

**Abstract** – Presented at the 2023 American Academy of Neurology (AAN) Annual Meeting

### **Quantitative Pupillometry in Patients with Surgical Decompression**

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#### **Objective:**

In this study, we aim to describe quantitative pupil reactivity and size characteristics post-surgical decompression.

#### **Background:**

Poor pupil reactivity and asymmetry are potential hallmarks of worsening intracranial injury in patients with acute neurological conditions. However, their clinical significance after intracranial surgery, when mass effect is less likely to directly affect midbrain pupillary pathways, is unclear.

#### **Design/Methods:**

We performed a retrospective chart review of patients with quantitative pupillometry who received decompressive hemicraniectomy for ischemic stroke, traumatic brain injury (TBI), or intracranial hemorrhage (ICH). We identified clinical and radiological neuroworsening within 1 hour of pupil measurements. We report abnormal pupils, defined as abnormal reactivity (Neurologic Pupil Index (NPI) <3), or asymmetric pupil reactivity (NPI difference  $\geq 0.7$ ), or asymmetric size ( $>1$  mm). We also tested abnormal pupil association with clinical and radiographic signs of neuroworsening before and after decompression.

#### **Results:**

Of 24 patients, the mean age was  $45.29 \pm 19.23$  years and 16 were male (66.7%). Thirteen patients received hemicraniectomies for stroke (N=7) or ICH (N=6; spontaneous or related to another injury), 9 had hemicraniectomy for acute subdural hemorrhage, and 2 underwent suboccipital craniectomies for posterior circulation ICH. For all patients, pupil abnormalities occurred in 53.82% of post-surgical measurements, as compared to 45.5% of available pre-surgical measurements. Within the subgroup of patients with  $\geq 3$  measurements before and after surgery (n=13), the median minimum NPI post-surgery was lower than pre-surgery (3.8 [2.7-3.39] v. 3.9 [2.7-3.51],  $p < 0.001$ ). Post-surgery, decreased NPI was associated with loss of cranial nerves, motor decline, and refractory intracranial pressure.

#### **Conclusions:**

Abnormalities in pupil reactivity and asymmetry occur frequently post-surgical decompression and are affiliated with neuroworsening events. Close quantitative monitoring of pupils may be indicated even after surgical decompression to identify episodes of neuroworsening, but further definitive studies are necessary.