



Brain Tissue Oxygenation and 3 and 6-month Neurological Outcome in Severe Traumatic Brain Injury

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Introduction

Brain tissue oxygenation (PbtO₂) monitoring has been utilized in the severe traumatic brain injury (sTBI) population as an in vivo tool to detect oxygenation changes in the acute injury phase. It has been previously reported that the longer a patient experiences a PbtO₂ of = 15 torr, the greater the likelihood of death. The purpose of this study is to assess PbtO₂ values and its relationship to 3 and 6-month outcome in adult sTBI.

Methods

Under an approved IRB protocol, PbtO₂ data were prospectively collected on sTBI patients (Glasgow Coma Scale (GCS) score <9) during the acute 5 days following injury. ICU management included ICP management per Guidelines of sTBI Management; however, PbtO₂ was not treated, just monitored. Glasgow Outcome Scale (GOS) score, a measurement of neurologic outcome, was assessed at 3 and 6-months from injury and dicotomized into poor (GOS 1-3) and favorable outcome (GOS 4-5). Statistical analyses were performed using a logistic regression model controlling for age and initial severity of injury.

Results

258 adult, sTBI patients with 3 and 6-month outcome were included. The mean age was 38±17 years, with 69% male and a median GCS of 6. Post-trauma day (PTD) 2 PbtO₂ data was chosen for analysis to avoid insertional microtrauma and minimize variability of values seen within the first 24 hours of monitoring. Logistic regression resulted in cut-off values of minimum PbtO₂ < 16.03 and maximum PbtO₂ > 37.15 being significant for poor 3-month neurological outcome (OR 2.46, 95%CI 1.29-4.68 p=.004 & OR 2.71, 95%CI 1.37-5.33 p=.006 respectively). There was no residual significance for 6-month neurological outcome at these same cutoffs; however, PTD2 PbtO₂ values in combination for minimum <18.3 and maximum >37.2 were significant predictors of poor outcome (OR 2.02, 95%CI 1.11-3.67, p=.02).

Conclusions

Monitoring of PbtO₂ in the adult sTBI population may be predictive of 3 month neurological outcome and provide a target cohort for early rehabilitation efforts. Additional studies are needed to assess the effectiveness of treating PbtO₂ values.

Learning Objectives

To understand the utility of Brain tissue oxygenation to predict 3- and 6-month outcome.