



Short Communication

Urethral epithelial cells on the surface on hydrophilic catheters after intermittent catheterization: cross-over study with two catheters

F Biering-Sørensen^{*1}, K Nielsen² and H Vest Hansen¹

¹Centre for Spinal Cord Injured, The Neuroscience Centre, Rigshospitalet, Copenhagen University Hospital, Denmark and ²Department of Pathology, Aalborg Hospital, Denmark

Aim: To count the number of cells on the surface of the two commercial hydrophilic catheters, Lofric[®] and EasiCath[®] used for intermittent catheterization (IC) after 30–60 s in water without the necessity of catheter jelly.

Participants: Twenty spinal cord lesioned (SCL) individuals. Six were women, and 14 men.

Methods: IC was performed on average five times a day (range: 4–10). In a randomised cross-over design all catheterizations were performed either with Lofric[®] or EasiCath[®] in two consecutive 24 h periods. The catheter used for the last catheterization in each 24 h period was fixed, and divided into pieces of 5 cm. From each of these a piece with the length of 5 mm was taken for surface microscopy after staining. The total number of cells was counted without knowledge of the type of catheter. According to the fractionator principle an unbiased estimate of the total number of cells on the surface of the catheter was calculated.

Results: There was no difference in the number of urethral epithelial cells on the catheters. No granulocytes were identified. The number of cells identified on the catheters were from 30 to >10 000. No differences related to age, level of SCL, ASIA impairment scale, months since SCL or type of IC were found. There was a trend that women had higher cell counts than men.

Conclusion: No difference was found regarding number of urethral epithelial cells on the surface of the catheters after catheterization. This indicates no difference in urethral trauma between the two catheters.

Keywords: spinal cord injury; paraplegia; tetraplegia; intermittent catheterization; urethral epithelial cells

Introduction

A recent study¹ demonstrated that the two commercial hydrophilic catheters, Lofric[®] and EasiCath[®], had functional differences indicating a possible risk of urethral trauma. Hydrophilic catheters are used for intermittent catheterization (IC) after 30–60 s in water without the necessity of catheter jelly. The aim of the present study is to count the number of cells on the surface of the catheters after IC.

Participants and methods

Twenty spinal cord lesioned individuals were included in the study. Six had cervical cord lesions (C4–6, ASIA A–D), 12 thoracic cord lesions (T1–12, ASIA A–D), one a L2 lesion (ASIA D), and one a Guillain-Barré

Syndrome. Six were women 17–48 years (median 45 years) of age, 2–16 months (median 8 months) after the spinal cord lesion (SCL), and 14 men 27–69 years (median 53 years) of age, 1 month–7 years (median 4 months) after SCL.

IC was performed on average five times a day (range: 4–10). Seven were catheterized with sterile technique by hospital personnel (four cervical SCL, two thoracic SCL, one Guillain-Barré Syndrome), while 13 performed clean intermittent self catheterization. Before enrolment into the study the urine was free of bacteria and white cells (dipslide).

In a cross-over design, all catheterizations were performed in the same manner, including the time for the catheterization, either with Lofric[®] or EasiCath[®] in two consecutive 24 h periods. Which catheter they used first was randomly determined. The catheter used for the last catheterization in each 24 h period was placed in a 4% formaline solution. After fixation the catheter was divided into pieces of 5 cm, where the first from the tip

*Correspondence: F Biering-Sørensen, Centre for Spinal Cord Injured, Rigshospitalet, Copenhagen University Hospital, Havnevej 25, DK-3100 Hornbæk, Denmark

of the catheter had a random length between 0 and 5 cm. From each of these pieces a piece with the length of 5 mm was taken from the tip end for microscopy. The 5 mm pieces were stained with a hematoxylin-eosin method. The surface of all the 5 mm pieces was microscopied, and the total number of cells on the pieces was counted without knowledge of the type of catheter. This number for all the pieces from each catheter was multiplied by 10 to give an unbiased estimate of the total number of cells on the surface of the catheter according to the highly efficient fractionator principle.²⁻⁴

Results

There was no difference in the number of urethral epithelia cells found on the two catheter types ($P=0.97$, paired Willcoxon-Pratt test), and this was true for both men ($P=0.78$) and women ($P=0.75$). In addition, there was no difference whether the catheterization was performed with sterile technique by hospital personnel or by clean intermittent self catheterization ($P=0.44$, Mann-Whitney rank sum test on the total number of cells for each method). No granulocytes were identified. The number of cells identified on the catheters were from 30 to > 10 000, but in general those individuals with high cell counts on the catheter had high counts on both types of catheters and vice versa (Table 1). There were no differences related to age, level of SCL, ASIA impairment scale, or months since SCL. There was a trend that women in spite of shorter catheters generally had a higher cell count than men.

Conclusion

No difference was found regarding number of urethral epithelial cells on the surface of the two catheter types after catheterization. This indicates no difference in urethral trauma between the two catheters.

Acknowledgements

Financial support to carry through the study was received from Coloplast A/S, Denmark.

Table 1 Number of cells on the catheters tested given together with the gender for each participant. Ranked according to the total sum of cells on the two catheters. M = male, F = female. SIC = sterile intermittent catheterization, CISC = clean intermittent self catheterization

Participant no.	Number of cells		Gender	Catheterization
	Lofrid [®]	Easicath [®]	M/F	SIC/CISC
5	110	30	M	CISC
20	110	70	M	SIC
11	40	270	M	CISC
4	170	250	M	CISC
3	320	260	M	CISC
2	220	430	M	SIC
1	210	650	M	SIC
8	80	> 1000	M	SIC
13	550	950	F	SIC
9	> 1300	380	M	CISC
10	> 1000	> 1000	M	CISC
16	830	> 1310	M	CISC
14	1550	> 1100	M	SIC
19	> 2210	440	M	CISC
12	> 1800	> 1700	F	CISC
7	> 2000	> 2500	F	CISC
15	2050	> 2700	F	SIC
6	> 2500	> 2500	F	CISC
17	> 4000	> 2230	M	CISC
18	> 10 000	> 3650	F	CISC

References

- 1 Waller L, Telander M, Sullivan L. The importance of osmolality in hydrophilic urethral catheters: a crossover study. *Spinal Cord* 1997; **35**: 229–233.
- 2 Gundersen HJG, Jensen EB. The efficiency of systematic sampling in stereology and its prediction. *J Microscopy* 1987; **147**: 229–263.
- 3 Gundersen HJG et al. The new stereological tools: Disector, fractionator, nucleator and point sampled intercepts and their use in pathological research and diagnosis. *Acta Pathol Microbiol Immunol Scand* 1988; **96**: 857–881.
- 4 Gundersen HJG, Jensen EVB, Kiukoieu K, Nielsen J. The efficiency of systematic sampling in stereology – reconsidered. *J Microbiology* (in press).