

The impact of oral disease and nonsurgical treatment on bacteremia in children

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Studies have demonstrated a wide range of incidence, nature (species of bacteria) and duration (IND) of bacteremia after dental office procedures that are both minimally invasive (for example, tooth brushing) and more invasive (for example, dental extractions).¹⁻⁶ The impact of bacteremia from dental procedures on the risk of developing infective endocarditis (IE) remains controversial, as the American Heart Association (AHA) guidelines for prevention of IE from dental procedures are not based on prospective clinical trials.⁷

The impact of dental disease on the IND of bacteremia after dental procedures still is unclear; no associations are found in some studies,^{8,9} and a significant effect is found in others.^{1,10-13} Similar to the literature on adults, investigators have reported a wide range of IND of bacteremia in children,^{8,12,14-18} and the role of dental disease in IND is poorly understood. In a study by Lockhart and colleagues,¹⁴ the investigators randomized 100 children to receive an antibiotic or a placebo before dental rehabilitation in an operating room (OR) setting.¹ They reported the role of the AHA-recommended dose of amoxicillin in moderating the IND of bacteremia in children younger than 8 years and demonstrated that the incidence of bacteremia was reduced significantly in the amoxicillin

ABSTRACT



Background. The authors examine the role of dental disease and nonsurgical dental procedures in the incidence and duration of bacteremia in children.

Methods. The authors randomized a group of children to receive amoxicillin or a placebo before dental rehabilitation in an operating room setting. They collected eight blood draws at the following times: two minutes after intubation (draw 1); after dental restorations, pulp therapy and cleaning (draw 2); 10 minutes later (draw 3); and five draws during and after dental extractions (draws 4-8). The authors compared dental disease parameters and the type of dental procedures performed with the incidence and duration of bacteremia.

Results. The authors enrolled 100 children (aged 1-8 years) in the study. The incidence of bacteremia from draw 2 was 20 percent in the placebo group and 6 percent in the amoxicillin group ($P = .07$), and the incidence from draw 3 was 16 percent in the placebo group and zero percent in the amoxicillin group ($P = .03$). Subjects with higher gingival scores were more likely to have a bacteremia for draw 2 ($P = .01$). The authors found that subjects in the group with bacteremia for draw 3 had undergone more pulpotomies than did subjects in the group without bacteremia for draw 3 (3 ± 2.5 standard deviation [SD] versus 1.5 ± 1.6 SD, $P = .04$), while they found almost no differences for draw 2.

Conclusions. This study suggests that gingival disease has an impact on bacteremia after dental restorations and prophylaxis. Although antibiotics have an impact, they do not eliminate bacteremia altogether.

Key Words. Bacteremia; infective endocarditis; pediatric dental care; gingival diseases.

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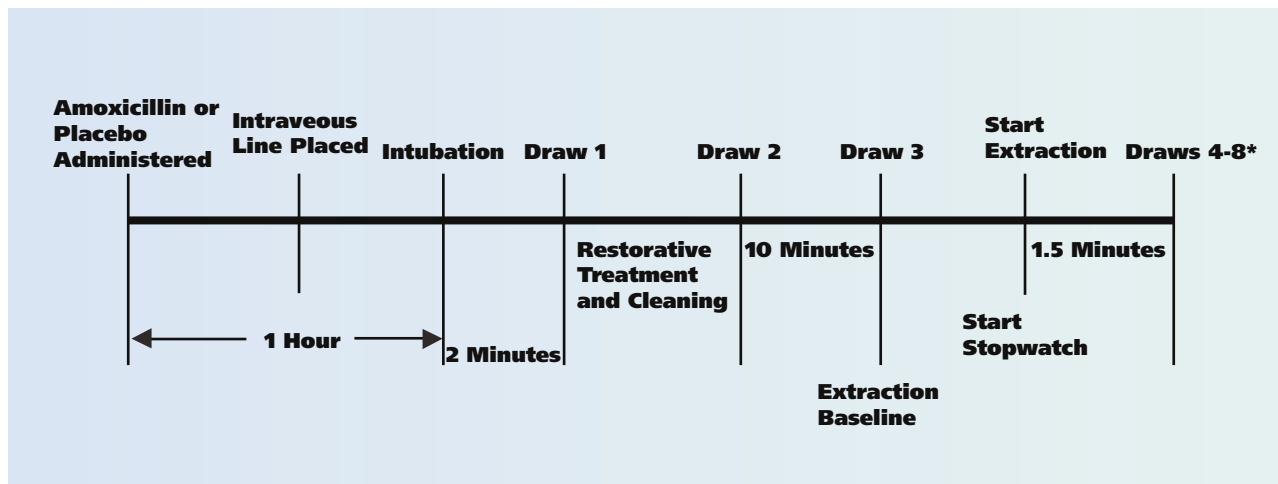


Figure. Study timeline. * In cases of single tooth extractions, the fifth blood draw took place three minutes after the initiation of the first extraction. Adapted and modified with permission by Lippincott Williams and Wilkins from Lockhart and colleagues.¹⁴

group compared with the placebo group (33 percent versus 84 percent, $P < .0001$). The species of bacteria and duration of bacteremia also were affected. The severity of dental disease did not affect the incidence of bacteremia shortly after extractions, but increases in age and number of teeth extracted were associated with higher incidence levels of bacteremia.

The goal of our study was to examine the role of dental disease and nonsurgical dental procedures on the incidence and duration of bacteremia in children.

SUBJECTS, MATERIALS AND METHODS

We enrolled 100 children who required dental treatment in an OR setting owing to uncooperative behavior, young age or the extent of treatment needs. We obtained consent from each child's parent or legal guardian as approved by the institutional review board at Carolinas Medical Center, Charlotte, N.C. We randomized the subjects using a computer-generated random number scheme, and used identical-appearing syringes to administer the placebo or the amoxicillin. All of the investigators were blinded to the assigned treatment.

The subjects received the AHA-recommended dose of an amoxicillin elixir (50 milligrams/kilogram) or a placebo one hour before dental rehabilitation in an OR setting (Figure). We then sedated the subjects with midazolam and brought them to the OR, where we performed a mask induction and placed an intravenous line for anesthetic administration purposes. For blood culture draws, we placed a large-bore (18-22 grams)

angiocath needle with a line in the antecubital fossa or dorsum of the hand, after we prepared the skin in the usual manner with alcohol, followed by povidone-iodine (10 percent).

We drew 6 milliliters of blood (draw 1) two minutes after we initiated intubation. After placing throat packs, we took dental radiographs and conducted a thorough oral examination. After we completed dental restorations, pulp therapy and prophylaxis, we drew a second 6-mL blood sample (draw 2). Ten minutes later, we drew a third 6-mL blood sample (draw 3) to determine the duration of bacteremia after the procedures were performed and as a baseline culture before dental extractions were performed. We have reported data from draw 1 and draws 4 to 8 after dental extractions.¹⁴

We flushed the angiocath needle and line with 3 cubic centimeters of saline after each blood draw, and we drew and discarded 2 cm³ of blood before each draw. The order of dental procedures was completion of the dental restoration followed by dental prophylaxis. Therefore, we performed draw 2 immediately after the dental cleaning; however, the incidence and duration of bacteremia likely also were influenced by the restorative treatment.

In addition to recording demographic variables (age, sex, ethnic group), we recorded the following for each subject:

ABBREVIATION KEY. **AHA:** American Hospital Association. **IE:** Infective endocarditis. **IND:** Incidence, nature (species of bacteria) and duration. **OR:** Operating room.

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