Case report

Salmonella prostatitis in a man with spinal cord injury

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Context: Prostatitis is a very unusual manifestation of *Salmonella* urinary tract infection and has not been reported in men with spinal cord injury (SCI).

Findings: A 57-year-old man with paraplegia and a history of recurrent symptomatic urinary tract infections presented with *Salmonella typhimurium* prostatitis. Clinical and sonographic examination of the urinary tract, as well as urinalysis including microbiologic examination, revealed no relevant abnormalities. The microbiologic analysis of the ejaculate revealed growth of monophasic *Salmonella enterica* ssp. *enterica* serotype 4,12:i:-. A 6-week course of antibiotic treatment was initiated. There were no recurrent symptomatic urinary tract infections during follow-up.

Conclusion: Salmonellosis is a reportable disease and carriers have to refrain from activities in the food sector. Therefore, *Salmonella* prostatitis should be considered and excluded in men with SCI and a history of recurrent urinary tract infection who use intermittent catheterization for bladder management.

Keywords: Ciprofloxacin, Fluoroquinolones, Prostatitis, *Salmonella*, *Salmonella typhimurium*, Spinal cord injuries, Urinary tract infection, Intermittent bladder catheterization

Introduction

Prostatitis is a common urological disorder, with a prevalence ranging from 2 to 10%.¹ However, bacterial infections of the prostate account for only approximately 10% of all prostatitis cases.² In men with spinal cord injury (SCI), the rate of bacterial prostate infections seems to be considerably higher (33.3%).³ However, there are no epidemiologic reports on the incidence or prevalence of bacterial prostatitis in men with SCI.

The most commonly isolated bacteria in acute and chronic prostatitis are *Escherichia coli*, *Klebsiella* spp., *Proteus* spp., *Enterococci* spp., and *Pseudomonas aeruginosa*.⁴⁻⁶ We present a unique case of *Salmonella typhimurium* prostatitis in a man with SCI.

Case report

A 57-year-old man with neurogenic lower urinary tract dysfunction as a result of post-traumatic complete SCI at T6 40 years ago presented for a routine urologic check-up. The patient reported a history of recurrent

urinary tract infections (UTIs) since he had started to use intermittent catheterization for bladder evacuation 6 years ago. Disinfection of the glans penis, use of a prehydrated hydrophilic catheter, and oral vaccination with an *E. coli* extract were unsuccessful in preventing recurrent UTIs (2–3 episodes/year). Two years ago, he had been diagnosed with symptomatic and febrile UTIs caused by *Enterococcus* and *Streptococcus viridans* and prostatitis caused by *E. coli*. (ejaculate culture). He was treated with ciprofloxacin for 6 weeks. Furthermore, long-term treatment with an alpha-1 antagonist (tamsulosin) had been initiated.

The patient reported performing clean intermittent catheterization five times daily after hand-washing and disinfection of the glans using a single-use hydrophilic catheter. He reported no urinary incontinence and no recent episodes of diarrhea. Bowel management consisted of digitally evacuation two to three times a week.

Physical examination revealed no signs of infection. Rectal examination of the prostate was unremarkable, apart from age-appropriate enlargement. Prostate, bladder, urethra, and kidneys appeared normal on sonographic examination. The video-urodynamic evaluation revealed an increased bladder capacity with neurogenic

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detrusor acontractility and reduced bladder sensation. No prostatic influx was observed. Urinalysis was normal, with no pathogenic bacteria detected. The serum level of prostate-specific antigen (PSA) (2.56 ng/ml) was within physiologic limits (0.27–3.42 ng/ml). The patient was HIV seronegative. Microbiologic analysis (National Center for Enteropathogenic Bacteria) of the ejaculate revealed growth of monophasic *Salmonella enterica* ssp. *enterica* serotype 4,12:i:-. Six weeks of antibiotic treatment (ciprofloxacin 500 mg twice daily) was initiated in accordance with the resistance testing. There were no recurrent symptomatic UTIs during follow-up.

Discussion

This is the first report of *Salmonella* prostatitis in a man with SCI. Reports of *Salmonella* prostatitis are exceedingly rare. Saphra and Winter⁷ have reported 49 UTIs (0.5%) from 9284 clinical and subclinical human *Salmonella* infections diagnosed at the New York *Salmonella* Center from 1939 through 1955. The prostate was involved in only “some” cases. Furthermore, a few case reports of *Salmonella* prostatitis have been published.^{8–13} In addition, the potential of prostate *Salmonella* infections in men with HIV infection and has been mentioned in the literature without reports of any confirmed cases.^{14,15}

The route of infection remains unclear in this case. In general, *Salmonella* UTI may be the result of hematogenous spread or an ascending infection from a contaminated perineal area in carriers of *Salmonella*.^{16,17} Furthermore, certain sexual practices⁹ or urinary catheterization^{17,18} may facilitate *Salmonella* UTI by direct introduction of the pathogen into the urinary tract. Hematogenous spread is most likely in patients with predisposing conditions, e.g. chronic disease or immunosuppression.^{16,19–21} This patient presented with no predisposing conditions. Furthermore, bacteremia with no symptoms of gastroenteritis is not very common with *S. typhimurium*.²² An ascending infection from a contaminated perineal area is unlikely in adults.^{9,23} Furthermore, this patient has not reported any recent episodes of diarrhea. A direct (venereal) introduction of *Salmonella* into the urogenital tract has been reported in a homosexual man.⁹ This patient has sexual dysfunction secondary to SCI and does not engage in sexual intercourse. However, he does perform intermittent catheterization for bladder evacuation. We therefore hypothesize that *Salmonellae* were introduced into the urinary tract via the urinary catheter.

Non-typhoid *Salmonella* UTI, most commonly presenting as cystitis or pyelonephritis, is rare but well

documented.^{16,19–21} Even though the most common clinical presentation of a non-typhoid *Salmonella* infection is gastroenteritis,¹⁹ the majority of patients with non-typhoid *Salmonella* UTI present with no gastrointestinal symptoms,^{16,20} and stool cultures are not positive in all patients.^{8,20} The reported proportion of patients with preceding diarrhea ranges from 10²⁰ to 32%.¹⁶ This patient did not report any recent episodes of diarrhea. However, stool was not submitted for microbiologic analysis.

Prostatitis caused by *S. typhimurium*, as in this case, has also been reported by other authors.^{11,12} *Salmonella* species isolated in other prostatitis cases include *Salmonella* *St. Paul*,¹⁰ *Salmonella enteritidis*,⁹ *Salmonella panama*,⁸ and *Salmonella paratyphoid*.¹³ However, *E. coli*, *Klebsiella* spp., *Proteus* spp., *Enterococci* spp., and *Pseudomonas* spp., the most common pathogens in UTIs in SCI,^{24,25} are typically isolated in prostatitis infections.^{4–6,26}

Apart from clinical signs and findings, microbiologic examination is the cornerstone of making the diagnosis of bacterial prostatitis. Most commonly, urine samples taken before and after prostate massage are submitted to microbiologic examination (two-glass test).²⁷ However, prostate massage is contraindicated in acute prostatitis because of the risk of causing severe pain and bacterial dissemination.^{14,28} These risks can be avoided by examining an ejaculate sample instead of the post-massage sample. Furthermore, this alternative two-glass test has been reported to be more sensitive than the standard one.²⁹ The determination of PSA serum levels is neither sensitive nor specific. Elevated PSA levels have been observed in approximately 60 and 20% of patients with acute and chronic, bacterial prostatitis, respectively.²⁶ In this patient, PSA levels were within physiologic limits.

In this case, *Salmonella* prostatitis was treated with ciprofloxacin for 6 weeks according to the guidelines of the European Association of Urology.³⁰ Fluoroquinolones, among which ciprofloxacin and levofloxacin are most widely used, are the first-line treatment in bacterial prostatitis, because they penetrate well into prostatic tissue and achieve good tissue levels.^{26,31} Approximately 10% of Enterobacteriaceae isolates are resistant to ciprofloxacin.¹⁸ The patients with *Salmonella* prostatitis reported in the literature had been treated with trimethoprim-sulfamethoxazole^{8–10} or nalidixic acid¹² for 3–7 weeks and became asymptomatic with no recurrences. Adding an alpha-1 antagonist to the antibiotic therapy of prostatitis has been reported to significantly improve clinical and microbiologic outcomes as well as decrease recurrence.^{32,33} The

evaluation of treatment success is usually based on the subsidence of symptoms, because there is no validated test of cure for bacterial prostatitis.²⁶ The recurrence of UTIs is characteristic for chronic bacterial prostatitis,²⁸ because the prostate serves as a reservoir for uropathogens. In our patient, there were no recurrent symptomatic UTI during the follow-up.

Conclusion

In conclusion, prostatitis is a very unusual manifestation of Salmonella UTI, but should be considered in men with SCI have a history of recurrent urinary tract infections and who void by intermittent catheterization. As Salmonellosis is a reportable disease and carriers have to refrain from activities in the food sector, detecting Salmonella infections (e.g. Salmonella prostatitis) is relevant.

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