
Advisory Statement

Antibiotic Prophylaxis for Urological Patients with Total Joint Replacements

American Urological Association; American Academy of Orthopaedic Surgeons

An expert panel of urologists, orthopaedic surgeons and infectious disease specialists, convened by the American Urological Association (AUA) and the American Academy of Orthopaedic Surgeons (AAOS) performed a thorough review of all available data to determine the need for antibiotic prophylaxis to prevent hematogenous prosthetic joint infections in urological patients who have undergone total joint arthroplasties. The result is this report, which has been adopted by both organizations as an advisory statement. The panel's conclusion: Antibiotic prophylaxis is not indicated for urological patients on the basis of pins, plates and screws, nor is it routinely indicated for most urological patients with total joint replacements on that basis alone. However, it is advisable to consider premedication in a small number of patients (Table 1) who may be at potential increased risk of hematogenous total joint infection.

Bacteremias are known to cause hematogenous seeding of total joint implants, both in the early postoperative period and for many years following implantation.²⁶ Probably the most critical

period are the first two years after joint replacement.¹⁴ Bacteremias do occur in the course of normal daily life activities^{2,10,12} and have been known to also occur following medical and dental procedures.¹² Clearly, bacteremias will occur as a result of acute infections in anatomic sites such as the oral cavity,^{1,5} skin, pulmonary, gastrointestinal, and urogenital systems. These have also been associated with late prosthetic implant infection.⁵

Antibiotic prophylaxis is indicated for many urological patients to prevent urinary tract infections. The recommendations in this statement, however, pertain only to consideration of bacteremia, which is less frequently a concern than urinary tract infection. The published evidence concerning urological procedures that might be at high risk for bacteremia is sparse,²² and as such recommendations for prevention of bacteremia are based on consensus and expert opinion rather than explicit data. For some urological patients, even if antibiotic prophylaxis against hematogenous infections of joint infection is not recommended, antibiotics might still be indicated for prophylaxis against urinary tract or other infections.^{11,21,28}

These recommendations assume that the patient's urine is sterile pre-operatively. If any bacteriuria is present pre-operatively, then the risk of bacteremia is dramatically increased²² and antibiotic treatment of the bacteriuria is required prior to manipulation of the urinary tract.

Antibiotic prophylaxis is not indicated for urologic patients who have had orthopedic surgery that has included pins, plates and/or screws. Antibiotic prophylaxis is not indicated for most healthy patients with total joint replacements. There is limited evidence that some patients with total joint replacements may be at higher risk for hematogenous infections, including (Table 1):

patients within two years post implant surgery,¹⁴ immunocompromised patients, those who had previous prosthetic joint infections, and those with some other conditions.^{4,5,14,15,16,20,25}

Antibiotic prophylaxis for such patients undergoing urologic procedures with a higher bacteremic risk (as defined in Table 2) should be considered using an empirical regimen (Table 3).

Occasionally a patient with a total joint prosthesis may present to the urologist with the recommendation from his/her orthopaedic surgeon that is not consistent with these guidelines. This could be due to special considerations about the patient's medical condition that are not known to the urologist, or to lack of familiarity with the guidelines. In this situation, the urologist is encouraged to consult with the orthopaedic surgeon to determine if there are any special considerations that might affect the decision on whether or not to use antibiotics, and may wish to share a copy of these guidelines with the orthopaedic surgeon, if appropriate. After this consultation, the urologist may decide to follow the orthopaedic surgeon's recommendations, or, if in the urologist's professional judgment antibiotic prophylaxis is not indicated, may decide to proceed without antibiotic prophylaxis. The urologist is ultimately responsible for making treatment recommendations for his/her patients based on professional judgment. Any perceived potential benefit of antibiotic prophylaxis must be weighed against the known risks of antibiotic toxicity, allergy, and development, selection and transmission of microbial resistance.

This statement provides guidelines to supplement practitioners in their clinical judgment regarding antibiotic prophylaxis for urologic patients with total joint prostheses. It is not intended as the standard of care, nor as a substitute for clinical judgment, as it is impossible to

make recommendations for all conceivable clinical situations in which bacteremia from the genito-urinary tract may occur. Practitioners must exercise their own clinical judgment to determine whether or not antibiotic prophylaxis is appropriate.

The AUA/AAOS Expert Panel consisted of: Paul D. Holtom, MD; Raymond J. Leveillee, MD; Michael J. Patzakis, MD; Ira D. Sharlip, MD; Jerome D. Wiedel, MD; J. Stuart Wolf, Jr., MD.
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Table 1. Patients at Potential Increased Risk of Hematogenous Total Joint

Infection^{3,4,5,13,14,15,19,22}

- A. All patients during the first two (2) years after prosthetic joint replacement.
- B. Immunocompromised/immunosuppressed patients
 - Inflammatory arthropathies (e.g.: rheumatoid arthritis, systemic lupus erythematosus)
 - Drug -induced immunosuppression
 - Radiation-induced immunosuppression
- C. Patients with co-morbidities (e.g.)
 - Previous prosthetic joint infections
 - Malnourishment
 - Hemophilia
 - HIV infection
 - Diabetes
 - Malignancy

Table 2: Risk Stratification of Bacteremic Urologic Procedures^{6,8,11,17-19, 21,22,24,27,28}

Higher Risk*

- Any stone manipulation (includes shock wave lithotripsy)
- Any procedure with transmural incision into urinary tract (does not include simple ligation with excision or percutaneous drainage procedure)
- Any endoscopic procedures of upper tract (ureter and kidney)
- Any procedure that includes bowel segments
- Transrectal prostate biopsy

- Any procedure with entry into the urinary tract (except for transurethral catheterization) in individuals with higher risk of bacterial colonization:
 - Indwelling catheter or intermittent catheterization
 - Indwelling ureteral stent
 - Urinary retention
 - History of recent / recurrent urinary tract infection or prostatitis
 - Urinary diversion

Lower Risk**

- Endoscopic procedures into urethra and bladder without stone manipulation or incision (includes fulguration and mucosal biopsy, if no incision)
- Open surgical or laparoscopic procedures without stone manipulation or incision into the urinary tract
- Catheterization for drainage or diagnostic instrumentation, including both transurethral and percutaneous access

* Prophylaxis for higher risk patients should be considered for patients with total joint replacement that meet the criteria in Table 1. No other patients should be considered for antibiotic prophylaxis prior to urologic procedures on the basis of the orthopaedic implant alone, although antibiotics still may be indicated for prophylaxis against urinary tract or other infections.

** Prophylaxis for lower risk patients not indicated on the basis of the orthopaedic implant alone, although antibiotics still may be indicated for prophylaxis against urinary tract or other infections.

Table 3: Suggested Antibiotic Prophylaxis Regimens^{9,21,22}

A prophylactic antibiotic is chosen on the basis of its activity against endogenous flora likely to be encountered, its toxicity, and its cost. In order to prevent bacteriuria, an appropriate dose of a prophylactic antibiotic should be given preoperatively so that effective tissue concentration is present at the time of instrumentation or incision.

- Recommended agents include
 - A single systemic level dose of a quinolone (e.g., ciprofloxacin, 500 mg; levofloxacin, 500 mg; ofloxacin, 400 mg) orally one to two hours preoperatively.
 - Ampicillin 2 gm IV (or Vancomycin 1 gm IV over 1 to 2 hours, in patients allergic to ampicillin) plus Gentamicin 1.5 mg/kg IV 30 to 60 minutes preoperatively.⁹
- For some procedures, additional or alternative agents may be considered for prophylaxis against specific organisms.

REFERENCES (Alphabetical)

1. Bartzokas CA, Johnson R, Jane M, Martin MV, Pearce PK, Saw Y: Relation between mouth and haematogenous infections in total joint replacement. *BMJ* 1994;309:506-508.
2. Bender IB, Naidorf IJ, Garvey GJ: Bacterial endocarditis: A consideration for physicians and dentists. *J Amer Dent Assoc* 1984;109:415-420.
3. Berbari EF, Hanssen AD, Duffy MC, Ilstrup DM, Harmsen WS, Osmon DR: Risk factors for prosthetic joint infection: case-control study. *Clin Infectious Dis* 1998; 27:1247-1254.
4. Brause BD: Infections associated with prosthetic joints. *Clin Rheum Dis* 1986;12:523-536.
5. Ching DW, Gould IM, Rennie JA, Gibson PH: Prevention of late haematogenous infection in major prosthetic joints. *J Antimicrob Chemother* 1989;23:676-680.
6. Chodak GW and Plaut ME: Systemic antibiotics for prophylaxis in urologic surgery: a critical review. *J. Urology* 1979; 121: 695-699.
7. Christiano AP, Hollowell CMP, Kim H, Kim J, Patel R, Bales GT, Gerber GS: Double-blind randomized comparison of single-dose ciprofloxacin versus intravenous cefazolin in patients undergoing outpatient endourologic surgery. *Urology* 2000; 55: 182-185.
8. Cundiff GW, McLennan, MT, Bent, AE: Randomized trial of antibiotic prophylaxis for combined urodynamics and cystourethroscopy. *Obstetrics & Gynecology* 1999; 93: 749-752.
9. Dajani AS. Taubert KA. Wilson W. Bolger AF. Bayer A. Ferrieri P. Gewitz MH. Shulman ST. Nouri S. Newburger JW. Hutto C. Pallasch TJ. Gage TW. Levison ME.

- Peter G. Zuccaro G Jr. Prevention of bacterial endocarditis. Recommendations by the American Heart Association. *JAMA*. 1997; 277:1794-1801.
10. Everett ED, Hirschmann JV: Transient bacteremia and endocarditis prophylaxis: A review. *Medicine* 1977; 56:61-77.
 11. Grabe M: Perioperative antibiotic prophylaxis in urology. *Current Opinion in Urology* 2001; 11: 81-85.
 12. Guntheroth WG: How important are dental procedures as a cause of infective endocarditis? *Amer J Cardiol* 1984;54:797-801.
 13. Hanssen AD, Osmon DR, Nelson CL: Prevention of deep prosthetic joint infection. *J Bone Joint Surg* 1996;78-A(3):458-471.
 14. Jacobson JJ, Millard HD, Plezia R, Blankenship JR: Dental treatment and late prosthetic joint infections. *Oral Surg Oral Med Oral Pathol* 1986; 61:413-417.
 15. Jacobson JJ, Patel B, Asher G, Wooliscroft JO, Schaberg D: Oral Staphylococcus in elderly subjects with rheumatoid arthritis. *J Amer Geriatr Soc* 1997;45:1-5.
 16. Johnson DP, Bannister GG: The outcome of infected arthroplasty of the knee. *J Bone Joint Surg* 1986;688:289-291.
 17. Kapoor DA, Klimberg IW, Malek GH, Wegenke JD, Cox CE, Patterson AL, Graham E, Echols RM, Whalen E and Kowalsky SF: Single-dose ciprofloxacin versus placebo for prophylaxis during transrectal prostate biopsy. *Urology* 1998; 52: 552-558.
 18. Kraklau DM and Wolf JS, Jr.: Review of antibiotic prophylaxis recommendations for office-based urologic procedures. *Techniques in Urology* 1999; 5: 123-128.
 19. Larsen EH, Gasser TC and Madsen PO: Antimicrobial prophylaxis in urologic surgery. *Urological Clinics of North America* 1986; 13: 591-604.

20. Murray RP, Bourne WH, Fitzgerald RH: Metachronous infection in patients who have had more than one total joint arthroplasty. *J Bone Joint Surg* 1991;73-A:1469-1474.
21. Naber KG, Hofstetter AG, Bruhl P, Bichler K-H, Lebert C: Guidelines for the perioperative prophylaxis in urological interventions of the urinary and male genital tract. *Int J Antimicrobial Agents* 2001; 17: 321-326.
22. Olson E, Cookson B: Do antimicrobials have a role in preventing septicaemia following instrumentation of the urinary tract? *Journal of Hospital Infection* 2000: 85-97.
23. Pallasch TJ, Slots J: Antibiotic prophylaxis and the medically compromised patient. *Periodontology 2000* 1996;10:107-138
24. Pearle MS and Roehrborn CG: Antimicrobial prophylaxis prior to shock wave lithotripsy in patients with sterile urine before treatment: a meta-analysis and cost-effectiveness analysis. *Urology* 1997; 49: 679-686.
25. Poss R, Thornhill TS, Ewald FC, Thomas WH, Batte NJ, Sledge CB: Factors influencing the incidence and outcome of infection following total joint arthroplasty. *Clin Orthop* 1984;182:117-126.
26. Rubin R, Salvati EA, Lewis R: Infected total hip replacement after dental procedures. *Oral Surg.* 1976;41:13-23.
27. Scholz M, Luftenegger W, Harmuth H, Wolf D and Holtl W: Single-dose antibiotic prophylaxis in transurethral resection of the prostate: a prospective randomized trial. *Br. J. Urology* 1998; 81: 827-829.
28. Terris MK: Recommendations for prophylactic antibiotic use in genitourinary surgery. *Contemporary Urology* Sept 2001; 12-27.

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