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### Changes In Quantitative Pupillary Reactivity During Diagnosis And Treatment Of Symptomatic Intracranial Hypotension.

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#### **Introduction**

Pupillary light response (PLR) evaluates cranial nerves II, III, and midbrain function. Bedside quantitative infrared pupillometry provides reproducible assessment of the PLR, reported as the neurological pupillary index (NPI). Increased intracranial pressure results in decreases in NPI. Intracranial hypotension (IH) can also cause brainstem distortion. We therefore hypothesized that similar changes in NPI could be seen with IH. Here, we describe sequential changes in NPI in IH before and after treatment.

#### **Methods**

We identified four patients monitored with pupillometry for clinical care during IH diagnosis and treatment. IH was diagnosed with a compatible history, exam, and characteristic neuroimaging findings. Patients' NPI at baseline, during symptomatic IH, and after treatment were compared using related samples Friedman's two-way ANOVA and Wilcoxon signed ranks tests.

#### **Results**

Two patients were male; causes of IH were CSF leak following lumbar instrumentation (n=3) and basilar skull fracture (n=1). Mean baseline NPI was normal (defined as >3) and declined in one or both eyes concurrent with clinical deterioration in the 24-48 hours preceding definitive diagnosis. All patients underwent treatment for CSF leak with epidural blood patch or fracture repair, with return of NPI > 3 within 5 hours of treatment. The baseline, symptomatic and post treatment NPI's differed significantly ( $3.55 \pm 0.35$  vs  $0.80 \pm 0.59$  vs  $3.65 \pm 0.24$ , mean +/- SD, pre-treatment vs nadir vs post-treatment,  $p=0.05$ ). Both baseline and post treatment NPI's differed from the NPI nadir ( $p=0.068$ ) but there was no difference between baseline and post-treatment NPI ( $p = 0.71$ ).

#### **Conclusions**

Impairment of the PLR, as measured by NPI, occurred during symptomatic IH and resolved after treatment. Because management of intracranial hyper- and hypotension differ markedly, our results emphasize the importance of evaluating the clinical context before attributing pupillary/NPI changes to increased ICP. Automated pupillometry provides a non-invasive, bedside tool for monitoring progression and treatment of intracranial hypotension