AAOS American Academy of Orthopaedic Surgeons
American Association of Orthopaedic Surgeons

Information Statement

Antibiotic Prophylaxis for Bacteremia in Patients with Joint Replacements

This Information Statement was developed as an educational tool based on the opinion of the authors. Readers are encouraged to consider the information presented and reach their own conclusions.

This statement represents the AAOS' current recommendations on this topic. The AAOS regularly reviews and updates all informational statements as new technology, evidence, or policy is developed. It is possible that these current recommendations may change as the result of the ongoing clinical guidelines development process around the topic of antibiotic prophylaxis for total joint patients undergoing dental procedures. As such, clinicians are encouraged to consider the recommendations in the context of their specific clinical situation and consult, where appropriate, other sources of clinical, scientific, or regulatory information prior to making a treatment decision. Clinicians are encouraged to check the AAOS website for the most up-to-date information.

More than 1,000,000 total joint arthroplasties are performed annually in the United States, of which approximately 7 percent are revision procedures.[1] Deep infections of total joint replacements usually result in failure of the initial operation and the need for extensive revision, treatment and cost. Due to the use of perioperative antibiotic prophylaxis and other technical advances, deep infection occurring in the immediate postoperative period resulting from intraoperative contamination has been markedly reduced in the past 20 years.

Bacteremia from a variety of sources can cause hematogenous seeding of bacteria onto joint implants, both in the early postoperative period and for many years following implantation. [2] In addition, bacteremia may occur in the course of normal daily life[3-5] and concurrently with dental, urologic and other surgical and medical procedures.[5] The analogy of late prosthetic joint infections with infective endocarditis is invalid as the anatomy, blood supply, microorganisms and mechanisms of infection are all different.[6]

It is likely that bacteremia associated with acute infection in the oral cavity,[7,8] skin, respiratory, gastrointestinal and urogenital systems and/or other sites can and do cause late implant infection. [8] Practitioners should maintain a high index of suspicion for any change or unusual signs and symptoms (e.g. pain, swelling, fever, joint warm to touch) in patients with total joint prostheses. Any patient with an acute prosthetic joint infection should be vigorously treated with elimination of the source of the infection and appropriate therapeutic antibiotics.[8,9]

Patients with joint replacements who are having invasive procedures or who have other infections are at increased risk of hematogenous seeding of their prosthesis. Antibiotic

prophylaxis may be considered, for those patients who have had previous prosthetic joint infections, and for those with other conditions that may predispose the patient to infection (Table 1). [8,10-16] There is evidence that some immunocompromised patients with total joint replacements may be at higher risk for hematogenous infections.[10-18] However, patients with pins, plates and screws, or other orthopaedic hardware that is not within a synovial joint are not at increased risk for hematogenous seeding by microorganisms.

Given the potential adverse outcomes and cost of treating an infected joint replacement, the AAOS recommends that clinicians consider antibiotic prophylaxis for joint replacement patients with one or more of the following risk factors prior to any invasive procedure that may cause bacteremia.

Table 1. Patients at Potential Increased Risk of Hematogenous Total Joint Infection[8,10-16,18]

- All patients with prosthetic joint replacement
- Immunocompromised/immunosuppressed patients
- Inflammatory arthropathies (e.g.: rheumatoid arthritis, systemic lupus erythematosus)
- Drug-induced immunosuppression
- Radiation-induced immunosuppression
- Patients with co-morbidities (e.g.: diabetes, obesity, HIV, smoking)
- Previous prosthetic joint infections
- Malnourishment
- Hemophilia
- HIV infection
- Insulin-dependent (Type 1) diabetes
- Malignancy
- Megaprostheses

Prophylactic antibiotics prior to any procedure that may cause bacteremia are chosen on the basis of its activity against endogenous flora that would likely to be encountered from any secondary other source of bacteremia, its toxicity, and its cost. In order to prevent bacteremia, an appropriate dose of a prophylactic antibiotic should be given prior to the procedure so that an effective tissue concentration is present at the time of instrumentation or incision in order to protect the patient's prosthetic joint from a bacteremia induced periprosthetic sepsis. Current prophylactic antibiotic recommendations for these different procedures are listed in Table 2. [19]

Occasionally, a patient with a joint prosthesis may present to a given clinician with a recommendation from his/her orthopaedic surgeon that is not consistent with these recommendations. This could be due to lack of familiarity with the recommendations or to

special considerations about the patient's medical condition which are not known to either the clinician or orthopaedic surgeon. In this situation, the clinician is encouraged to consult with the orthopaedic surgeon to determine if there are any special considerations that might affect the clinician's decision on whether or not to pre-medicate, and may wish to share a copy of these recommendations with the physician, if appropriate. After this consultation, the clinician may decide to follow the orthopaedic surgeon's recommendation, or, if in the clinician's professional judgment, antibiotic prophylaxis is not indicated, may decide to proceed without antibiotic prophylaxis.

Table 2.

Procedure	Antimicrobial Agent	Dose	Timing	Duration
Dental	Cephalexin, cephradine, amoxicillin	2 gm PO	1 hour prior to procedure	Discontinued within 24 hours of the procedure. For most outpatient/office-based procedures a single pre-procedure dose is sufficient.
Ophthalmic	Gentamicin, tobramycin, ciprofloxacin, gatifloxacin, levofloxacin, moxifloxacin, ofloxacin, or meomycin-gramicidin-polymyxin B cefazolin	Multiple drops topically over 2 to 24 hours or 100 mg subconjunctivally	Consult ophthalmologist or pharmacist for dosing regimen	
Orthopaedic†	Cefazolin Cefuroxime OR Vancomycin	1-2 g IV 1.5 g IV 1 g IV	Begin dose 60 minutes prior to procedure	
Vascular	Cefazolin OR Vancomyin	1-2 g IV 1 g IV	Begin dose 60 minutes prior to procedure	
Gastrointestinal				
Esophageal, gastroduodenal	Cefazolin	1 -2 g IV	Begin dose 60 minutes prior to procedure	
Biliary tract	Cefazolin	1-2 g IV		
Colorectal	Neomycin + erythromycin base (oral)	1 g	Dependent on time of procedure, consult with GI physician and/or pharmacist	
	OR metronidazole (oral)	1 g		
Head and neck	Clindamycin + gentamicin OR cefazolin	600-900 mg IV 1.5 mg/kg IV 1-2 g IV	Begin dose 60 minutes prior to procedure	
Obstetric and gynecological	Cefoxitin, cefazolin Ampicillin/sulbactam	1-2 g IV 3 g IV	Begin dose 60 minutes prior to procedure	
Genitourinary	Ciprofloxacin	500 mg PO or 400 mg IV	1 hour prior to procedure Begin dose 60 minutes prior to procedure	

† If a tourniquet is used the entire dose of antibiotic must be infused prior to its inflation

This statement provides recommendations to supplement practitioners in their clinical judgment regarding antibiotic prophylaxis for patients with a joint prosthesis. 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 bacteremias may occur. The treating clinician is ultimately responsible for making treatment recommendations for his/her patients based on the clinician's 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. Practitioners must exercise their own clinical judgment in determining whether or not antibiotic prophylaxis is appropriate.

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