

The Severity of Pre-Operative A1c and Predicting Postoperative Complications in Spine Surgery

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Preoperative hyperglycemia affects outcome of various surgeries, although tight preoperative control has not been well studied regarding the potential improvement in postoperative course and outcome. Diabetes mellitus (DM) is present in 29.1 million Americans, representing 9.3% of population. 8.1 million cases were undiagnosed in 2012. Mortality in undiagnosed DM patients is five times higher than in diagnosed DM patients who are hyperglycemic on admission. Most of previous investigations of hyperglycemia were retrospective reviews of inpatient data and were not designed to improve care of outcome in spine surgery. The American Diabetes Association recommends using hemoglobin A1c as a tool to predict outcomes; however, there have not been studied prospective methods. The main purpose of this project is to decrease perioperative complications in spine surgeries.

First, we would like to identify the level of A1c which can predict poor outcomes for subsequent spine surgery. We hypothesize that higher levels of hemoglobin A1c will be associated with higher perioperative complication rates. Furthermore, we hypothesize that we can define a level of A1c that can serve as a target for preoperative control of patients' DM to decrease mortality and morbidity. Outcomes will be measured by perioperative mortality and morbidity.

Second, we would like to identify high risk patients so they may have better control of hyperglycemia in the preoperative period of elective spine surgery. The study sites are University of Missouri Health Care (Neurosurgery Spine and Orthopaedic Spine Center) and Springfield Neurological and Spine Institute (SNSI). A total of 2,500 spine surgeries would be expected in a year with an estimated recruitment of 20% (500 subjects). Participants will be given a questionnaire regarding DM history and medications. Enrolled subjects will have assessment of their A1c at time of scheduling surgery along with preoperative laboratory. We will follow the A1c value classification of the American Diabetes Association recommendations, in which normal is < 5.7%, risk of developing DM is 5.7 - 6.4%, and where DM is > 6.5%. On the day of surgery, a fasting glucose will be assessed prior to the procedure. Intraoperative and postoperative glucose levels will be monitored. We will review electronic medical records (EMR) for A1c, fasting glucose, intra/post-operative glucose level, and preoperative medication list. The perioperative complications, including stroke, MI, death, UTI, DVT, PE, wound infection, nonunion, failure of hardware, cerebral spinal fluid leak, and length of hospitalization will be monitored. Surgical data will include the type of spine surgery (anterior, posterior, level of spine, instrumentation, non-instrument, number of fusion level). Study participants will be evaluated in follow-up at 30-days, 3-months, 6-months and 12-months. Differences between groups with normal glucose, impaired glucose regulation and diabetes will be assessed. Relationships between fasting glucose, A1c level, intraoperative, and post-operative glucose control will be analyzed along with perioperative complications. Similarly to monitoring smoking cessation prior to spine surgery, monitored A1c levels could carry a similar purpose to improve patient outcomes.