ANESTHESIOLOGY NEWS

CLINICAL ANESTHESIOLOGY

RSS

ISSUE: 7/2008 | VOLUME: 34:07

Glucose Control Reduces Post-op Infections

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General and vascular surgery patients with postoperative hyperglycemia have a markedly higher risk for infection, independent of their preoperative blood glucose levels or diabetic status, a new study has shown.

The researchers said surgical infection rates could be reduced nationwide if surgeons and operating room teams monitored and tightly controlled postoperative glucose levels in all elective and emergency surgical patients.

"Postoperative hyperglycemia is a mutable factor that could be altered significantly and lead to less postoperative infectious outcomes with their attendant morbidity and potential mortality," said senior author Selwyn O. Rogers Jr., MD, MPH, chief of the division of trauma, burns, and surgical critical care at Brigham and Women's Hospital, in Boston. He presented the study in New York at the 128th annual meeting of the American Surgical Association (ASA).

Other surgeons said the study offers new clues about the relationship between glycemic control and postsurgical recovery. However, they said the study fails to answer major questions about how glucose control can improve patient outcomes.

"It's an interesting observation but it needs a lot more study before we cavalierly go about lowering patients' blood sugar," said surgeon Murray Brennan, MD, of Memorial Sloan-Kettering Cancer Center in New York City.

Many studies have shown that tight glucose control improves outcomes for patients in the surgical ICU, but this is the first to link elevated postoperative blood sugar levels to infections in the general surgical population.

The finding comes from a retrospective review of 995 consecutive patients who underwent major general and vascular operations at Brigham and Women's between July 2005 and December 2006. All patients had 30-day follow-up, were older than 16 years and were not admitted to the ICU.

Analysis showed that patients who had higher postoperative glucose levels had higher rates of infection, and the infection rates rose incrementally as glucose levels increased. Rates of postoperative infection climbed 30% with every 40-point elevation from normoglycemia, defined as less than 110 mg/dL. Longer hospitalization was also observed for patients with elevated glucose from 110 to 200 mg/dL (odds ratio [OR], 1.4; 95% confidence interval [CI], 1.1-1.7) and greater than 200 mg/dL (OR, 1.8; 95% CI, 1.4-2.5). The association between infection and elevated blood glucose was independent of preoperative blood glucose levels or diabetes status.

In multivariate analyses, only postoperative glucose (OR, 1.3; 95% CI, 1.03-1.64), ASA

classification (OR, 1.9; 95% CI, 1.31-2.83) and emergency status (OR, 2.2; 95% CI, 1.21-3.80) remained significant predictors of infection.

Dr. Rogers said that by closely monitoring and controlling a patient's blood glucose level, surgical teams might be able to reduce a patient's risk for infection, thereby shortening associated hospital stays. The concept has been garnering scientific support in the surgical ICU for the last five years but has never been suggested for general surgery patients.

However, the principle of tight glucose control is still a long way from acceptance for general surgical patients. The study does not answer some of the most critical questions: What is the ideal blood glucose range for a surgical patient? How often and when should glucose levels be checked? Does hyperglycemia increase the risk for infection or does infection increase risk for hyperglycemia?

"Those are important things we do not know," said Hiram C. Polk Jr., MD, professor of surgery at the University of Louisville in Kentucky.

The surgical field has long known that a patient's risk for infection and morbidity increases significantly when blood glucose exceeds 200 mg/dL. In recent years, research has suggested the risk increases at a much lower point—40 mg/dL or even lower—leading surgeons to strive for much tighter glucose control than in the past.

But that approach can be potentially dangerous, Dr. Polk said.

"I don't think that there is a neat number like 150, as this paper suggests. The problem is that, inevitably, you are going to get some people too low, and that's where the lawsuits are."

Moreover, patients' blood glucose can vary widely over the operative period—a person could be hyperglycemic in the morning and hypoglycemic in the evening, he said.

The study should not be used to set new standards for glycemic control in surgical patients, Dr. Polk said. But it should serve as a reminder to surgeons to be proactive about checking patients' blood glucose perioperatively, he said.

He advised that before every operation, surgeons confirm whether or not a patient should have intraoperative glucose monitoring. Perioperative glucose checks added to the surgical "time-out," he said.

"The people who need to be monitored are diabetics or people with blood sugar over 150 who might [have] previously unsuspected diabetes. So check—correct site, correct patient, etc, right surgeon, right room, etc. And then ask if you need to monitor temperature and glucose."

Dr. Rogers added that prospective studies in general and vascular surgical patients are needed to examine the association of hyperglycemia and infection. The study limitations include the retrospective nature of the review and use of administrative data.