A near-fatal case of sepsis with an antibiotic-resistant organism complicating a routine transrectal prostate biopsy in a health care worker

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Abstract

A 58-year-old physician with an elevated prostate specific antigen developed severe septic shock following a repeat transrectal prostate biopsy despite standard preoperative prophylactic protocol. This case highlights the significance of harbouring antibiotic-resistant bacteria and the risk of previous quinolone exposure. We believe this case may herald a rare but potentially serious consequence of increasingly common antibiotic resistance and that high-risk patients should be studied to determine their likelihood of carrying antibiotic-resistant flora in their genitourinary/gastrointestinal tract.

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Introduction

The spread of antibiotic resistance and the appearance of multiple antibiotic–resistant pathogenic bacteria is an increasingly prevalent problem that complicates the care of many patients.[1] We present the case of a near-fatal sepsis infection in a health care worker with a history of antibiotic exposure owing to highly resistant *Escherichia coli* (*E. coli*) complicating a routine transrectal prostate biopsy despite sufficient ciprofloxacin prophylaxis. This case raises consideration that colonization by resistant organisms in high-risk patients places them at higher risk for systemic infections after usually innocuous procedures.

Case presentation and management

A 58-year-old physician with an elevated prostate-specific antigen level underwent a transrectal prostate biopsy in January 2001. Standard preoperative prophylactic protocol with ciprofloxacin 500 mg twice daily was administered orally beginning the evening before the elective procedure and continued for 3 days. Notably, this individual spent much of his time in an oncology care unit with a large population of patients who were immunocompromised and who harboured a wide spectrum of antibiotic-resistant organisms. The patient also had 2 previous intervals of ciprofloxacin administration for prostate biopsies within the previous 2 years.

The day following the biopsy, the patient was transported to the hospital by emergency medical services after his wife found him confused, febrile and feeling generally unwell. On examination, he was systemically ill and toxic with a heart rate of 145 beats/minute, a temperature of 40°C, an oxygen saturation of 82% and a blood pressure of 70/45 mm Hg. Physical examination revealed that the patient was diaphoretic, had a decreased level of consciousness and had ST elevation seen in the lateral leads of the electrocardiogram. Immediate resuscitation included intubation, volume and aggressive inotropic drug support, including levofed. Central venous catheterization was performed in the emergency department, and standard measures were undertaken to maintain the patient's blood pressure. Initial antibiotics in the emergency department were single doses of ampicillin, gentamicin and metronidazole. The patient was transferred to the intensive care unit (ICU) for management of severe septic shock, and multiple blood cultures were acquired. Upon transfer to the ICU, the antibiotic regimen was changed to ciprofloxacin, piperacillin–tazobactam and metronidazole. A transthoracic echocardiogram was performed, and cardiac enzymes were obtained to rule out combined septic and cardiogenic shock. Gentle diuresis was also initiated to reduce the pulmonary edema secondary to the aggressive volume resuscitation.

Blood cultures grew *E. coli* resistant to ampicillin, gentamicin, trimethoprim–sulfamethoxazole (TMP–SMX), piperacillin, cephalothin, norfloxacin and ciprofloxacin, with intermediate sensitivity to tobramycin and amoxicillin–clavulanic acid. The organism was later found to be sensitive to meropenem and piperacillin–tazobactam. With consultation of the infectious disease service, the antibiotic regimen was changed to piperacillin–tazobactam, metronidazole and meropenem. Repeated blood cultures were acquired daily, and a CT scan of the

patient's abdomen and pelvis did not demonstrate any abscess.

As further blood cultures were available, the patient's antibiotic regimen was changed to meropenem and amikacin. With physiological support, the patient's manifestations of end-organ impairment began to resolve and he was released from the ICU after 7 days.

Discussion

Prostate biopsy is routinely performed using oral antibiotic prophylaxis with ciprofloxacin or similar drug protocol.[2] There is an anticipated infection rate with this procedure of 0% to 8%, with the major complication being urinary tract infections if quinolone prophylaxis is carried out to at least 4 days of total treatment.[3–6] Our personal experience has shown a similar infection rate, requiring the hospitalization of 0.2% of patients.[7] Yet, there have been reported cases of failure of ciprofloxacin prophylaxis in which severe or fatal sepsis has occurred owing to antibiotic-resistant bacteria.[3,8] While it may be simply coincidental that a health care professional was severely affected, this patient's presentation was unique as the most acute and severe septic presentation in our experience of over 8000 transrectal ultrasound guided prostate biopsies that had been performed before this incident.

The colonization of antibiotic-resistant organisms as a result of working in an environment where such organisms are widespread is a concern for health care workers. As antibiotic resistance becomes increasingly prevalent, the extent of exposure increases. The National Nosocomial Infections Surveillance (NNIS) system reported that nosocomial *E. coli* isolates resistant to ciprofloxacin increased from 0.3% in 1989 to 1.4% in 1994.[9] These resistant organisms are expected to be present in patients commonly subjected to antibiotics, owing to a compromised immune system creating the selective ecological pressure exerted by various antimicrobials. Specifically, new cases of fluoroquinolone resistance have been found in up to 35% of cancer patients receiving this prophylactic treatment.[10] Frequently, it has been found that health care workers' hands are transiently contaminated with such organisms.[11,12] If these organisms persistently colonize on health care personnel they may carry them for years, putting themselves and their contacts at risk.[13,14] However, there has been little literature to investigate the possible work-related hazard of chronic colonization of antibiotic-resistant organisms on health care workers in nonoutbreak periods. Part of the reason for this is that these studies may raise potential legal risks and work place restrictions for the participating individuals and institutions.

As a further factor of potential significance, the patient in our case study also underwent 2 prophylactic antibiotic treatments using ciprofloxacin during the previous 2 years for the same procedure. Such protocols are suspected to put selective pressure on the usual gastrointestinal and urinary flora that may raise the risk for colonization of antibiotic-resistant organisms when working in a high-exposure environment. Peña and colleagues[15] reviewed a series of non-neutropenic adult patients with *E. coli* bacteremia and found a significant correlation between the incidence of ciprofloxacin-resistant *E. coli* bacteremia and previous exposure to a fluoroquinolone. In fact, the logistic regression analysis identified prior quinolone use as the only independent risk factor for ciprofloxacin-resistant *E. coli* bacteremia, with 63% of the patients having previous exposure. This is further evidence against the widespread overprescription of quinolones, which has steadily increased for the past 10 years.

This patient potentially represents a class of individuals who may have an elevated risk for colonization of antibiotic-resistant organisms and who may therefore be subject to failure of standard prophylactic antibiotic regimens before invasive procedures.

This case of rapid and nearly fatal sepsis following a common elective invasive procedure highlights the consequence of harbouring bacteria resistant to standard prophylactic regimens. We recognize that this is a rare observation, but the extremely severe sepsis combined with the unique circumstances raise a question about whether health care professionals are at higher risk of harbouring antibiotic-resistant organisms. We believe that this case may herald a rare but potentially serious consequence of increasingly common antibiotic resistance and that in some cases it may be appropriate to screen health care workers' antibiotic-resistant flora. It would also be interesting to undertake further study to determine if incidental use of antibiotics while working

in this environment predisposes health care workers to colonization of antibiotic-resistant organisms.

While we cannot extrapolate a conclusion or recommendation for prophylactic protocol on the basis of a single incident, we do suggest that health care professionals and patients previously exposed to quinolone therapy consider additional prophylactic coverage. We believe that prospective studies are needed to assess whether other cases like this one could be prevented.

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