TITLE: INCIDENCE OF ISCHEMIA DURING CABG USING HALOTHANE

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Introduction: The primary concern in the anesthetic management of patients undergoing coronary artery bypass grafting (CABG) is avoidance of myocardial ischemia, since any benefits which may derive from the procedure might be offset by ischemic injury incurred during the procedure. Although mortality during elective CABG may be as low as 1-3%,[1] the incidence of perioperative myocardial infarction (MI) is still as high as 5-40%.[1] Some investigators suggest that a significant number of these MI's may originate as ischemic episodes in the pre-cardiopulmonary bypass (CPB) period.[2] We therefore examined the incidence of pre-CPB ischemia in a randomly-selected group of patients undergoing halothane anesthesia for CABG.

Materials and Methods: We studied 18 coronary artery patients (11 males) by continuously recording a lead V_5 surface electrocardiogram (EKG) during the pre-CPB period. Five patients had normal preoperative left ventricular (LV) function (LVEDP $\leq$ 12 torr, ejection fraction $\geq$ 50%) both before and after the stress of coronary angiography; six had impaired function (LVEDP > 12, ejection fraction < 50%) only after the stress of coronary angiography; seven had impaired function even prior to angiography. Fifteen patients continued their usual propranolol dosage until 8-12 hours prior to surgery; three others had not been taking the drug. Nine patients had each sustained between one and three MI's; eight of these patients had sustained an MI within six months of surgery. Three patients demonstrated symptoms of mild pre-operative CHF, and were taking digoxin. Eight patients were being treated for hypertension. Blood pressure remained elevated in three patients.

Anesthesia consisted of morphine-scopolamine pre-medication, followed by nitrous oxide-halothane, with pancuronium for muscle relaxation. Ventilation was mechanically controlled. Each patient's pre-operative EKG defined his baseline rhythm and ST-segment configuration. We defined ischemia as new ST-segment deflections of at least 2 millimeters.

Findings: We found no EKG evidence of new myocardial ischemia prior to CPB in any patient. One patient (with impaired LV function at rest and a recent MI) demonstrated pre-operative ST-segment depression of three millimeters, which remained unchanged in the pre-CPB period.

Discussion: Our lack of EKG evidence of new ischemia in the pre-CPB period contrasts sharply with the incidence of 26% reported by Slogoff et al,[3] who studied 38 patients medicated with propranolol until 12 hours prior to CABG. This incidence increased to 57% among patients not medicated with propranolol, and to 70% among patients whose propranolol was withdrawn 24-72 hrs prior to surgery. The fact that we found no evidence of new ischemia in any of our patients may relate to: 1. Patient selection; 2. Definition of ischemia; 3. Anesthetic technique.

Although Slogoff et al[3] did not evaluate the pre-operative status of their patients, we feel that the high incidence of pre-operative ventricular dysfunction, recent MI, and hypertension among our patients did not bias our results toward a lower incidence of ischemia. We used the same ST-segment definition of ischemia as did Slogoff et al,[3] but they monitored lead II, a lead which may underestimate the incidence of ischemia in coronary artery patients.[4]

Slogoff used a morphine-based anesthetic, while we used halothane. Halothane has been documented to produce myocardial depression in dogs[5] and in swine,[6] without producing concomitant biochemical evidence of ischemia. Halothane has been shown to improve existing myocardial ischemia in dogs, via a mechanism which may be separate from its effect on the major indices of myocardial oxygen demand.[7] Halothane has been shown to produce dose-dependent myocardial depression in humans,[8] but whether it can improve or prevent myocardial ischemia in man is still a matter of speculation. However, a recent human study comparing halothane and morphine anesthesia has shown halothane to be associated with comparable changes in heart rate and systolic blood pressure, but with a lower incidence of myocardial ischemia.[9]

Conclusion: We believe that the choice of anesthetic technique--specifically the choice of halothane instead of morphine--may help to reduce the incidence of myocardial ischemia in the prebypass period.

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