

Burkholderia cepacia infection of the prostate caused by inoculation of contaminated ultrasound gel during transrectal biopsy of the prostate

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Abstract

Burkholderia cepacia infection of the prostate is very rare. We report 6 cases of prostatic infection secondary to inoculation of contaminated ultrasound gel during transrectal biopsy of the prostate. All of these patients required hospitalization and were treated with intravenous antibiotics. One of these cases is the first description of chronic prostatitis with *B. cepacia*.

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Introduction

Ultrasound procedures and transmission gel have been implicated in the spread of several bacterial pathogens including *Burkholderia cepacia*.¹ One of the authors (JH) has published a description of transrectal biopsy of the prostate leading to prostate infections with *B. cepacia*, secondary to intrinsically contaminated ultrasound gel.² That paper focused on the microbiologic and infection control aspects of the outbreak. In this report, we detail the clinical aspects, including therapy and outcomes, of patients who had a biopsy of the prostate resulting in infection with *B. cepacia*. One of these cases is the first report of chronic prostatitis caused by *B. cepacia*.

Case series

Case 1: St. John's

A 73-year-old remote kidney transplant recipient had a 4-year history of intermittent bacteremia with *B. cepacia*. In 2000, a urological assessment initiated by an elevated prostate-specific antigen (PSA) was performed. The patient had no lower urinary tract symptoms and digital rectal exam was normal. A transrectal ultrasound-guided biopsy was recommended. As in all cases described in this series, ultrasound gel was placed on the probe with a condom placed

over this. Lubricating gel was applied to the outside of the condom before insertion into the rectum. The biopsies were then taken in standard sextant fashion. Because of long-standing corticosteroid therapy, he was given ciprofloxacin for 2 days before and 3 days post-biopsy. The biopsy showed benign hyperplasia only.

From 2002 to 2003, the patient had microscopic hematuria and large numbers of white blood cells in his urine, although he was asymptomatic. In September 2003, urine cultures grew *B. cepacia* susceptible to ceftazidime, ciprofloxacin and trimethoprim/sulfamethoxazole and he was placed on ciprofloxacin for 4 months. In September 2004, urine cultures were again positive for *B. cepacia*. The patient had 6 more positive urine cultures for *B. cepacia* between September 2004 and May 2007. On at least 3 occasions during this time period, the patient was treated with ciprofloxacin for periods ranging from 90 days to 4 months. In 2007, during a hospital admission he again showed *B. cepacia* in his urine. At this point, he was treated with cefotaxime, 1 g intravenous (IV) every 12 hours for 1 day, followed by ampicillin, 1 g IV every 8 hours for 8 days, followed by 2 g IV every 8 hours for 12 days. Two days after treatment a urine culture was negative for growth. The patient later died during his hospital stay of natural causes. His death was unrelated to the infection.

Case 2: St. John's

A 64-year-old male, with a 2-year history of elevated PSA, had a transrectal biopsy performed in 2000. His initial biopsy was negative for prostate cancer, but his PSA remained elevated. A second biopsy in June 2001 was suggestive of carcinoma of the prostate. Eight days after the biopsy the patient presented with dysuria at which time a urine culture was taken; he was diagnosed with acute prostatitis and started on ciprofloxacin. The culture was positive for *B. cepacia*.

Four days later he presented to the emergency room with complaints of worsening dysuria, gross hematuria, incontinence and fever. He was admitted to the urology service with the diagnosis of acute prostatitis and treated with IV

cefotaxime 1 g every 8 hours for the 5 days during his hospital stay. His lower urinary tract symptoms resolved and later that month he had a prostatectomy to treat his prostate carcinoma without incident.

Case 3: St. John's

A 67-year-old man was diagnosed with prostatitis 8 days after a transrectal biopsy of the prostate to investigate an enlarged prostate and raised PSA. A week later he presented to the emergency room with chills, fever, dysuria and increased urinary frequency and was placed on ciprofloxacin 500 mg orally twice a day. Urine and blood cultures at this time showed infection with *B. cepacia*, susceptible to ciprofloxacin. He saw a urologist a week later, by which time his symptoms had resolved. Oral ciprofloxacin was continued for 2 more weeks with complete resolution.

Case 4: St. John's

A 74-year-old man with a history of benign prostatic hyperplasia presented to his family doctor 2 days after ultrasound-guided transrectal biopsy of the prostate with dysuria and was prescribed ciprofloxacin 500 mg twice a day.

The next day he presented to emergency with fever, rigors and continuing dysuria. A blood culture was positive for *B. cepacia*. He was treated initially with IV cefotaxime, which was changed the next day to IV trimethoprim/sulfamethoxazole and piperacillin/tazobactam 3.375 g every 8 hours. Two days later, the patient continued to be febrile; an ultrasound of the prostate ruled out a prostate abscess. Over the next few days the patient's condition improved. He was discharged from hospital on day 7 with trimethoprim/sulfamethoxazole DS 2 tabs, twice a day for 5 days.

Case 5: St. John's

A 67-year-old man, with a history of chronic obstructive pulmonary disease and benign prostatic hyperplasia, was diagnosed with adenocarcinoma of the prostate after a transrectal ultrasound-guided biopsy of the prostate. He presented to emergency room 3 days after his biopsy with shortness of breath, fever, chills, hematuria and increased urinary frequency. He was admitted and a blood culture was positive for *B. cepacia*. He was treated with IV ceftazidime 2 g every 8 hours and ciprofloxacin 750 mg orally twice a day, both for 7 days. The patient's symptoms resolved over 3 to 4 days and he was discharged with the diagnosis of bacteremia secondary to prostate biopsy and treated with ciprofloxacin 500 mg twice a day for another week. He remained asymptomatic.

Case 6: Halifax

A 53-year-old man with an elevated PSA level on routine screening had a transrectal biopsy performed by a urologist in a private office. Six prostate needle biopsies were performed without complication. The patient had no other urological findings on history. Examination revealed a normal-sized prostate.

On the second day after the biopsies, the patient reported to the emergency room with fever. He did not describe any lower urinary tract symptoms or hematuria. He had no dyspnea or chest pain. On examination his temperature was 40°C. Other vital signs were normal. Cardiorespiratory and abdominal examinations were unchanged from his initial consultation. His prostate was non-tender.

The patient was admitted to hospital and started on IV ampicillin and gentamicin. Over the next 48 hours, his temperature remained elevated in the range of 40°C. Preliminary blood cultures revealed the presence of gram negative bacilli. Consultations with infectious diseases were obtained. They did not feel there was reason to do an echocardiogram to rule out endocarditis. A change of antibiotics to ciprofloxacin was made. Repeat TRUS was considered to determine if there was a prostatic abscess present. However, the patient's fever broke by the next morning and remained at a normal level for 48 hours prior to discharge. He was sent home with a prescription for 10 days of ciprofloxacin.

Final blood cultures were not available until after discharge. These cultures revealed growth of *B. cepacia* reported as susceptible to ciprofloxacin, but not ampicillin or gentamicin.

Discussion

Prostatitis is a common condition affecting many men. Acute prostatitis usually responds quite well to antibiotics. Patients are often initially treated with trimethoprim-sulfamethoxazole or a fluoroquinolone for 3 to 4 weeks.³ Chronic prostatitis usually requires up to 4 to 6 weeks of therapy and is also treated with trimethoprim-sulfamethoxazole or a fluoroquinolone.⁴

It has been suggested that after a transrectal biopsy there is a 44.5% rate of urinary tract infections (UTIs)⁵ and a 13% incidence of bacteremia⁶ when prophylaxis is not used. Using ciprofloxacin as prophylaxis has been shown to decrease the rate of UTIs and bacteremia.⁷

Therapy may be difficult for *B. cepacia* prostatitis as evidenced by case 1 where relatively asymptomatic chronic infection occurred. We describe success of some regimens but optimum therapy is not known. The infections were not always cleared with ciprofloxacin alone and sometimes required multiple IV antibiotics early in treatment.

In particular, chronic prostate infection with *B. cepacia*, which has not been previously described in the literature, may be difficult to treat. In Case 1 there was a chronic infection of the urinary tract. The patient was treated with anti-microbials on multiple occasions over a 7-year period, but continued to have *B. cepacia* recovered from his urine. To our knowledge, this is the first case of chronic prostate infection with *B. cepacia*.

Iatrogenic infections in the hospital setting are not uncommon.^{1,2,8} *B. cepacia* has been implicated in the transmission of infection through contamination of liquids and instruments. The reasoning for this is not completely understood, but the ability to degrade parabens in gels may contribute to its ability to survive in ultrasound gel-filled containers.² This organism is capable of causing opportunistic infections in vulnerable individuals.⁹ There have been reports of *B. cepacia* infections relating to transrectal ultrasound-guided needle biopsy of the prostate. These cases have been reported in St. John's, Newfoundland and in Calgary, Alberta.² It is likely that case 6, which occurred in Halifax, Nova Scotia, was the result of contaminated ultrasound gel as well.

The presentation of a bacteremic urinary tract infection after a transrectal biopsy of the prostate suggests possible contamination from the procedure. Contaminated ultrasound gel in this case was an unrecognized source of infection. During the time these infections occurred, ultrasound gel was purchased in large 4- to 5-L bottles and distributed to smaller refillable 250-mL to 1-L squeeze bottles. It was previously determined that many of these refillable squeeze bottles contained *B. cepacia*, which was actually the same strain that was isolated from individuals infected with the bacteria.² The contaminated bottles in St. John's were all from the same manufacturer. It should be mentioned that another possible source of infection could have been the lubricating jelly. This was checked at the same time as the ultrasound gel and did not contain *B. cepacia*.

This series illustrates the importance of sterile technique and also sterile ultrasound gel. Although the rectal mucosa is involved and considered not to be sterile, these infections demonstrate how harmful organisms can still be transmitted to the patient during a transrectal ultrasound. Single-sterile packets of ultrasound gel should be used and refilling of containers should be banned. Attention should be taken to follow the manufacturer's recommendations regarding

device reprocessing to ensure proper cleaning and disinfection. After these changes were made in St. John's, there were no further urinary tract infections with *B. cepacia*.

Conclusion

This case series outlines 6 cases of prostate infection after the use of non-sterile ultrasound gel in St. John's and Halifax. The iatrogenic infections seemed to cause significant morbidity in these patients, bringing them to hospital for treatment. When performing transrectal biopsies of the prostate, one should use sterile techniques. In particular, this series emphasizes the importance of sterile ultrasound gel.

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References

1. Gillespie JL, Arnold KE, Noble-Wang J, et al. Outbreak of pseudomonas aeruginosa infections after transrectal ultrasound-guided prostate biopsy. *Urology* 2007;69:912-4.
2. Hutchinson J, Runge W, Mulvey M, et al. *Burkholderia cepacia* infections associated with intrinsically contaminated ultrasound gel: The role of microbial degradation of parabens. *Infect Control Hosp Epidemiol* 2004;25:291-6.
3. Lipsky BA. Prostatitis and urinary tract infection in men: What's new; what's true? *Am J Med* 1999;106:327-34.
4. Pewitt EB, Schaeffer AJ. Urinary tract infection in urology, including acute and chronic prostatitis. *Infect Control Hosp Epidemiol* 1997;11:623-46.
5. Fawcett DP, Eykyn S, Bultitude MI. Urinary tract infection following trans-rectal biopsy of the prostate. *Br J Urol* 1975;47:679-81.
6. Thompson PM, Talbot RW, Packham DA, et al. Transrectal biopsy of the prostate and bacteraemia. *Br J Surg* 1980;67:127-8.
7. Olson ES, Cookson BD. Do antimicrobials have a role in preventing septicaemia following instrumentation of the urinary tract? *J Hosp Infect* 2000;45:85-97.
8. Keizur JJ, Lavin B, Leidich RB. Iatrogenic urinary tract infection with pseudomonas cepacia after transrectal ultrasound guided needle biopsy of the prostate. *J Urol* 1993;149:523-6.
9. Mahenthiralingam E, Baldwin A, Dowson CG. *Burkholderia cepacia* complex bacteria: Opportunistic pathogens with important natural biology. *J Appl Microbiol* 2008;104:1539-51.

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