

## Is Preoperative Assessment and Treatment of Asymptomatic Bacteriuria Necessary for Reducing the Risk of Postoperative Symptomatic Urinary Tract Infections After Urologic Surgical Procedures?

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<b>OBJECTIVE</b>	To evaluate whether it is always necessary to test for the presence of asymptomatic bacteriuria (AB) in patients undergoing urologic surgical procedures, and if present, whether to treat AB with antimicrobial prophylaxis.
<b>MATERIALS AND METHODS</b>	All patients who underwent urologic surgical procedures from December 2008 to October 2013 in a tertiary referral urologic center were considered for this study. All patients received antimicrobial prophylaxis in line with European Association of Urology guidelines on urologic infections. AB was diagnosed if $\geq 10^5$ colony-forming units/mL were cultured. The population was subdivided into 2 groups: group A, patients with preoperative AB, and group B, patients without AB. Data on postoperative symptomatic urinary tract infections (UTIs) were compared for the 2 groups.
<b>RESULTS</b>	A total of 2201 patients were considered eligible for this study and were analyzed; 668 (30.4%) patients were found to harbor AB (group A), and 1533 (69.6%) patients did not have AB (group B). Microbiologically verified symptomatic postoperative UTIs occurred in 198 patients (8.9%). No difference in terms of overall rate of postoperative symptomatic UTI was found between the 2 groups (group A: 70 [10.4%] and group B: 128 [8.3%]; OR: 1.28 95%CI 0.94-1.74; $P = .12$ ), as well as in terms of urosepsis (group A: 2 [0.30%] and group B: 4 [0.26%]; $P = 1.0$ ).
<b>CONCLUSION</b>	In patients undergoing urologic surgical procedures who are receiving antimicrobial prophylaxis in accordance with European Association of Urology guidelines, the preoperative presence of AB in this study was not associated with a higher incidence of postoperative symptomatic UTI. UROLOGY 99: 100–105, 2017. © 2016 Elsevier Inc.

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Antimicrobial prophylaxis is effective in a wide range of surgical procedures and contributes substantially to reducing postoperative infectious complications.<sup>1</sup> However, whether asymptomatic bacteriuria (AB) before urologic surgical procedures should be routinely treated is a key question calling for closer investigation. Indeed, treatment of AB increases the use of antimicrobial agents that is paralleled by a contemporary growing frequency of multidrug-resistant strains, having significant consequences for public health. To find new strategies to reduce the indiscriminate use of antibiotics, we focused our attention on the role of AB in urologic surgery. The Infectious Diseases Society of America recommends screening and AB treatment in pregnant women and before certain urologic procedures.<sup>2,3</sup> Moreover, the latest version

of the European Association of Urology (EAU) guidelines on urologic infections suggests that bacteriuria poses a definite risk and should be treated before procedures involving entry to the urinary tract as well as breaching of the mucosa, particularly in endoscopic urologic surgery.<sup>4</sup> Several authors also suggest treating AB before urologic surgery, because its presence has been correlated with a higher incidence of severe infectious complications such as bacteremia, septicemia, and upper urinary tract infection (UTI).<sup>3,5</sup> On one hand, little evidence is available in support of presurgical AB treatment and is often only based on expert opinions.<sup>4</sup> In non-urologic surgery, it has been shown that preoperative AB does not directly lead to distant seeding of infection, and its treatment should be avoided.<sup>6,7</sup> On the other hand, we have noticed that compliance with EAU guidelines in urologic surgery is often poor and might have important consequences on patients and public health.<sup>8</sup> Recently, it was demonstrated that adherence to the EAU guidelines on urologic infections reduces the prevalence of resistant bacterial strains, in particular against piperacillin-tazobactam, gentamicin, and ciprofloxacin, and cuts both direct and indirect costs with no significant difference in the rate of postoperative infectious complications.<sup>9</sup> A clarification of the need for preoperative AB evaluation might improve urologists' adherence to international guidelines on urologic infections. From this background, the following 2 questions arise: (1) If an asymptomatic patient is to undergo antimicrobial prophylaxis in line with the international guidelines before urologic surgical procedure, is it really necessary to collect a urine culture sample beforehand? (2) Is the presence of preoperative AB a determinant factor for postoperative UTI development in patients receiving antimicrobial prophylaxis according to guidelines? Without evidence for preoperative diagnosis and treatment of AB, unnecessary use of antimicrobials could be prevented, antibiotic stewardship would be improved, and health-care costs related to urine cultures and antimicrobial treatment would be saved.

## MATERIALS AND METHODS

### Study Population, Design, and Inclusion Criteria

The study population consisted of 3137 patients enrolled between December 2008 and October 2013 in a prospective study to evaluate the importance of adherence to EAU guidelines on antimicrobial prophylaxis aimed for the rate of bacterial resistance and cost saving.<sup>9</sup> We revised all clinical charts and medical records of enrolled patients and selected 2201 patients who had been treated in accordance to EAU guidelines.<sup>4</sup> In the present paper, we analyze all patients who had received an antimicrobial prophylaxis schedule in line with EAU guidelines and had undergone urologic endoscopic or laparoscopic procedures, or open surgery. All patients who had undergone urologic diagnostic procedures, such as simple cystoscopy, were not included because of the fact that we aimed to evaluate the role of AB assessment and treatment in urologic surgical procedures only. The design of this retrospective case-control study aimed to identify factors that could contribute to medical complications. Subjects who experienced the condition or disease ("cases") were compared with those who

did not, but who were otherwise similar ("controls").<sup>10</sup> The selected patient population was subdivided into 2 groups: group A (patients with microbiologically verified preoperative AB) and group B (patients without AB). Data regarding postoperative symptomatic UTIs for the 2 groups were compared as the main outcome measurement.

### Data Collection

The following clinical data were collected: date of birth, gender, history of UTIs, body mass index, American Society of Anesthesiologists score, Altemeier classification, history of antimicrobial use, diagnosis on admission and comorbidities, preoperative urine culture results, outcome (symptomatic postoperative UTIs, yes or no; febrile UTIs, yes or no), and postoperative urine culture results. The wound contamination classification as described by Altemeier et al stratified all wounds into clean, clean-contaminated, contaminated, and dirty or infected, and has been used in this study as a useful tool for comparing the risk of postoperative infectious complications among all enrolled patients.<sup>11</sup> All data were recorded by using a dedicated database or, in case of missing data, by reviewing available electronic ambulatory medical charts (Hospital Information System—Java 15.0\_06, windows XP [5.1]). Patients with incomplete clinical or microbiological information were excluded from the analysis.

### Definition of Postoperative Infectious Complications

An infectious complication related to surgery following antimicrobial prophylaxis was defined as either manifestation of symptoms related to UTI and confirmed by microbiological analysis or surgical site infections.<sup>12</sup>

### Microbiological Considerations

All isolates were identified by standard microbiological methods described in the literature.<sup>13</sup> In accordance with Hooton et al,<sup>13</sup> susceptibility testing was performed using the VITEK II semiautomated System for Microbiology (BioMerieux, Marcy l'Etoile, France). The Kirby-Bauer disc diffusion method was employed according to the recommendations of the Clinical and Laboratory Standards Institute.<sup>14</sup> Here, we considered only patients with the presence of AB defined by the presence of at least  $10^5$  colony-forming units of uropathogen bacteria per milliliter, as reported in our previous study.<sup>15</sup> Ciprofloxacin, levofloxacin, third- and fourth-generation cephalosporins (ceftazidime, ceftriaxone, cefepime), piperacillin-tazobactam, carbapenems (imipenem, meropenem), aminoglycosides (gentamicin), and vancomycin resistance patterns against all isolated pathogens were analyzed. Criteria for antimicrobial susceptibility or resistance were defined according to the Clinical and Laboratory Standards Institute.

### Statistical and Ethical Considerations

Informed consent was not required as all procedures were performed according to routine standards. The study was conducted in line with the Good Clinical Practice guidelines and the ethical principles laid down in the latest version of the Declaration of Helsinki. The local ethics committee, asked to evaluate the study, deemed it exempt from their approval on account of its retrospective nature. Categorical variables were presented in percentages and compared using  $\chi^2$  analysis. Continuous variables were presented as mean  $\pm$  standard deviation and compared with Student *t* test or the Mann-Whitney *U* test. Relative risks and 95% confidence intervals were estimated by applying

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