

Continuous insulin infusion is associated with a reduced post-surgical length of stay, but not with the complication rate, in patients with diabetes mellitus undergoing coronary artery bypass graft

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ABSTRACT. Objective: To establish if glucose management with continuous intravenous insulin infusion (CII) in the early post-operative period after coronary artery bypass graft (CABG) surgery is associated with complication rate and length of hospital stay (LOS) in patients with diabetes mellitus (DM). **Research design and methods:** We reviewed the records of 587 patients with DM who underwent CABG from January 1999 until January 2008; 316 patients were placed on CII, while 271 patients were treated with subcutaneous insulin. We examined patient age, glycated hemoglobin (HgbA1c), 24- and 72-h post-operative average capillary blood glucose (CBG), length of stay (LOS), and the rate of compli-

cations. **Results:** There was no difference in HgbA1c between the groups. Mean CBG values at both 24 h and 72 h remained the same in the CII group (167 mg/dl), while in the non-CII group they were 194 mg/dl and 189 mg/dl, respectively ($p < 0.001$ between the groups). Post-surgical median LOS was 6 days in the CII group and 6.5 days in the non-CII group ($p = 0.003$). Complications occurred at similar rate (in 10% and 11% of patients) in the two groups. **Conclusions:** CII is associated with a reduced post-surgical LOS in patients with DM who undergo CABG.

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INTRODUCTION

It is well known that patients with diabetes undergoing coronary artery bypass graft (CABG) surgery are at higher risk of poor surgical outcomes than individuals without diabetes. These patients have increased perioperative mortality (1, 2), prolonged length of stay (LOS) in hospital (3, 4), increased hospitalization costs (5), and a higher incidence of deep sternal wound infections (6-8) and of post-surgical stroke (9-11).

Intravenous insulin infusion is often used in critically ill patients in surgical or medical intensive care units (12). Early trials have demonstrated that strict glycemic control with continuous intravenous insulin infusion (CII) in diabetic patients after cardiac surgery positively affects the rates of post-operative atrial fibrillation (13), mediastinitis (6, 14), as well as LOS (5), and mortality (15, 16). The use of intensive insulin regimens to lower blood glucose concentrations has been shown to decrease mortality in diabetic patients with myocardial infarction (17). However, recent publications either failed to reproduce similar beneficial effects (18, 19) or have reported that

outcomes associated with intensive glycemic control were less favorable than outcomes in patients with less intensive glycemic management (20, 21).

We examined whether post-CABG glucose management with CII in diabetic patients influenced the rate of immediate post-operative complications and length of hospital stay, when compared to subcutaneous (SC) insulin regimens.

RESEARCH DESIGN AND METHODS

We conducted a retrospective review of the records of all patients who underwent CABG surgery at Beth Israel Medical Center in New York City from January 1999 to January 2008. Records of 587 patients known to have a history of diabetes (Type 1 or Type 2) were reviewed. Patients with stress-induced hyperglycemia after surgery, which we defined as capillary blood glucose (CBG) > 150 mg/dl on two or more readings without known history of diabetes, were excluded from the study.

Selection criteria differed by year of surgery. Patients hospitalized from January 1999 to 2003 either received sliding scale SC rapid acting insulin therapy plus long-acting insulin or an intravenous insulin infusion (CII) for a minimum of 3 days post-operatively. Patients who had at least one post-operative CBG > 150 mg/dl during the first 4 h after surgery were placed on CII, while patients with CBG < 150 mg/dl during this period were placed on the SC insulin therapy.

All patients with a known history of diabetes who underwent CABG starting January 2003 were placed solely on CII protocol post-operatively for a minimum of 24 h. Insulin infusion was initiated and titrated according to the results of CBG testing with

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