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Original contribution

Preoperative β-blocker use: is titration to a heart rate of 60 beats per minute a consistently attainable goal?

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Abstract

Study objective: To quantify the prevalence of perioperative β-blocker use and its impact on preoperative and preinduction heart rate (HR), in light of the recent publication of specific recommendations regarding perioperative β-blocker use and desired HR.

Design: Retrospective observational study in patients who underwent elective and coronary artery bypass graft (CABG) surgery between January 2001 and March 2002.

Setting: Tertiary-care teaching hospital.

Measurements: Percentage of eligible patients who received β-blockers preoperatively and the impact of non–protocol-based β-blocker therapy on preadmission and preinduction HR were recorded. Differences were assessed with unpaired t test and χ^2 analysis; $P < .05$ was considered significant, with corrections for multiple comparisons.

Results: Of the patients who underwent vascular surgery, 9 had documented prior β-blocker intolerance. Of the remaining 172 patients, 94.8% had indication for perioperative β-blocker use. However, only 47.7% of the eligible patients received β-blockers. Of the 155 CABG patients, 74.2% were taking β-blockers preoperatively. Only 29% of vascular patients and 32% of CABG patients who were receiving β-blockers had HR less than 60 beats per minute (bpm) at preadmission. The mean preadmission HR in vascular surgery patients was 65.2 ± 11 and 73.2 ± 13.8 bpm in β-blocker and non–β-blocker patients, respectively ($P = .0001$). In CABG surgery patients, preadmission HR values were 64.2 ± 13 and 76.1 ± 12 bpm in β-blocker and non–β-blocker patients, respectively ($P = .001$). The preinduction HR subsequently increased in the β-blocker as well as in the non–β-blocker groups.

Conclusion: Only half of the patients who qualify to receive preoperative β-blockers by current recommendations actually receive them before noncardiac surgery, and the majority of these patients have preadmission and preinduction HR less than 60 bpm. Targeting β-blocker therapy treatment to an HR less than 60 bpm may not be readily achievable in many patients.

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1. Introduction

During the past decade, multiple reports and reviews have suggested that β-blockers are effective in reducing perioperative cardiac morbidity and mortality [1-8]. In clinical studies, heart rate (HR) is the most commonly used index of adequacy of β-blocker therapy [1,3,9]. The 90% decrease in cardiac events reported by Poldermans et al [3] was seen in a protocol where β-blockers were titrated preoperatively to an HR of ≤60 beats per minute (bpm) (or to a maximum allowable dose of bisoprolol) and maintenance of stringent perioperative HR control. Consistent with that study and other reports in the literature [1,6], the American College of Cardiology and the American Heart Association recommended titrating preoperative β-blockers to maintain resting HR between 50 and 60 bpm [9]. The present study was undertaken to determine whether patients presenting for major vascular and coronary artery surgery in a nonprotocol setting at our tertiary-care facility were consistently receiving β-blockade in accordance with the aforementioned recommendations.

2. Materials and methods

After approval by Yale–New Haven Hospital's Human Investigation Committee, a retrospective database and chart review was conducted for patients who underwent elective major vascular surgery and coronary artery bypass grafting (CABG) surgery over 15 consecutive months at Yale–New Haven Hospital. The data from 9 patients were excluded from the review because of documented intolerance to β-blockers. The records of 327 other patients were available

Table 1 Eligibility criteria for use of perioperative β-blockers[a]

Have any one of the following (revised cardiac risk criteria):
High-risk surgical procedure, defined as intrathoracic, intraperitoneal, or suprainguinal vascular procedure
Ischemic heart disease, defined as the following:
History of myocardial infarction
History of current angina
Use of sublingual nitroglycerine
Positive exercise test results
Q waves on electrocardiogram
Patients who have undergone percutaneous transluminal coronary angioplasty or CABG surgery AND who have chest pain presumed to be of ischemic origin
Cerebrovascular disease defined as the following:
History of transient ischemic attack
History of cerebrovascular accident
Diabetes mellitus requiring insulin therapy
Chronic renal insufficiency, defined as baseline creatinine level of at least 2.0 mg/dL
Have any 2 of the following (minor clinical criteria):
Aged 65 years or older
Hypertension
Current smoker
Serum cholesterol concentration at least 240 mg/mL
Diabetes mellitus not requiring insulin

[a] Suggested by Auerbach and Goldman [10], based on Lee et al [11] and Mangano et al [1].

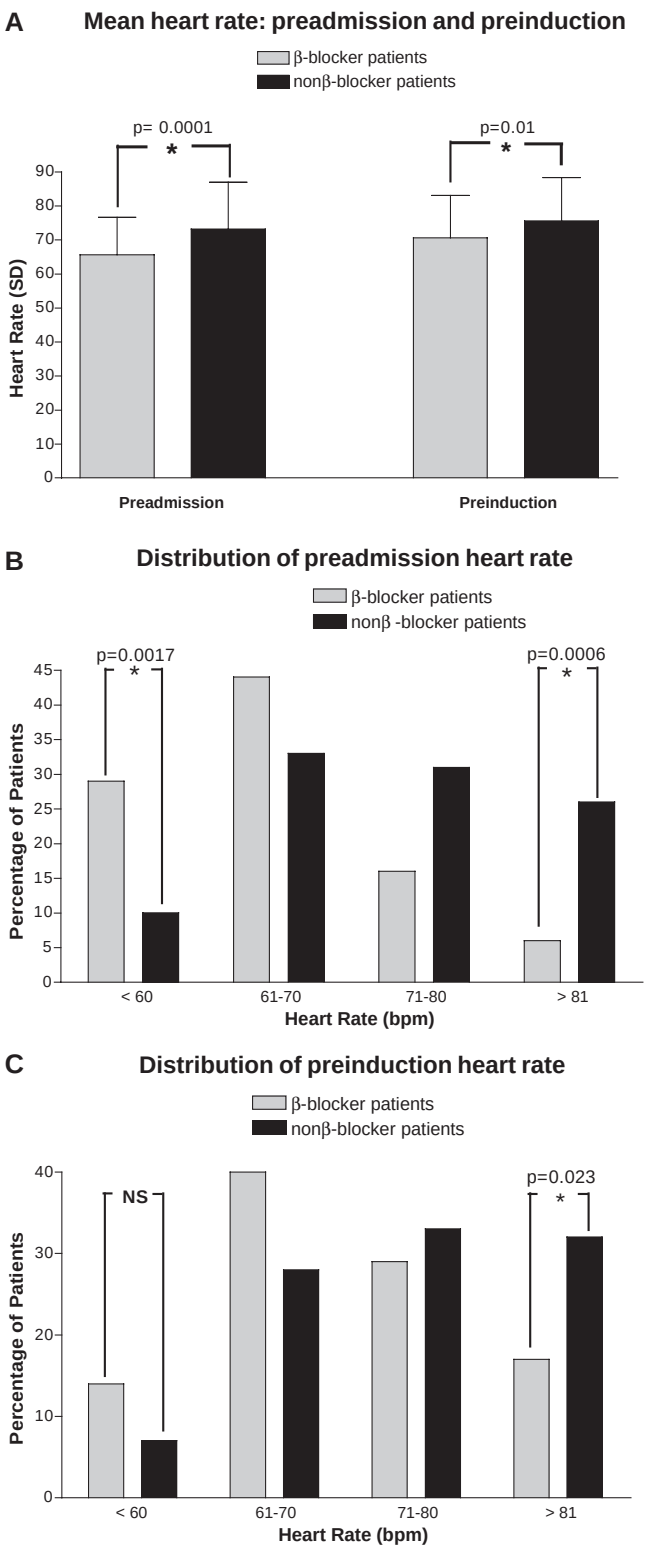

Fig. 1 Mean HR and distribution of preadmission and preinduction HRs in vascular surgery patients.