

EFFECTS OF STORAGE CONDITIONS ON ADHERENT BACTERIA OF CATHETERS FOR INTERMITTENT SELF-CATHETERIZATION

Hypothesis / aims of study

We studied differences in the amount of remaining bacteria on various catheters for intermittent self-catheterization stored under different conditions after exposure to artificial urine or friction loading.

Study design, materials and methods

We examined three catheters made of silicon (SI), polyvinyl chloride (PVC), and latex (La) using of *S. aureus* (SA), *E. coli* (EC), *P. aeruginosa* (PA), and *C. albicans* (CA). 1) After friction loading of 120cmH₂O, each catheter was soaked in artificial urine for seven days (one cycle). All catheters, which were subjected to four cycles, were used to evaluate the amount of adherent bacteria. 2) Each catheter was soaked for one hour in prepared infected urine (10⁷ cfu/mL). After the catheters were washed with tap water five times, stored for 23 hours under the following conditions: a) under the dry condition; b) in tap water; c) 0.025% benzalkonium chloride solution. After repeating this procedure three times, the remaining bacteria on catheters were cultured and measured to examine the difference.

Results

1) There were no great differences in adherent bacteria on any catheters before the procedure, except for CA; ranged from 10² to 10⁴ cfu/ml. Almost no CA remained on any catheters. 2) After four cycles of the procedure, SI had a decrease in PA (9.1 x 10²→1.0 x 10², p=0.018); PVC had no significant increase in any strains; and La had increases in SA (7.6 x 10²→5.3 x 10⁴, p=0.003) and in PA (2.3 x 10³→5.4 x 10⁴, p=0.012). 3) For storage conditions, under the dry condition, SI had a significant decrease in SA (7.0 x 10²→0, p=0.007) and an increase in PA (1.0 x 10²→1.4 x 10⁴, p=0.024); PVC had no significant increases in any strains; and La had decreases in two strains: SA (5.3 x 10⁴→0, p=0.002) and EC (5.4 x 10²→0, p=0.004). No bacteria were detected on any catheters stored under the dry condition with a change from 5 to 10 catheter washes. When stored in tap water, SI had an increase in EC (0→3.5 x 10⁵, p=0.007); PVC had no significant increases in bacteria; and La had a significant decrease in EC (5.4 x 10³→0, p=0.004). Stored under conditions c) and d), all catheters showed 0 cfu/ml of bacteria.

Interpretation of results

All catheters except for La showed no obvious change in the amount of adherent bacteria after four cycles of the procedure consisting of friction loading and exposure to artificial urine (for four weeks). For the storage conditions, the dry storage led to an increase in the amount of *P. aeruginosa* on the SI, but the sufficient washing and the storage in tap water resulted in the disappearance of or a decrease in bacteria, suggesting that washing significantly affected the amount of adherent bacteria and the bacterial growth may be controllable under the dry storage condition with sufficient catheter washing. In the catheters stored in the benzalkonium chloride solution, bacteria disappeared very rapidly.

Concluding message

In Japan, it is popular to store self-catheters in antiseptics (like stored in 0.025% benzalkonium chloride solution). Our study indicated the non-inferiority of dry storage condition of catheters compared with wet antiseptic condition in the aspects of bacterial adhesion, also the superiority in consideration of living body safety and patient convenience in catheter storage.

References

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