Perioperative Glycemic Control

Canadian Diabetes Association
Clinical Practice Guidelines Expert Committee

INTRODUCTION
Diabetes management at the time of surgery poses a number of challenges to the healthcare team. The physical stress associated with surgery typically results in acute hyperglycemia, which adversely affects immune function (1) and wound healing (2). Furthermore, hyperglycemia in the perioperative period may increase the risk of postoperative infections (3,4) and other adverse clinical outcomes, including renal allograft rejection (5).

MAJOR SURGERY
Improved postoperative glycemic control (plasma glucose [PG] levels of 4.5 to 6.0 mmol/L) using a continuous intravenous (IV) insulin infusion along with continuous feeding significantly decreases mortality and morbidity in patients who require postoperative intensive care and mechanical ventilation after major surgery (6). This benefit is observed even in those without a prior diagnosis of diabetes. Postoperative PG levels >6.1 mmol/L in patients with diabetes undergoing cardiac surgery are associated with an increased risk of in-hospital adverse outcomes (7). In this population, improved perioperative (both intraoperative and postoperative) glycemic control with a continuous IV insulin infusion also decreases the rate of deep sternal wound infections—a major complication of cardiac surgery (8). However, the safe implementation of intensive glycemic control with a continuous IV insulin infusion requires an appropriate protocol and staff training to ensure effectiveness and to minimize hypoglycemia.

MINOR AND MODERATE SURGERY
The appropriate perioperative glycemic targets for minor or moderate surgeries are less clear. To date, no intervention studies have assessed the impact of different PG levels on morbidity or mortality in this setting. However, a number of small studies that compared different methods of achieving glycemic control during minor and moderate surgeries did not demonstrate any adverse effects of maintaining perioperative glycemic levels between 5.0 and 11.0 mmol/L (9-11). Given the data supporting tight perioperative glycemic control during major surgeries and the compelling data showing the adverse effects of hyperglycemia, it is reasonable to target glycemic levels between 5.0 and 11.0 mmol/L for minor and moderate surgeries.

RISK OF HYPOGLYCEMIA
The benefits of improved perioperative glycemic control must be weighed against the risk of perioperative hypoglycemia, which may be masked by the actions of the anesthetic agents. This risk can be reduced by frequent capillary monitoring.

RECOMMENDATIONS
1. A continuous IV insulin infusion should be used to achieve glycemic levels of 4.5 to 6.0 mmol/L in postoperative patients who require intensive care and mechanical ventilation and demonstrate hyperglycemia (random PG >6.1 mmol/L) [Grade A, Level 1A (6)].
2. A continuous IV insulin infusion should be used to maintain intraoperative glycemic levels between 5.0 and 11.0 mmol/L for patients with diabetes undergoing cardiac surgery [Grade C, Level 3 (8)].
3. Perioperative glycemic levels should be maintained between 5.0 and 11.0 mmol/L for most other surgical situations [Grade D, Consensus].

REFERENCES

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