% versus 64.6%, but this difference was not significant ($p = 0.16$). Asymptomatic bacteriuria was similar in the two groups, 35.4% in two weeks group versus 37.4% in three weeks group ($p = 0.85$). UTI was not seen in the two weeks group, while it occurred in 9.9% of the patients in the three weeks group ($p = 0.03$).

Reassessment three months after surgery showed a recurrence of stricture with a need for intervention in 4% of patients in the three weeks group and 2% of patients in the two weeks group ($p = 0.62$). UTI was found in 3% of patients in the three weeks group and in 4% of patients in the two weeks group ($p = 0.73$). There were no cases of urethrocutaneous fistula in either patient group. None of the patients with contrast extravasation at postoperative pcRUG had UTI or recurrence at the three-month follow-up visit (Table 3).

Discussion

In summary, we found a higher incidence of UTI at the time of catheter removal in patients with a DUC of three weeks after bulbar urethroplasty compared to patients with two weeks DUC ($p = 0.03$). There were no differences between the two groups for significant extravasation of contrast on initial pcRUG or bacteriuria, and no difference in recurrence rate at three months follow-up.

Evidence concerning the optimal time for catheter removal after bulbar urethroplasty is limited, with few studies assessing this issue. A study by Poelaert et al. included 219 urethroplasty patients and found extravasation on pcRUG in 6.4% of these patients [3]. When assessing extravasation according to DUC $<$ or $>$ 10 days, 3.4% of patients in the group with DUC $<$ 10 days and 8.3% of patients with DUC $>$ 10 days had extravasation on pcRUG. However, the strictures in patients with DUC $>$ 10 days were more complex than those grouped to DUC $<$ 10 days, which is likely a confounder. Findings from this study also suggest that extravasation on pcRUG is a predictive factor for stricture recurrence and reoperation. However, that was not evident in our study, at least during the short-term follow-up of three months.

To our knowledge, the largest material on catheter removal time after bulbar urethroplasty is published by Granieri et al. [6]. It comprises a series of 407 patients where they found extravasation rate of 5.1% after a mean DUC of 18 days as assessed by pcRUG. This is similar to our findings with an extravasation rate of 4% in the retrospective group and 8.2% in the prospective group, but we note few patients in our groups (four patients in both groups). After an additional week of urethral catheterization, the extravasation rate in the material of Granieri et al. was reduced to below 1% [6]. In our material none of the patients had extravasation after an additional DUC of two weeks.

Prolonged DUC is associated with patient discomfort, inactivity and risk of UTI which can also lead to urethral inflammation as well as urethral stricture formation [4,5]. Keeping DUC as short as possible is thus important. Results from our study indicate that a DUC of two instead of three weeks may be favorable with regards to infection, and seems safe to implement. Also, it is noteworthy that none of the patients with contrast extravasation at pcRUG had UTI or stricture recurrence at the three-month follow-up visit. However, stricture recurrence is most likely to occur later after urethroplasty with median time to recurrence of 5–10 (0.5–121) months [7–9].

Limitations and strengths

The statistical power of this study was limited by the sample size. In order to evaluate optimal DUC in regard to recurrence of urethral strictures a larger study population is needed. However, this study is to our knowledge the largest study comparing catheter time after open urethroplasty in Scandinavia. Including re-stricture rates in a longer perspective would have given more validity to the study, but the study protocol was originally applied for as a quality control study, restricted to a three-month follow-up.

The small study size is also the most likely explanation for the aberrant finding of a higher smoking rate in the prospective group.

Previous studies defined findings on pcRUG as no contrast extravasation or extravasation, while in our study extravasation of contrast was subjectively assessed as significant or insignificant by the attending urologist.

Conclusion

The findings in this study suggest that a DUC of two weeks may be more favorable compared to a DUC of three weeks, but the study size is small and further studies are needed to substantiate these findings.

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Disclosure statement

The authors report no conflicts of interest.

References

[1] Al-Qudah HS, Cavalcanti AG, Santucci RA. Early catheter removal after anterior anastomotic (3 days) and ventral buccal mucosal onlay (7 days) urethroplasty. Int Braz J Urol. 2005;31(5):459–464.

[2] Granieri MA, Webster GD, Peterson AC. 1066 Extravasation on postoperative peri-catheter retrograde urethrogram after bulbar urethroplasty: time to pull the RUG out? Eur Urol Suppl. 2015; 14(2):e1066.

[3] Poelaert F, Oosterlinck W, Spinoit AF, et al. Duration of urethral catheterization after urethroplasty: how long is enough? Minerva Urol Nefrol. 2017;69(4):372–376.

[4] Islam MR, Alam MM, Siddique MI, et al. Comparative study of early and conventional catheter removal following buccal mucosal graft urethroplasty. Mymensingh Med J. 2015;24(2):290–294.

[5] Tenke P, Kovacs B, Bjerklund Johansen TE, et al. European and Asian guidelines on management and prevention of catheter-associated urinary tract infections. Int J Antimicrob Agents. 2008; 31(Suppl 1):S68–S78.

[6] Granieri MA, Webster GD, Peterson AC. A critical evaluation of the utility of imaging after urethroplasty for bulbar urethral stricture disease. Urology. 2016;91:203–207.

[7] Kahokehr AA, Granieri MA, Webster GD, et al. A critical analysis of bulbar urethroplasty stricture recurrence: characteristics and management. J Urol. 2018;200(6):1302–1307.

[8] Liu JS, Dong C, Gonzalez CM. Risk factors and timing of early stricture recurrence after urethroplasty. Urology. 2016;95:202–207.

[9] Sukumar S, Elliott SP, Myers JB, et al. Multi-institutional outcomes of endoscopic management of stricture recurrence after bulbar urethroplasty. J. Urol. 2018;200(4):837–842.