Preprostate Biopsy Rectal Culture and Postbiopsy Sepsis

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KEYWORDS

• Prostate • Biopsy • Urosepsis • Drug resistance • Rectal swab
• Targeted antimicrobial prophylaxis

KEY POINTS

- There has been an increase in bacterial resistance to fluoroquinolones (FQs) in men undergoing transrectal ultrasound-guided prostate biopsy and subsequent urinary tract infections (UTIs) with FQ-resistant uropathogens.
- Prebiopsy rectal swabs have been done to detect the presence of FQ-resistant bacteria, which allows for alteration of the periprocedural antibiotics used for prophylaxis.
- Three main strategies have emerged to address this: (1) the targeted approach whereby the periprocedural prophylaxis is chosen based on the antibiotic susceptibilities of the microbes detected on rectal swab culture, (2) prophylactic rectal cleansing with povidone-iodine, and (3) the augmented approach whereby the prophylaxis regimen includes an FQ and an additional empiric antibiotic or antimicrobial regimen excluding FQs altogether.
- Given concerns about the development of multidrug-resistant bacteria, the authors prefer the targeted approach. Reductions in incidence of postbiopsy UTI, febrile UTI, bacteremia, and hospital admission in comparison with placebo have been demonstrated in the literature, along with the decreased cost of care associated with this approach.
- Urologists face pay-for-performance concerns, and should consider alteration of their biopsy antibiotic prophylaxis regimen to reduce the risk of biopsy-related infectious complications.

INTRODUCTION

Transrectal ultrasound-guided prostate biopsy (TRUSP) has been in use since the early 1980s and is one of the most commonly performed procedures in urology.[1] Approximately 1 million TRUSPs are performed in Europe and the United States annually, and serve as the primary procedure for the histologic diagnosis of prostate cancer.[2–4] Urologists are performing more biopsies per patient and more total biopsies than ever before, which has subsequently led to earlier and more accurate diagnoses of prostate cancer, in addition to significant reductions in death from prostate cancer in a subset of patients at high risk for death from this disease.[5] Since its inception in the 1980s, TRUSP has generally been considered to be a benign, relatively safe outpatient procedure.[6] Occurring in more than 50% of patients, most complications associated with TRUSP historically were minor in nature and included hematuria, urethral bleeding, rectal

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bleeding, and hematospermia.[4,7,8] These complications were typically self-limited and did not require additional treatment.[9] Major complications related to TRUSP during this same period included urinary obstruction (1%–2%), syncope from vasovagal reaction (8%), and bacteremia (0.1%–0.5%), which represented a rare occurrence.[10,11]

Several recent studies exploring hospitalizations after TRUSP, however, have revealed a notable shift in the etiology of complications following TRUSP, with an alarming increase in the occurrence of major infectious complications post-TRUSP including febrile urinary tract infection (UTI), prostatitis, bacteremia, sepsis, septic shock, and in some cases even death.[4,8,12–14] Loeb and colleagues[3] reported a 2.65-fold higher hospitalization admission rate among Medicare patients within 30 days of TRUSP in comparison with the control population using Surveillance Epidemiology and End Results (SEER) data. In addition, this analysis revealed that infectious complications requiring hospitalization among men undergoing TRUSP became more common over time from 1991 to 2007 compared with randomly selected controls.

At present, fluoroquinolones (FQs) are the most commonly used antimicrobial for TRUSP prophylaxis, as they have previously been shown to reduce infectious complications from approximately 25% to 8% compared with placebo.[15,16] Despite prophylaxis with FQs, however, a recent study revealed a 4-fold increase in post-TRUSP infections from 0.52% in 2002 to 2009 to 2.15% in 2011, with 52% of infections caused by FQ-resistant isolates.[13,17] With the increasing rates of drug-resistant post-TRUSP infectious complications, several approaches have been evaluated to reduce the rate of infectious complications in men undergoing TRUSP. These approaches have included 3 main strategies: (1) A targeted approach whereby pre-TRUSP RS culture bacterial identification and antimicrobial sensitivities are used to direct TRUSP antibiotic prophylaxis; (2) prophylactic rectal cleansing with povidone-iodine; and (3) an augmented TRUSP prophylaxis approach whereby standard antimicrobial prophylaxis with an FQ plus the addition of an alternative antimicrobial agent or the use of TRUSP prophylaxis regimens excluding FQs altogether are explored.[8]

Studies to date exploring the effects of povidone-iodine rectal cleansing on post-TRUSP infectious complications have shown similar rates of infectious complications between prophylaxis and control groups. Hwang and colleagues[18] showed a statistically significant difference in rates of bacteremia and sepsis among control versus prophylaxis groups (3.5% vs 0.3%). Other investigators have shown no difference in outcomes.[19]

In 2013, Adibi and colleagues[20] reported on the efficacy of the augmented approach versus the standard approach. Subjects receiving 3 days of ciprofloxacin or sulfamethoxazole/trimethoprim double strength in addition to 1 dose of intramuscular gentamicin before TRUSP between January 2011 and December 2011 were compared with historical controls between January 2010 and December 2010. Urine and blood cultures along with bacterial susceptibilities were obtained at admission and compared between the 2 groups. Cost analysis was done to determine the cost-effectiveness of standard and augmented regimens. The investigators found that the rate of hospitalization attributable to post-TRUSP infections was 3.8% (11 patients among 290 biopsies) in 2010, which decreased to 0.6% (2 patients among 310 biopsies) in 2011 ($P<.001$). Of the admitted patients who received standard prophylaxis, 73% had fluoroquinolone-resistant *Escherichia coli* urinary infection and/or bacteremia, and only 9% had strains resistant to gentamicin. It was concluded that the augmented regimen resulted in cost savings of $15,700 per 100 patients in comparison with the standard regimen. The investigators did not differentiate which subjects received sulfamethoxazole/trimethoprim versus FQ, making it difficult to establish how many subjects in the intervention arm actually avoided infectious complications secondary to receiving sulfamethoxazole/trimethoprim instead of an FQ in a population with a known high prevalence of FQ-resistant uropathogens. This finding might suggest that a significant number of subjects in the intervention arm were actually overtreated with gentamicin. It is also important that at least 9% of their study subjects were inappropriately treated with gentamicin, ending up with significant infectious complications resistant to this antimicrobial which might otherwise have been avoided altogether had the investigators used the targeted approach.[20] Other investigators have shown similar reductions in infectious complications using the augmented approach.[21,22] Although a seemingly promising approach, the augmented strategy may lead to the accelerated development of multidrug-resistant bacteria, limiting the ability to manage post-TRUSP complications. The authors thus favor the targeted approach, and for the purposes of this review focus on this strategy.

This article provides a review of the following:

- Current TRUSP antimicrobial prophylaxis guidelines (APGs)