Pseudomonas aeruginosa Acute Prostatitis and Urosepsis after Sexual Relations in a Hot Tub[▽]

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We report a case of a previously healthy 38-year-old male with acute prostatitis and concurrent *Pseudomonas aeruginosa* urosepsis. Pulsed-field gel electrophoresis analysis confirmed that the source of the organism was the patient's newly purchased hot tub, which was filled with water from a stream.

CASE REPORT

A previously healthy 38-year-old white male presented to the emergency room with a 10-hour history of fevers, chills, and significant suprapubic pain. He also complained of dysuria and feelings of incomplete emptying after voiding. He denied any history of sexually transmitted diseases, recent urinary tract infections, or genitourinary trauma. He did mention having sexual relations with his wife three times the previous week in a newly purchased hot tub. His wife was asymptomatic.

He received 6 liters of crystalloid fluid for hypotension in the emergency department. A Foley transurethral catheter was placed for urinary output measurement prior to urology consultation. A computed tomography scan of the abdomen and pelvis revealed significant soft tissue stranding surrounding the prostate, seminal vesicles, and posterior aspect of the bladder.

On physical exam the patient was febrile to 101.9°F, hypotensive (systolic blood pressure, 85 to 90 mm Hg), and tachycardic (pulse, 110 to 120 beats/min). The patient appeared in distress, yet nontoxic. His abdominal and pelvic exam demonstrated moderate suprapubic discomfort and an exquisitely tender soft prostate without enlargement or nodules. Urinalysis on admission revealed cloudy urine, positive leukocyte esterase, >100 white blood cells per high-power field, negative nitrite, and 10 bacteria per high-power field. Unfortunately, culture was not performed because the urine was inadvertently discarded, and prostatic fluid was not collected. His peripheral white blood cells count was 20,000/μl (normal range, 4,400 to 10,700/μl) with 80% neutrophils and 7% bands. Other laboratory data, including a serum creatinine level of 1.1 mg/dl, were within normal limits. Blood cultures were obtained prior to initiation of intravenous ciprofloxacin.

The patient was admitted to the intensive care unit for close hemodynamic monitoring. His antibiotic was changed to intravenous piperacillin-tazobactam. Alpha-adrenergic blocker therapy (terazosin) and ibuprofen were also initiated for symp-

tomatic relief. Infectious disease consultation was obtained on hospital day 2, when the patient remained febrile and his blood cultures demonstrated growth of gram-negative rods, subsequently identified as *Pseudomonas aeruginosa* (sensitive to ciprofloxacin and piperacillin-tazobactam). The patient's antibiotics were switched to oral ciprofloxacin, 500 mg twice daily, for a total of 3 weeks. Follow-up urine and blood cultures were negative on day 2 of admission.

The remainder of the patient's hospitalization was uneventful, except for difficulty with urination and a failed voiding trial on hospital day 4. His terazosin alpha blockade was titrated up after his urinary catheter was reinserted. He developed a fever of 101.4°F on hospital day 6, and a repeat computed tomography scan of his pelvis ruled out a prostatic abscess and demonstrated significant improvement in the previously noted periprostatic stranding. On hospital day 10, the patient was afebrile and feeling well, passed a voiding trial, and was discharged home in good condition.

P. aeruginosa can survive in a variety of moist environments due to its minimal nutritional requirements and growth temperature range (4 to 42°C) (1). Although inhibited by chlorine levels in water of 2 to 3 ppm, *P. aeruginosa* can multiply to densities of 10⁴ to 10⁶ organisms/ml when levels drop to <1 ppm (4). These characteristics allow it to multiply in hot tubs, where chlorine levels are rapidly dissipated by the warm temperatures (39 to 40°C) and aeration (4). Hot tub use has been linked to *P. aeruginosa* folliculitis and more-serious infections, including pneumonia and those involving the urinary tract (cystitis, prostatitis, and urosepsis) (2, 3, 5–7). Salmen et al. reported three cases of urinary tract infections in previously healthy individuals, including one patient with acute prostatitis (7). *P. aeruginosa* isolates cultured from the two implicated hot tubs displayed the same serotype/pyocin type or antibiogram as the patients' isolates. In both cases, the chlorination levels of the hot tubs were not maintained according to Centers for Disease Control and Prevention guidelines (www.healthyswimming.org). Salmen et al. also suggested that sexual activity in hot tubs and genital exposure to the water jets might enhance the risk of urinary tract infection. The latter exposure was also reported by McNeil in a case of urosepsis (3).

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FIG. 1. Pulsed-field gel electrophoresis analysis of *Pseudomonas aeruginosa* chromosomal DNA digested with SpeI. Lane A, water isolate 1; lane B, water isolate 2; lane C, blood isolate; lane D, water isolate 3.

Our patient had sexual relations with his wife in their newly purchased hot tub, which was likely a risk factor for the prostatitis and urosepsis that ensued. Unfortunately, the patient's urine was not cultured. It is therefore assumed, based on the urinalysis and bacteremia, that the prostatitis was caused by *P. aeruginosa*.

A sample of the hot tub water, collected in a sterile container, was subjected to culture and yielded three morphotypes of *P. aeruginosa*. Strain typing by pulsed-field gel electrophoresis (PFGE) analysis, using the restriction endonuclease SpeI, was performed on the hot tub water and blood culture isolates (8).

One of the hot tub isolates and the blood culture isolate exhibited indistinguishable PFGE patterns, indicating that the water was the likely source of this patient's infection (Fig. 1). Upon further questioning, the patient revealed that the hot tub had been filled with water from a stream located behind his home. The hot tub was equipped with an ozonator in addition to using chemical disinfection with sodium dichloro-S-triazinetriene (Dichlor-Shock). The patient claimed that disinfection was performed according to instructions provided by the manufacturer. However, this type of disinfection presumes the use of potable water in the hot tub and may not be effective for nonpotable water, which would logically be expected to have higher bacterial counts. Guidelines for public spa operation from the Centers for Disease Control and Prevention do not specifically address the type of water that is used to fill spas; however, there are guidelines in some states, at least, that prohibit the use of nonpotable water for filling hot tubs or pools (<http://www.hillsboroughcounty.org/water/reclaimedwater/faq.cfm#QUESTION11>).

We believe this to be the first case of acquired hot tub-associated *P. aeruginosa* prostatitis and urosepsis documented by PFGE strain typing. Sexual activity and the use of nonpotable water were likely risk factors for infection.

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