

Stress Hyperglycemia Is Associated With Surgical Site Infection: A Prospective Observational Study of Nondiabetic, Noncritically Ill Orthopaedic Trauma Patients

Justin E. Richards, MD; Julie Hutchinson, ACNP; Kaushik Mukherjee, MD, MSCI; A. Alex Jahangir, MD; Hassan R. Mir, MD; Jason M. Evans, MD; Aaron M. Perdue, MD; William T. Obremskey, MD, MPH; Manish K. Sethi, MD; Addison K. May, MD; Vanderbilt University Medical Center, Nashville, Tennessee, USA

Purpose: Multiple studies have demonstrated the detrimental effects of hyperglycemia in trauma patients; however, there is a paucity of data concerning hyperglycemia and nondiabetic orthopaedic patients. We conducted the present study to evaluate the relationship of hyperglycemia and surgical site infections in a cohort of nondiabetic, noncritically ill orthopaedic trauma patients.

Methods: This was a prospective observational pilot study over a 9-month period (February 2011–October 2011). Inclusion criteria were patients age >17 years admitted with orthopaedic injuries requiring surgical intervention. Patients with a history of diabetes mellitus, current corticosteroid use, multisystem injuries, or who were admitted to the ICU were excluded. Demographics, medical comorbidities (as classified by the American Society of Anesthesiologist physical status), body mass index (BMI), presence of an open fracture, and number of operations were recorded. Fingertick blood glucose values were ordered twice daily for each patient. Hyperglycemia was documented for a fasting glucose value >125 mg/dL or a random value >200 mg/dL on more than one occasion, and was considered prior to the development of an infection. Hemoglobin A1C (Hgb A1C) was obtained from hyperglycemic patients, and occult diabetes was considered for an Hgb A1C >5.9. Occult diabetes mellitus was excluded from final study analysis. Surgical site infection was considered by a return trip to the operating room and confirmed by positive intraoperative cultures at the operative site.

Results: 171 patients were enrolled. Forty patients (23.4%) were hyperglycemic; 7 of these 40 (17.5%) had Hgb A1C >5.9. The final study population consisted of 164 patients, 33 (20.1%) with hyperglycemia. There were 12 (7.3%) surgical site infections. There was no significant association with age, gender, race, medical comorbidities, obesity (BMI >29), tobacco use, or the number of surgical procedures and the primary outcome. Patients with hyperglycemia were more likely to develop a surgical site infection (7 of 33 [21.2%] vs 5 of 131 [3.8%]; $P = 0.001$). Open fractures (6 Type I, 22 Type II, 22 Type III) were also associated with surgical site infections (7 of 50 [14%] vs 5 of 114 [4.4%]; $P = 0.03$). However, there was no association with open fractures and hyperglycemia (10 of 50 [20.0%] vs 23 of 114 [20.2%]; $P = 0.98$).

Conclusion: Hyperglycemia was present in 20% of nondiabetic orthopaedic trauma patients and demonstrated a significant association with surgical site infection in this prospective observational cohort. While many factors may contribute to surgical site infections, there is presently a lack of data on hyperglycemia in nondiabetic, noncritically ill patients. Future randomized studies are necessary to further determine the impact of glucose control on outcome in orthopaedic trauma.

- The FDA has not cleared this drug and/or medical device for the use described in this presentation (i.e., the drug or medical device is being discussed for an “off label” use). For full information, refer to page 496.