

Original Research

To assess the effect of intraoperative glycemic control as a biomarker for postoperative recovery characteristics among patients with and without diabetes undergoing general elective surgeries

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ABSTRACT:

Aims: To assess the effect of intraoperative glycemic control as a biomarker for postoperative recovery characteristics among patients with and without diabetes undergoing general elective surgeries. **Materials & methods:** 60 patients of either sex, of age above 30 and below 60 years and American Society of Anesthesiologists (ASA). Demographic information, clinical comorbidities, and operative details were abstracted from the clinical records using standardized definitions. Fasting blood glucose status was recorded in all patients on day of surgery. We divided the patients into 2 groups; Group A: Controlled diabetics Group B: Non diabetics. In the operation theater, intravenous (IV) line was established. Standard multipara monitor were attached and baseline parameters was recorded. Recovery profile of patient was assessed. All the results were analyzed by SPSS software. **Results:** There was no need of insulin therapy whereas in group B, 1 (3.33%) subject required insulin therapy. The difference was non- significant ($P > 0.05$). No subject required insulin therapy whereas in group B, 80 percent required no insulin therapy and 4 subjects required 1 unit and 2 required D- 25 IV. The difference was significant ($P < 0.05$). In group A 26 (86.7%) and in group B 24 (80%) had no vomiting. The difference was non- significant ($P > 0.05$). **Conclusion:** DM patients are at increased risk for developing perioperative complications. Prior to surgery, a thorough assessment of the characteristics of these patients, including treatment for DM, is critical.

Keywords: Glycemic Control, Surgeries, Diabetes

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INTRODUCTION

Inadequate glycemic control in the surgical patient has been shown to increase morbidity and mortality. Reports have mainly focused on the cardiac, neurosurgical, and critical care patient. Some of the key findings related to outcome may, however, be applied to the general surgical patient. Furthermore, hyperglycemia has been associated with poor clinical outcomes in both diabetes and nondiabetes patients. Diabetes patients are more likely to present as surgical patients with glycemic control challenges.¹⁻³ In a retrospective analysis of 179 diabetes patients who had noncardiac surgery, mortality at 1 year was 24%. Predictors of death were ischemic heart disease, urgent surgery, American Society of Anesthesiologists physical status score, and hyperglycemia. A high blood glucose (BG) level is

one component of anesthetic care that may need more stringent control, as evidenced by many studies, but tight control may also have negative outcomes as shown in the data from the Normoglycemia in Intensive Care Evaluation–Survival Using Glucose Algorithm Regulation (NICE-SUGAR) study.⁴⁻⁶ Caution is necessary when generalizing IIT clinical studies from critical ill patients to neurosurgical patients since brain glucose metabolism is often altered by neurological injury.⁷ Hence; the present study was undertaken for assessing the effect of intraoperative glycemic control as a biomarker for postoperative recovery characteristics among patients with and without diabetes undergoing general elective surgeries.

MATERIALS & METHODS

60 patients of either sex, of age above 30 and below 60 years and American Society of Anesthesiologists (ASA) Grade I-II undergoing laparoscopic cholecystectomy under general anesthesia. were enrolled in present study. Pre anesthetic checkup was done a day prior to surgery. Demographic information, clinical comorbidities, and operative details were abstracted from the clinical records using standardized definitions. Fasting blood glucose status was recorded in all patients on day of surgery. We divided the patients into 2 groups; Group A: Controlled diabetics Group B: Non diabetics.

In the operation theater, intravenous (IV) line was established. Standard multipara monitor were attached and baseline parameters was recorded. Recovery

Table 1: Insulin therapy 5 min insuffocate

	Group A		Group B		P value
	Frequency	Percent	Frequency	Percent	
NU	30	100.0	29	96.7	0.61
2 units	0	0	1	3.3	
Total	30	100.0	30	100.0	

Table 2: Insulin therapy 5 min extubate

	Group A		Group B		P value
	Frequency	Percent	Frequency	Percent	
NU	30	100.0	24	80	0.021
1unit	0	0	4	13.33	
D- 25 IV	0	0	2	6.67	
Total	30	100.0	30	100.0	

DISCUSSION

Several observational and interventional studies have indicated that hyperglycemia (hyperG) in diabetic and nondiabetic neurosurgical patients is associated with adverse outcomes, such as an increased prevalence of complications, prolonged hospital stay, and higher mortality rates. In addition there are deleterious effects of glucose deficit on brain metabolism. Individuals with previously unknown hyperG are at greater risk than those with preexisting diabetes mellitus (DM). Available evidence shows that hyperG has negative consequences on the whole organism, including the brain. Undiagnosed DM and hospital-induced hyperG increase postoperative complications, hospital costs, and length of stay. hyperG is closely linked to prognosis in different brain injury scenarios.⁷⁻⁹ Hence; the present study was undertaken for assessing the effect of intraoperative glycemic control as a biomarker for postoperative recovery characteristics among patients with and without diabetes undergoing general elective surgeries.

In the present study, there were 25 males and 5 females and in group B, there were 24 males and 6 females. There was no need of insulin therapy whereas in group B, 1 (3.33%) subject required insulin therapy. The difference was non-significant ($P > 0.05$). Underwood P et al evaluated the relationship between preoperative A1C and clinical outcomes in individuals with diabetes mellitus

profile of patient was assessed. All the results were analyzed by SPSS software.

RESULTS

There were 25 males and 5 females and in group B, there were 24 males and 6 females. There was no need of insulin therapy whereas in group B, 1 (3.33%) subject required insulin therapy. The difference was non-significant ($P > 0.05$). No subject required insulin therapy whereas in group B, 80 percent required no insulin therapy and 4 subjects required 1 unit and 2 required D- 25 IV. The difference was significant ($P < 0.05$). In group A 26 (86.7%) and in group B 24 (80%) had no vomiting. The difference was non-significant ($P > 0.05$).

undergoing noncardiac surgery. Of 1,775 patients with diabetes, 622 patients (35%) had an A1C value available within 3 months before surgery. In individuals with A1C values ≤ 6.5 or $> 8\%$, the hospital LOS was significantly longer compared with the control group. Multivariate regression analysis demonstrated that a higher A1C value was associated with increased hospital LOS after adjustments for age, sex, BMI, race, type of surgery, Charlson Comorbidity Index, smoking status, and glucose level on the day of surgery. There were too few events to meaningfully evaluate for death, infections, or readmission rate. Their study suggested that chronic hyperglycemia (A1C $> 8\%$) is associated with poor surgical outcomes (longer hospital LOS).⁸ In another study conducted by Kotagal M et al, authors studied the association between diabetes status, perioperative hyperglycemia, and adverse events in a statewide surgical cohort. Among 40,836 patients, 19% had diabetes; 47% underwent a perioperative blood glucose (BG) test, and of those, 18% had BG ≥ 180 mg/dL. Diabetes mellitus (DM) patients had a higher rate of adverse events than non-diabetes mellitus (NDM) patients. After adjustment, among NDM patients, those with hyperglycemia had an increased risk of adverse events compared with those with normal BG. Among NDM patients, there was a dose-response relationship between the level of BG and composite adverse events. Underlying this paradoxical effect may be the

underuse of insulin, but also that hyperglycemia indicated higher levels of stress in NDM patients than in DM patients.⁹

In the present study, no subject required insulin therapy whereas in group B, 80 percent required no insulin therapy and 4 subjects required 1 unit and 2 required D- 25 IV. The difference was significant ($P < 0.05$). In group A 26 (86.7%) and in group B 24 (80%) had no vomiting. The difference was non-significant ($P > 0.05$). In a similar study conducted by Goodenough CJ et al, authors assessed the role of preoperative glycosylated hemoglobin and postoperative glucose together in predicting major complications after abdominal surgery. All patients with HbA1c within 3 months before surgery were included. The primary end point was major complication, using the Clavien-Dindo complication system, within 30 days of surgery. Among 438 patients who had a measured HbA1c, 96 (21.9%) experienced a major complication. On multivariate analysis, HbA1c $\geq 6.5\%$ was found to be the most significant predictor of major complications. Glycosylated hemoglobin and glucose were strongly correlated (correlation coefficient 0.414, $p < 0.01$). Elevated peak postoperative glucose levels were correlated with elevated HbA1c and were independently associated with major complications.¹⁰ Hwang JS et al, in a similar study determined the correlations among four commonly used glycemic markers and to identify the glycemic markers most strongly associated with the occurrence of surgical site infections and postoperative wound complications in patients with diabetes mellitus after undergoing total knee arthroplasty (TKA). There were positive correlations among the levels of the four glycemic markers; the strongest correlation was found between the preoperative HbA1c and PPG2 levels. After controlling for potential confounding variables using multivariate analysis, the HbA1c cutoff level of 8 and FBG 200 mg/dL or higher were associated with superficial surgical site infection after TKA. In general, there was a positive correlation among the various available glycemic markers among patients with diabetes undergoing TKA, and patients undergoing surgery with HbA1c ≥ 8 and/or FBG ≥ 200 mg/dL were associated with superficial surgical site infection.¹¹

CONCLUSION

DM patients are at increased risk for developing perioperative complications. Prior to surgery, a thorough assessment of the characteristics of these patients, including treatment for DM, is critical.

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