Abstract - Presented at the 2022 Society of Critical Care Medicine (SCCM) 51st Critical Care Congress

Predicting Outcomes with Pupillometry in Critically Ill Children (KIDS-POP)

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Introduction

Automated infrared pupillometry (AIP) is a non-invasive neurological monitoring modality gaining recognition in the pediatric intensive care unit (PICU). Studies conducted in large adult cohorts suggest that a pupillometer output termed the neurologic pupillary index, or NPi, may be utilized in outcome predictive models. There is an unmet need for reliable, evidence-based prognostication tools for children, and the utility of AIP for this purpose has not yet been explored. With this study, we aimed to describe the relationship between NPi and functional outcomes in critically ill children.

Methods

A single-centered observational cohort study performed in the PICU of freestanding, children's hospital. Enrolled children received automated infrared pupillometry per standard of care. The relationships between quantitative pupillometry measurements and discharge functional outcomes, defined by changes in the Functional Status Scale (FSS) score, were explored.

Results

Data from 108 patients were extracted with a median age of 11.4 years. Primary diagnoses were classified as neurological in 79/108 (73.15%) and non-neurological in 29/108(26.9%). Patients who experienced death or new morbidity had higher PRISM-III scores at admission(18 vs. 12; p=0.0004), lower mean GCS at admission (6.6 vs. 9.3; p=0.0065) and incurred longer hospital lengths of stay (25.6 vs. 12.4 days; p=0.003). Death prior to discharge occurred in 28/108 (25.9%). Mean NPi was significantly lower in patients who experienced new morbidity or death (right eye 4.1 vs. 3.1, p< 0.0001). This difference was even more notable when the outcome of "severely functionally impaired at discharge" was analyzed separately (FSS change > 16 or death) (3.96 vs. 2.33, p< 0.0001).

Conclusions

Reduction in pupillary reactivity quantified by NPi was associated with new morbidity and mortality in a heterogenous population in the pediatric intensive care unit. This suggests that automated pupillometry may play a role in future outcome predictive models for children.