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Brief Report

# An outbreak of *Pseudomonas aeruginosa* urinary tract infections following outpatient flexible cystoscopy

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The investigation of an outbreak of *Pseudomonas aeruginosa* urinary tract infections after ambulatory cystoscopies identified a damaged cystoscope contaminated by *P aeruginosa* and acting as a relay object. This outbreak urges us not to trivialize urinary tract infections occurring after an elective cystoscopy. Patients should be advised to signal the occurrence of urologic symptoms after urologic exploration.


Persistent cystoscope contamination has been previously reported,[1] and the incidence of urinary tract infection (UTI) after flexible cystoscopy ranges from 2% to 21.2% according to studies.[2,3] The most frequent microorganisms involved are *Escherichia coli*, enterococci and staphylococci,[4] whereas *Pseudomonas aeruginosa* is responsible of only 1%-2% of them.[5] To our knowledge, only one cystoscopy-related outbreak of *P aeruginosa* infections is reported in the literature.[6] The authors identified a contaminated cystoscope to be the likely source of infections, and implementing proper cystoscope reprocessing methods terminated the outbreak.[6] Other endoscopy-related outbreaks caused by carbapenem-resistant *Enterobacteria* have been linked to difficulties in cleaning protocols or reprocessing practices.[7] We report here an outbreak of *P aeruginosa* UTI after outpatient cystoscopy.

## METHODS

The 4 reusable cystoscopes used in urology consultation are hand-cleaned and disinfected according to national recommendations.[8] Microbiological controls are performed at least once per year and before reuse in cases of device maintenance, and are considered in conformity if bacteria are undetectable (<1 colony forming unit per cystoscope).[8]

The patients who developed *P aeruginosa* positive clinical samples between July 9, 2015, (last date of the cystoscope conform analysis) and June 30, 2016 (30 days after the last use of the cystoscope) were listed for relevant units: infectious diseases, emergency, urology consultation, and urology hospitalization unit. This list was then compared with the list of patients who underwent a cystoscopy between July 7, 2015, and May 31, 2016. However, the hospital urologists actively searched their outpatients for urinary tracts symptoms after cystoscopy, emergency consultation, or treatment for UTI symptoms. The laboratories external to the hospital were also contacted to collect *P aeruginosa* strains isolated in outpatients.

Microbiologic analyses were performed on to the cystoscope as recommended.[8] A comparative molecular typing of *P aeruginosa* isolates was performed by pulsed-field gel electrophoresis.[9]

## RESULTS

In November 2015, patient 4 presented with a bacteremia after a *P aeruginosa* UTI. On May 20, 2016, patient 10 developed lower urinary tract symptoms and *P aeruginosa* bacteremia. Five days later, a

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**Table 1**
Demographic characteristics of the 11 patients with *Pseudomonas aeruginosa* urinary tract infections

| Patient | Age (years) | Sex | Date of cystoscopy | Date of positive sampling | Delay between cystoscopy and positive sampling (days) | Specimen | Clinical isolates[§] |
|---|---|---|---|---|---|---|---|
| 1[†] | 67 | M | August 14, 2015 | August 16, 2015 | 2 | Urine | |
| 2[†] | 61 | M | September 7, 2015 | September 10, 2015 | 3 | Urine | |
| | | | | February 02, 2016 | 161 | Testicular abscess | T186-5.1[‖] T186-5.2[‖] |
| 3[‡] | 67 | M | September 16, 2015 | September 22, 2015 | 6 | Urine | |
| 4[*] | 71 | M | November 13, 2015 | November 16, 2015 | 3 | Urine | |
| 5[‡] | 65 | M | December 17, 2015 | December 28, 2015 | 11 | Urine | |
| 6[‡] | 81 | M | January 19, 2016 | January 22, 2016 | 3 | Urine | T186-6 |
| 7[†] | 69 | M | January 19, 2016 | January 22, 2016 | 3 | Urine | |
| 8[‡] | 81 | M | February 17, 2016 | March 14, 2016 | 26 | Urine | |
| 9[†] | 59 | M | February 26, 2016 | March 15, 2016 | 18 | Urine | |
| 10[*] | 59 | M | May 17, 2016 | May 20, 2016 | 3 | Urine | T186-2[‖] |
| 11[*] | 56 | M | May 11, 2016 | May 25, 2016 | 14 | Urine | T186-7[‖] |

*M*, male.
*Patients of the outbreak alert.
†Patients identified by crossing the list of patients exposed to the cystoscope number 419 and those presenting positive samples for *P aeruginosa*.
‡Patients signalled by urologists.
§Clinical isolates were not all stored, mainly when bacteriologic cultures were performed in private laboratories outside of the hospital.
‖Isolates displaying the same molecular profile of strains isolated from the contaminated cystoscope.

third similar case was notified to the infection control team for patient 11 presenting with a positive urine culture for *P aeruginosa*. The 3 patients underwent a bladder examination with the same cystoscope number 419, which was then quarantined from May 31, 2016, and an outbreak investigation was conducted.

Between July 7, 2015, and May 31, 2016, 389 patients underwent cystoscopies, including 104 patients using the cystoscope number 419. In the meantime, 151 samples were positive for *P aeruginosa* in the 4 relevant units, including 98 urine samples. Four of the 104 patients exposed to the cystoscope number 419 had a *P aeruginosa* positive sample after cystoscopy. None of the 285 patients exposed to the 3 other cystoscopes were contaminated with *P aeruginosa*. Between May and October 2016, the urologists reported 4 further cases, all exposed to cystoscope number 419. Altogether, 11 patients presented with a *P aeruginosa* UTI after cystoscopy with the cystoscope number 419, and the outbreak lasted 9 months (Table 1). On July 1, 2016, the cystoscope number 419 was sampled and 2 morphotypes of *P aeruginosa* were identified (T186-3 and T186-4). T186-3 and T186-4 displayed the same genotypic profile A as well as T186-2 (patient 10), T186-5.1 and T186-5.2 (patient 2), and T186-7 (patient 11) (Table 1). This result shows the transmission of the same *P aeruginosa* strain among 3 patients with cystoscope number 419 acting as transmission relay. Patient 8, who was known for having recurrent *P aeruginosa* UTI, was infected by T186-6 that displayed genotype B unrelated to the strains contaminating the cystoscope number 419. The other clinical isolates from the 7 other patients were not typed because they were not conserved by the laboratories external to the hospital.

The cystoscope number 419 was returned to the manufacturer that confirmed a channel scratch. The microbiologic quality of the water from water points-of-use used during disinfection complied with microbiological quality requirements for health care use (<1 colony forming unit of *P aeruginosa* per 100 mL) (data not shown).

## DISCUSSION

Cystoscopy-related outbreaks are scarcely reported in the literature, and the risk of patient contamination through cystoscopy is poorly known.[3,6] Several outbreaks occurring after bronchoscopy are associated with the use of a damaged device, inadequate disinfection, and manufacturing defect.[10-12] The outbreak reported here was relayed by a cystoscope contaminated by *P aeruginosa*, probably in biofilm attached on to the channel scratch, which allowed it to resist disinfectants.[13] Indeed, the cystoscope was the only common point between patients of the outbreak, and it was contaminated with strains belonging to the same genotype as 3 of the 11 patients. Furthermore, no other case of infection was reported in patients exposed to other cystoscopes during the same period. We cannot confirm that the 8 other patients were indeed contaminated by the same genotype, as their clinical strains were not conserved. However, this can be suggested given the outbreak situation with a contaminated cystoscope that was damaged, offering favorable conditions for biofilm formation. *P aeruginosa* being a usual biofim former species, and because cleaning and disinfection practices were correctly applied, one can assume that the ineffective disinfection process was linked with a resistance to disinfectant, which is already proved for several strains of *P aeruginosa*, even more when in biofilm favored by a damaged channel.

Disinfection steps are performed manually to reach a high-level disinfection, and cystoscopes are sampled at least once per year and after each maintenance return according to the national guidelines.[8] However, no microbiological surveillance is performed after a simple act in patients, and the risk of patient exposure to a cystoscope with a persisting contamination remains unknown.

Here, the incidence of *P aeruginosa* UTI after bladder exploration with the contaminated cystoscope reached 10.18%, whereas no *P aeruginosa* UTI were reported among the 285 other patients exposed to the 3 other cystoscopes of the unit. However, one can assume that this incidence rate is underestimated given the difficulty of follow-up in outpatients, and given that UTI, considered as benign infections, are not exhaustively signaled. The outbreak presented here was relatively silent as it included 11 patients over a 9-month period, but the deep investigation of the infection control team permitted to identify the cystoscope number 419 as a common device. This situation underlines the interest to record every cystoscopy procedure and to perform a medical feedback for urinary or infectious symptoms in the month after cystoscopy for inpatients and outpatients.

## CONCLUSIONS

The example of this outbreak urges us not to trivialize UTI occurring after an elective cystoscopy. Patients should be advised to signal the occurrence of urologic symptoms after urologic exploration. In case of concomitant infections caused by *P aeruginosa*, the cystoscope should be suspected as a potential reservoir.

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