

Perioperative Hyperglycemia Control: A Critical Aspect of Surgical Care

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DESCRIPTION

Perioperative hyperglycemia, the condition of elevated blood glucose levels around the time of surgery, is a significant concern in the management of surgical patients. It is associated with a range of adverse outcomes, including increased risk of infection, delayed wound healing, cardiovascular complications and prolonged hospital stays. Effective control of blood glucose levels during the perioperative period is therefore important for optimizing patient outcomes and reducing the risk of complications.

Impact of hyperglycemia in the perioperative setting

Hyperglycemia can occur in both diabetic and non-diabetic patients due to the stress of surgery. The body's stress response to surgery includes the release of hormones such as cortisol, catecholamines and glucagon, which increase blood glucose levels by promoting gluconeogenesis and inhibiting insulin action. This response can be particularly pronounced in patients with pre-existing diabetes, but it is also seen in non-diabetic patients, particularly those with underlying insulin resistance or critical illness. The consequences of perioperative hyperglycemia are well-documented. High blood glucose levels can impair immune function, making patients more susceptible to infections, including Surgical Site Infections (SSIs). Hyperglycemia can also negatively impact wound healing by affecting collagen synthesis and reducing blood flow to tissues. Moreover, elevated glucose levels can aggregate inflammatory responses and increase the risk of cardiovascular events, such as myocardial infarction and stroke, particularly in patients with pre-existing cardiovascular disease.

Identifying patients at risk

Identifying patients at risk for perioperative hyperglycemia is a key step in managing this condition. While patients with known diabetes are an obvious high-risk group, other factors can contribute to hyperglycemia in the perioperative setting. These include obesity, metabolic syndrome, advanced age, use of certain medications (such as steroids) and the presence of critical

illness or major trauma. Preoperative screening for hyperglycemia should be conducted in all patients, particularly those undergoing major surgery or those with risk factors for glucose intolerance. This screening typically includes measuring fasting blood glucose and glycated hemoglobin (HbA1c) levels. An elevated HbA1c indicates poor long-term glycemic control and suggests that the patient may be at higher risk for perioperative hyperglycemia.

Strategies for perioperative hyperglycemia control

Effective management of perioperative hyperglycemia involves a multidisciplinary approach, including surgeons, anesthesiologists, endocrinologists and nursing staff. The key strategies for controlling blood glucose levels during the perioperative period include:

Preoperative optimization: For patients with diabetes or those at high risk for hyperglycemia, preoperative optimization of blood glucose levels are important. This may involve adjusting oral hypoglycemic agents, initiating or optimizing insulin therapy and addressing other modifiable risk factors such as obesity and hypertension. Patients should be encouraged to maintain good glycemic control in the weeks leading up to surgery, as evidenced by an HbA1c level within the target range (usually below 7%).

Intraoperative blood glucose management: During surgery, blood glucose levels should be closely monitored and managed to avoid significant fluctuations. The target glucose range in the intraoperative period is typically 140-180 mg/dL, though this may be adjusted based on the patient's individual circumstances and the type of surgery being performed.

Intravenous insulin infusion is often the preferred method for managing hyperglycemia during surgery, particularly in patients undergoing major procedures or those with poorly controlled diabetes. Insulin infusions allow for rapid adjustments to glucose levels and are preferred over subcutaneous insulin due to their more predictable pharmacokinetics.

Postoperative blood glucose control: Postoperative hyperglycemia is a common occurrence due to the continued stress response, changes in nutrition and alterations in physical activity. Therefore,

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blood glucose levels should be monitored regularly in the immediate postoperative period. Insulin therapy, whether via infusion or subcutaneous injections, remains the cornerstone of postoperative glycemic control.

For patients who were on oral hypoglycemic agents preoperatively, these medications may need to be temporarily discontinued or adjusted postoperatively to avoid hypoglycemia, particularly if the patient is not eating normally. Insulin therapy may be continued until the patient is stable and their oral intake is normalized.

Avoiding hypoglycemia: While hyperglycemia is a concern, it is also important to avoid hypoglycemia, which can be equally dangerous. Hypoglycemia in the perioperative setting can lead to confusion, seizures and even coma. To prevent hypoglycemia, blood glucose monitoring should be frequent and insulin doses should be carefully titrated based on the patient's blood glucose levels and clinical status.

Challenges and considerations

Managing perioperative hyperglycemia can be challenging due to the dynamic nature of blood glucose levels during surgery and recovery. Factors such as anesthesia, changes in nutritional

intake, and the body's stress response all influence glucose metabolism. Additionally, the need to balance hyperglycemia control with the risk of hypoglycemia requires careful monitoring and individualized treatment plans. In certain surgical settings, such as cardiac surgery or surgery for critically ill patients, the management of perioperative hyperglycemia is even more complex and may require specialized protocols. In these cases, continuous glucose monitoring and expert consultation with endocrinologists or diabetes specialists may be necessary to optimize outcomes.

CONCLUSION

Perioperative hyperglycemia control is essential component of surgical care that can significantly impact patient outcomes. By identifying at-risk patients, optimizing preoperative glucose levels and implementing careful intraoperative and postoperative glucose management, healthcare providers can reduce the risk of complications and improve recovery. The collaborative effort of a multidisciplinary team is essential to achieve effective perioperative glycemic control, ensuring the best possible outcomes for surgical patients.