Atrial Fibrillation Prophylaxis After Cardiac Surgery Does Not Reduce Length of Stay


Study Overview

Objective. To determine if β blockers given for atrial fibrillation prophylaxis after cardiac surgery reduce hospital length of stay (LOS) and costs of care.

Design. Randomized, double-blind, placebo-controlled trial with an intention-to-treat analysis.

Setting and participants. The study setting was a single Canadian academic medical center. Eligibility criteria included being scheduled for cardiac surgery with cardiopulmonary bypass grafting and residing at home prior to surgery. Exclusion criteria were applied both preoperatively and postoperatively. Preoperative exclusion criteria included emergent surgery, prior adverse reaction to β blockers, chronic obstructive pulmonary disease, junctional rhythm or second- or third-degree arteriovenous block, and chronic amiodarone use. Postoperative exclusion criteria included sinus bradycardia, a cardiac index of less than 2.3 L/min/m², requirement for intravenous inotropic agent other than low-dose dopamine, and evidence of bronchospasm. Postoperative exclusion criteria were applied within 12 hours of arrival to the intensive care unit (ICU) for a patient to be randomized.

Methods. Patients were randomized to either metoprolol 50 mg every 12 hours or placebo after the patient’s arrival in the ICU. After an interim analysis, the study drug dose was increased to 50 mg every 8 hours for all patients except for patients with a cardiac index above 2.3 L/min/m². The study treatment was continued for 14 days or until hospital discharge.

Main outcome measures. The primary outcome measure was total hospital LOS in hours from arrival in the ICU to hospital discharge. Secondary outcomes included ICU and non-ICU LOS, occurrence of atrial fibrillation, requirement for cardioversion, β-blocker toxicity, stroke, systemic emboli, and death.

Main results. Of 3114 patients undergoing nonemergent cardiac surgery during the study period, 2621 were screened, 1476 met eligibility criteria, and 1306 patients gave consent. After postoperative eligibility screening, 1000 patients were enrolled into the study. 514 patients were randomized to either 50 mg of metoprolol every 12 hours or placebo, and 486 patients were randomized to either 50 mg of metoprolol every 8 hours or placebo. Baseline characteristics in the 2 groups were similar. 146 (29%) patients in the intervention group and 199 (40%) patients in the placebo group received non-study β blockers. The intervention group had a statistically significant reduction in heart rate after 4 days of treatment as compared with the control group (–4.6 beats/min versus +4.2 beats/min; P < 0.001). No significant differences were seen in total LOS between the intervention and study groups (155 ± 90 hours versus 152 ± 61 hours; P = 0.79). Similarly no differences were seen in ICU and non-ICU LOS. The rate of atrial fibrillation was 31% in the intervention group and 39% in the placebo group (P = 0.01). There were no significant differences in the rates of measured postoperative complications; however, patients randomized to the intervention group were more likely to require more than 3 days of mechanical ventilation when compared to the placebo group (P = 0.03). No differences were seen in costs between the 2 groups.

Conclusion. While β-blocker therapy to prevent post-cardiac surgery atrial fibrillation appears effective for reducing this common complication, the reduction in this complication does not appear to reduce hospital LOS or overall hospital costs.

Commentary

Postoperative atrial fibrillation following cardiac surgery is a common occurrence, seen in up to 40% of patients [1]. Because some studies have suggested that postoperative atrial fibrillation might increase hospital LOS [2,3], it is reasonable to assume that β-blocker prophylaxis might reduce hospital stays. However, no major trial has evaluated whether postoperative β blockers actually reduce hospital
LOS as a primary outcome. This well-designed randomized, double-blind, placebo-controlled trial attempts to address this question.

Several problems exist with this study, however. First, the study drug dose was increased during the study. While the higher dosage could have exerted some influence in the study’s ultimate outcome, this is unlikely as analysis of physiological factors in both dosage groups suggested that each group achieved adequate β blockade. Second, 40% of the placebo group received non-study β blockers, which may have biased the outcome results towards the null hypothesis (no difference between the groups). However, about half of the placebo patients who received a non-study β blocker were prescribed this therapy after developing postoperative atrial fibrillation. Finally, the study had a 90% power to detect a 10% reduction in LOS in the patient sample. The sample size calculations were based on a postoperative atrial fibrillation rate of 50%. The actual rate of atrial fibrillation within the study was much lower, resulting in the study being underpowered to detect the predicted difference in LOS.

Applications for Clinical Practice

Treatment with β blockers was effective at reducing postoperative atrial fibrillation but did not reduce overall hospital LOS or hospital costs. Nonetheless, it is prudent to routinely use β blockers after cardiac surgery, as this study might have been underpowered to detect an actual reduction in LOS.

—Review by Harvey J. Murff, MD, MPH

References


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