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ONE MINUTE CONSULT
BRIEF ANSWERS TO SPECIFIC CLINICAL QUESTIONS

Q: Getting to the root of the problem: Should my patient receive antibiotics before dental procedures to prevent infective endocarditis?

A: There has been some confusion within the medical community about antibiotic prophylaxis for specific patient populations before undergoing dental procedures.[1,2] Guidelines have changed significantly from the original 1955 recommendations that initially included longer antibiotic courses and a more generalized patient population.[1,2]

Individual risk for infective endocarditis depends on both inherent patient risk factors and procedural risk factors. The American Heart Association,[3] Thornhill et al,[1] and the American Dental Association[4] have provided guidelines and definitions of patient characteristics associated with higher risk of developing infective endocarditis and stratification of various dental procedures:

- Prior history of infective endocarditis
- Prosthetic material used for heart valve repair (including percutaneous valve procedures)
- Unrepaired cyanotic congenital heart disease
- Repaired congenital heart disease in which palliative shunts or conduits were used
- Complete repair or heart transplant with subsequent valvulopathy.[1,3,4]

Here, we offer practical points to aid decision-making related to antibiotic prophylaxis for patients and clinicians.

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ANTIBIOTIC PROPHYLAXIS AND INFECTIOUS DISEASES

A major aspect of infectious disease practice is to promote antibiotic stewardship for the community at large, which helps to prevent ongoing antibiotic resistance and prevent unnecessary harm to patients from interventions. Infective endocarditis is associated with significant morbidity and mortality; however, given its overall low incidence,[1] randomized controlled clinical trials to study antimicrobial prophylaxis is impractical and unlikely to be completed. Furthermore, it is important to discuss the utility of prophylaxis in patients with prosthetic joints undergoing dental procedures as this has been a controversial topic among clinicians.[2]

If a high-risk patient undergoes an invasive dental procedure, ie, involving gingival or apical manipulation or oral mucosa perforation, it is reasonable to give a single dose of antibiotic prophylaxis 30 to 60 minutes before the invasive dental procedure, usually amoxicillin 2 g. For patients allergic to penicillin, other options include single doses of cephalexin 2 g, doxycycline 100 mg, or azithromycin 500 mg.[3]

Risk classification

A recently published cohort study by Thornhill et al[1] performed risk-stratified, case-crossover analyses of roughly 8 million US patients. It is the only study in recent times to demonstrate that antibiotic prophylaxis in high-risk patients before invasive dental

procedures is successful in decreasing the incidence of infective endocarditis (odds ratio 0.38, $P = .002$). The study also found a statistically significant temporal relationship between invasive procedures and the subsequent development of infective endocarditis in high-risk patients (odds ratio 2.00, $P = .002$). Further, they classified patients in need of prophylactic antibiotics according to the type of procedure:

- Invasive: use antibiotic prophylaxis (eg, tooth extraction, oral surgery, scaling)
- Intermediate: possible use of antibiotic prophylaxis (eg, fillings, crowns)
- Noninvasive: antibiotic prophylaxis not necessary (eg, oral examination without gingival-apical manipulation, placement of removable orthodontic appliances).[1,3]

This study has limitations.[1] First, the data were obtained from 2000 to 2015 and may not be representative of the current cardiac population given the boom in newer prosthetic valve interventions.[5,6] Also, there was no microbial identification, which raises the question of another potential cause of infective endocarditis other than the patient's recent dental procedures.[1] Lastly, the study did not capture the population lacking dental insurance, who are more likely to have poor oral hygiene and may have different endocarditis risk profiles.

An interesting aspect seen in this study was the low level of clinician adherence to established guidelines, as approximately one-third of high-risk individuals who underwent invasive dental procedures received antibiotic prophylaxis.[1] Compliance has been a long-standing issue commented on by Wahl[7] in the 1990s, when even cardiologists were roughly 50% compliant with American Heart Association guidelines. In a separate survey, it was shown that dentists were also nonadherent with guidelines and often overprescribed antibiotic prophylaxis owing to medical-legal concerns (24%) and inappropriate classification of high-risk groups, including history of type 2 diabetes (27%), human immunodeficiency virus (18%), and chronic kidney disease (13%).[8]

MULTIDISCIPLINARY APPROACH

Currently, a multifactorial approach can be used to decrease the risk of infective endocarditis and includes good oral hygiene and education and counseling of patients to self-monitor.

Oral hygiene

An important modifiable risk factor recognized by the American Heart Association is good oral hygiene, which is believed to be far more important than antibiotic prophylaxis before invasive dental procedures.[2] Routine daily dental care such as toothbrushing has been reported to lead to transient oral bacteremia known to be associated with infective endocarditis, which cumulatively could represent a significant risk over time.[9] Further research has shown that good dental health has been associated with less incidence of this transient bacteremia.[10] Thus, ensuring proper access to and utilization of dental services is another key feature of good oral health. A recent study by the National Center for Health Statistics[11] looked at access to dental insurance in the United States and showed wide variability, with only 50% of adults age 18 to 64 having had dental coverage during the 12-month study period.

Self-monitoring

Education and counseling of high-risk patients regarding taking prophylactic antibiotics and monitoring for febrile illnesses after dental procedures is a crucial part of care.[12] For febrile patients, emphasis on the importance of getting blood cultures before systemic antibiotic therapy must be stressed. This can be instrumental in early detection of organisms and early diagnosis and can hopefully lead to rapid de-escalation of therapy, all of which lead to better prognosis for patients.

Additionally, it is important to advise patients to be evaluated by dentistry before advanced cardiac procedures, with the goal of improving oral health and potentially decreasing the risk of infective endocarditis.

PROSTHETIC JOINT INFECTION: INSUFFICIENT EVIDENCE FOR REGULAR PROPHYLAXIS

Although it was common in the past for patients with prosthetic joints undergoing invasive dental procedures to receive antibiotic prophylaxis to prevent infection, recent guidelines have shifted away from regular prophylaxis owing to insufficient evidence. In a UK cohort study, Thornhill et al[13] noted no significant temporal association with prosthetic joint infection after invasive dental procedures. A review by Goff et al[2] revealed the pitfalls present in the system of private dentistry, including the lack of awareness by orthopedic surgeons, dentists, and primary care physicians regarding actual infection risk after invasive dental procedures, estimated to be less than 1%.[14] They also described the lack of awareness regarding disadvantages of overprescribing antibiotics leading to patient harm from *Clostridioides difficile* infection and other adverse drug reactions.

TAKE-HOME POINTS

- We understand the extreme caution taken when prescribing prophylactic antibiotics. Currently, there are no reliable data to support prophylaxing the general joint-replacement population.
- However, for immunocompromised patients, such as those with human immunodeficiency virus, transplant recipients, patients on chemotherapy or those with history of prosthetic joint infections treated surgically, there are conflicting guidelines about antibiotic prophylaxis and further research is warranted.[2]
- There is convincing evidence currently to prescribe antibiotic prophylaxis to those high-risk patients undergoing invasive dental procedures as described.
- It is important to stress that the overall incidence of infective endocarditis after dental procedures is low, and that good oral hygiene, adherence to guidelines, and access to dental care should be at the forefront.
- There is always room to improve on antibiotic stewardship for our patients at large, and we hope that our comments clarify some of the questions that may arise.

DISCLOSURES

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