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REVIEW ARTICLE

Issues in Professional Judgment: Antibiotic Prophylaxis in Client with Prosthetic Joint

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ABSTRACT

Issues related to clinical decision-making regarding prescribing antibiotic prophylaxis prior to oral procedures for the client with a prosthetic joint are discussed.

Method: PubMed and relevant professional guidelines were searched for research and for evidence-based guidelines.

Outcome: There is a need for evidence-based guidelines developed by stakeholders including the American Academy of Orthopedic Surgeons, the American Dental Association and the Infectious Disease Society. There is an absence of level 1 evidence for or against the use of prophylactic antibiotics in patients with prosthetic joints undergoing invasive dental treatment. Therefore, until the professional organizations provide evidence-based guidance, professional judgment must depend on the client history following joint replacement and the state of the host immune response.

Keywords: Antibiotic prophylaxis, Total joint replacement, Dental care.

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INTRODUCTION

Surgical replacement of total hip and knee joint arthoplasty is expected to increase due to an aging population and the most common reason for replacement, that being disabling effects of arthritis (both osteoarthritis and rheumatoid arthritis).[1] Although the worldwide prevalence of total joint replacements is unclear, what is clear is that hip and knee replacement is a common procedure in orthopedic practice of medicine.[2] Prosthetic joint infections (PJIs) are rare but serious complications do occur in 0.3 to 1.0% of patients after primary total hip replacement and 1.0 to 2.0% of patients after primary total knee replacements.[3] The greatest risk occurs during the first two postoperative years (6.5, 3.2 and 1.4 infections per 1000 patient-years during the first year, second year and after the second year respectively).[3] Staphylococci are the most common cause of PJI and are uncommon in the oral cavity.[4] Devastating personal and financial consequences can arise following PJI. Treatment often requires removal of the infected prosthesis and prolonged intravenous antimicrobial therapy, along with an estimated cost exceeding $50,000.00 for each episode.[4]

Efficacy of Antibiotic Prophylaxis

In the proceedings of a symposium on antimicrobial therapy published in 2011[3] researchers expressed the need for evidence-based guidelines for deciding to use antibiotic prophylaxis (AP) prior to dental procedures when the client has a history of prosthetic joint replacement. Despite the routine use of AP perioperatively during joint replacement surgery, most PJIs are caused by bacterial seeding during the replacement surgical procedure. Late prosthesis infection via hematogenous seeding (bacteremia) is a less common cause. Among PJIs occurring via the hematogenous route, most result from *S. aureus* bacteremia, skin infections or urosepsis.[5] The development of a PJI due to hematogenous seeding after dental procedures is thought to be a rare event. According to a recent literature review, this occurred in 0.04 to 0.20% of reported PJI case series, and many of these infections were not documented with microbiological verification of bacterium from the oral cavity.[6] Whether AP will prevent PJI following dental procedures is unknown as no randomized trials have been completed.[7] Prior to the 1997 joint statement between the American Dental Association (ADA) and the American Academy of Orthopedic Surgeons[8] (AAOS) any patient with a history of total joint replacement (TJR) was advised to receive AP prior to oral procedures. During this time concern increased regarding development of antibiotic resistance and the connection to unnecessary use of antibiotics. Antibiotic prophylaxis was suggested as a practice promoting antibiotic resistance.[8] This adverse effect led the professional associations' expert committees to identify appropriate uses for AP in the patient with TJR.[7] The 1997 joint statement (updated in 2003 with minor revisions)[9] determined that only selected individuals with TJR would likely benefit from antibiotic prophylaxis and specified oral procedures involving significant bleeding as likely to cause bacteremia. In 2009, without collaboration with the ADA, the AAOS published a new statement calling for antibiotic prophylaxis prior to oral procedures in all individuals with a TJR.[10]

The updated 2003 joint policy developed by representatives from the ADA and the AAOS was based on expert opinion and is no longer supported by the AAOS.[11] According to the ADA, 'the organization and the AAOS are currently in the process of developing evidence-

based clinical guidelines on the topic of antibiotic prophylaxis for patients with orthopedic implants undergoing dental procedures. The ADA and AAOS do not have a joint recommendation at this time. There are differing opinions on the need for antibiotic prophylaxis.[11] The ADA believes that the professional goal should be consensus among the dentist and physician. This is the goal being pursued in the ongoing ADA/AAOS project to develop joint guidelines following a systematic review of the literature.

Antibiotic prophylaxis is a practice of administering antibiotics when no infection exists, but with the goal of preventing an infection from a transient bacteremia. National guidelines determined AP does not eliminate bacteremia,[12] a randomized clinical study found that administration of AP prior to tooth extraction did not eliminate bacteremia formation,[13] and a recent case control study reported that AP did not reduce prosthetic joint infection nor were dental procedures risk factors for subsequent prosthetic joint infection.[14] A factor that was associated with a lower risk of PJI was good oral hygiene or oral health (OR 0.7; 95% CI 0.5-1.03).[14]

Role of Oral Health to Reduce Magnitude of Bacteremia

A recent randomized study demonstrated that bacteremia after toothbrushing is associated with poor oral hygiene and gingival bleeding.[15] This toothbrushing study reported an almost eightfold increase in the risk for bacteremia in the group with generalized bleeding. A prior analysis of data from this study reported the incidence of bacteremia in the group with high plaque and calculus scores was not significantly different from the group having a single tooth extraction.[13] Results, such as this, support the recommendation for individuals with prosthetic joints to maintain healthy oral tissues. The recommendation for individuals to maintain healthy periodontal tissues and reduce apical or other oral infection comes from the logic that healthy tissues would lower the magnitude of bacteremia. Since having bacteria in the circulation is the perceived avenue for prosthetic joint infection, this recommendation seems logical. It must be stated, however, that no research has demonstrated that healthy oral tissues prevent prosthetic joint infection. Good oral hygiene and prevention of dental disease could possibly decrease the frequency of bacteremia from daily activities and may protect against PJI. As well, developing a recommendation to give AP before oral procedures for the purpose of preventing associated bacteremia formation and prosthetic joint infection when research does not demonstrate the practice to be successful, is not an evidence-based clinical decision.

CONCLUSION

The upcoming joint guidelines regarding the use of AP prior to oral procedures being developed by representatives from the AAOS, ADA and the Infectious Disease Society is being anxiously awaited by the worldwide dental community. It should be available by mid-2012 (personal communication with Peter Lockhart, committee member). Since, adverse effects of taking antibiotics injudiciously include the development of antibiotic resistance, as well as other potential infections (antibiotic-associated diarrhea, candidiasis, etc.). This issue must be based on evidence-based science. The benefits and risks of AP to the patient with a prosthetic joint who desires oral procedures must be clearly defined.

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