The Impact of Glycosylated Hemoglobin and Diabetes Mellitus on Postoperative Infections After Foot and Ankle Surgery

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Purpose
To determine the relationship between postoperative infection and glycemic control for diabetic patients undergoing foot and ankle surgery.

Introduction
The relationship between hyperglycemia and adverse outcomes following surgery has been widely documented, particularly as regards to infectious complications (1-7). Most of these studies focused on patients with a history of diabetes mellitus. Patients with diabetes mellitus are at an increased risk of severe foot infection compared to those without diabetes, and poorly controlled and complicated diabetes has been shown to be a significant risk factor for postoperative infection following foot and ankle surgery (6-10). Myers and colleagues identified the association between an elevated hemoglobin A1c (HgbA1c) and postoperative infections after hindfoot/ankle arthrodesis (8). Younger et al. determined that the single most important factor predicting the success of a transmetatarsal amputation in diabetic patients was blood glucose control as measured by HgbA1c (10). They emphasized the necessity of obtaining HgbA1c on initial consultation, and to recommend delaying surgery until daily glycemic control was acceptable. As well, long-term glycemic control as measured by HgbA1c has been recognized as a major risk factor for negative outcome following coronary artery procedures, myocardial infarction, and a significantly higher incidence of 30-day morbidity following vascular artery procedures (6, 7, 11-13).

Perioperative hyperglycemia, as measured by fingerstick and serum glucose, has also been shown to be an independent risk factor for postoperative complications (1, 2, 5, 14).

However, Moitra and colleagues documented the relationship between HgbA1c and perioperative glycemic control in non-cardiac surgery patients (15). They found that long-term glycemic control affected perioperative glycemic control and patients with poor pre-operative glycemic control (HgbA1c >7%) had higher perioperative glucose levels compared to patients with good pre-operative glycemic control (HgbA1c <7%). As well, they concluded that while perioperative glucose is a stronger predictor of postoperative control, HgbA1c has the advantage of being taken before the day of surgery and can identify diabetic patients who are at higher risk of elevated perioperative glucose levels.

Patients with diabetes mellitus, especially when the disease is poorly controlled, may have associated comorbid conditions that place them at higher risk for postoperative complications. Postoperative complications lead to higher health care costs and poorer overall outcomes. To our knowledge no studies have been performed in the foot and ankle looking at HgbA1c and postoperative complications. By determining if HgbA1c correlates with complications, may help guide surgical decision making.

Materials and Methods
We conducted a review of 190 diabetic patients who underwent foot and ankle surgery with a minimum 3-month follow-up.

The study included patients with well-established DM, regardless of diabetes subtype, who had been treated pharmacologically. Exclusion criteria include ≥2 days course of antibiotic use within 1 week prior to surgery, on immunosuppressant medications at the time of surgery, age >80 years or <12 years, and lack of medical records regarding post-operative progress at least three months from the date of surgery.

To identify associated factors for postoperative infection, the following 4 variables were analyzed: BMI, smoking, surgery time, and HgbA1c. Bivariate analyses as well as multiple regression utilized to evaluate the association.

Conclusion
In conclusion, within the limitations of the study, we could detect no association of HgbA1c >7 with occurrence of postoperative infection following foot and ankle surgery after adjusting for other covariates. Given the observed difference in infection rates, further, higher powered, controlled studies, adjusting for clinically significant covariates, are necessary.

References