Inpatient Post-Operative Hyperglycemia in Patients With Malignant Glioma Correlates With Increased Post-Operative Complications, and 30-Day Readmission or Mortality

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Introduction

Expert opinion on inpatient blood glucose (BG) control recommends 140-180 mg/dL for critically ill patients or <140 mg/dL premeal for non-critically ill patients. Inpatient hyperglycemia is correlated with high morbidity and mortality in ischemic stroke, aneurysmal subarachnoid hemorrhage and traumatic brain injury populations. Limited studies assessing inpatient hyperglycemia in malignant glioma patients. This study's aim is to assess if a correlation between complications and 30-day readmission/mortality exists in post-operative malignant glioma patients who are on corticosteroids.

Methods

Performed a retrospective review of WHO Grade III/IV patients undergoing resection and prescribed corticosteroids post-operatively. Demographics, morbidities, presenting symptoms, pre-operative MRI and enhancing volume were obtained. Post-Operative Day (POD) 0, 1, 2 BG values were recorded. Post-operative complications (seizure, wound infection, UTI, pneumonia, sepsis, wound dehiscence, and DVT/PE), and 30-day readmission or mortality were recorded. A ROC curve of average POD 0-2 BG values assessing complicationsand readmission/mortality were performed, determining BG value of significance. A stepwise logistic regression and subsequent model was developed.

Learning Objectives

- Highlight Prior Work Assessing Inpatient Blood Glucose Management
- Highlight Significant Findings
- Appreciate Blood Glucose Control in Patients with Malignant Gliomas
- Apply Concepts to Individual Clinical Practice

Results

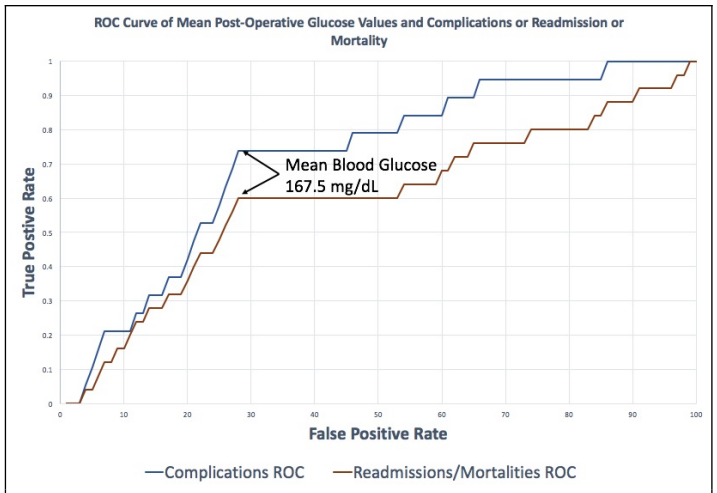

Chart 1: ROC Curve assessing Mean Post-Operative Blood Glucose and Complications or Readmissions/Mortalities

Stepwise Regression – Post-Operative Complications

Parameter	Chi Square	p - value
Age	0.070	.79
Gender	0.088	.77
Coronary Artery Disease	0.71	0.79
Hypertension	0.031	0.86
Diabetes	0.001	0.99
Hyperlipidemia	0.046	0.70
Renal Disease	0.196	0.66
KPS	6.301	0.01
Seizure at Presentation	0.002	0.96
Pre-Operative Enhancing Volume	2.794	0.09
Edema Present	0.006	0.94
Post-operative Glucose Mean >167 mg/dL	17.407	0.0003

Table 1: Parameters and resultant significance of Stepwise Logistic Regression assessing for post-operative complications. Parameters with significance of <0.1 were placed in model.

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Stepwise Regression – 30-Day Readmission or Mortality

Parameter	Chi Square	p - value
Age	1.31	0.25
Gender	0.03	0.85
Coronary Artery Disease	0.01	0.91
Hypertension	0.86	0.36
Diabetes	0.61	0.43
Hyperlipidemia	4.44	0.04
Renal Disease	0.82	0.37
KPS	5.25	0.02
Seizure at Presentation	1.56	0.21
Pre-Operative Enhancing Volume	4.70	0.03
Edema Present	2.72	0.1
Post-operative Glucose Mean >167 mg/dL	14.92	0.0001

Table 2: Parameters and resultant significance of Stepwise Logistic Regression assessing for 30-day readmission or mortality. Parameters with significance of <0.1 were placed in model.

Logistic Regression Model – Post-Operative Complications

Parameter	Odds Ratio	Confidence Interval
KPS (per unit increase)	0.69	0.52 – 0.92
Pre-operative Enhancing Volume (per cm^3 increase)	1.01	0.9985 – 1.0278
Mean Post-operative Glucose >167 mg/dL	11.38	3.81 – 38.37

Based off stepwise regression assessing parameters with likelihood of developing post-operative complication. KPS was considered protective as the unit value increased. Mean post-operative blood glucose >167 mg/dL increased odds of developing post-operative complication.

Logistic Regression Model – 30-Day Readmissions or Mortalities

Parameter	Odds Ratio	Confidence Interval
Hyperlipidemia	4.94	1.18 – 24.69
KPS (per unit increase)	0.65	0.45 – 0.94
Pre-operative Enhancing Volume (per cm^3 increase)	1.022	1.003 – 1.045
Cerebral Edema	0.31	0.07 – 1.20
Mean Post-operative Glucose >167 (mg/dL)	20.40	5.05 – 116.30

Based off stepwise regression assessing various parameters with likelihood of having a 30-day readmission or mortality.

Conclusions

In this study, we demonstrated that mean BG values >167.5 mg/dL in the immediate post-operative period correlated with increased odds of the patient developing a post-operative complication (OR 11.38) or having a 30-Day hospital readmission or mortality (OR 20.40). Physicians prescribing corticosteroid therapy for this patient population should realize the associated risks and potential complications that can result and strive for improved blood glucose control.