Effects of cardiopulmonary bypass on cefuroxime pharmacokinetics in pediatric cardiovascular surgery patients

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Abstract

Surgical site infections remain a serious and frequent complication of cardiac surgery. Of particular concern are deep sternal wound infections and mediastinitis which can lead to significant morbidity and mortality. Several national healthcare and medical organizations have developed consensus recommendations for the use of antibiotics for surgical prophylaxis. Cefuroxime is recommended as prophylaxis for cardiac surgeries, with the first dose administered within an hour of incision and before initiation of cardiopulmonary bypass. Cardiopulmonary bypass, which is often required for surgical repair of congenital heart defects, has the potential to alter drug pharmacokinetics. To date, no studies evaluate the effects of cardiopulmonary bypass on cefuroxime pharmacokinetics in pediatric cardiac surgery patients. The specific aim of this study is to determine the pharmacokinetic profile of cefuroxime in pediatric patients undergoing open heart surgery and requiring cardiopulmonary bypass. Effects of hemodilution and profound hypothermic circulatory arrest will be evaluated by collecting blood samples at defined milestones of the cardiopulmonary bypass process. This study will provide substantial data regarding appropriate cefuroxime dosing to maintain adequate serum concentrations for pediatric cardiac surgery patients and may lead to future pediatric cardiopulmonary bypass pharmacokinetic studies.