Pupillometry as a predictor of outcome after hemicraniectomy

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Purpose
To study the effect of hemicraniectomy on pupillary changes quantified with a pupillometer and to analyze the impact of these changes on patient outcome.

Background
Decompressive hemicraniectomy is used to relieve life-threatening mass effect and evidence-based guidelines support its use in patients with large hemispheric infarction. Pupillary light reflex (PLR) changes can be an indicator of cerebral herniation and often serve as a trigger for hemicraniectomy. Pupillary abnormalities have been found to be a poor prognostic indicator in some, but not all studies of outcome after hemicraniectomy. Subjective pupil examination using a hand-held flashlight is error prone and none of these previous studies employed quantitative automated pupillometry.

Methods
Design
Retrospective analysis

Patient Selection
Patients from November 2016 to July 2018 who underwent hemicraniectomy and had pupillometer readings

Data Collection
- PLR measured by NPi before and after craniectomy
- Midline shift on CT scans before and after hemicraniectomy

Primary Diagnosis
- Ischemic Stroke: 7 (53.8)
- Intracranial Hemorrhage: 3 (23.1)
- Subarachnoid Hemorrhage: 1 (7.7)
- Subdural Hematoma: 1 (7.7)
- Infection: 1 (7.7)

Hemicraniectomy Indications
- Pupil Change: 6 (46.1)
- Decreased consciousness: 4 (30.8)
- Increased ICP: 2 (15.4)
- Multifactorial: 1 (7.7)

Results
Demographics
- Patients, n: 13
- Mean age, years (SD): 39.7 (11.4)
- Male, n (%): 5 (38.5)
- Female, n (%): 8 (61.5)

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Demographics
- Before hemicraniectomy: 9.5 (5.3)
- After Hemicraniectomy: 6.9 (3.9)
- Difference: 2.5 (4.0)

Outcome
- Difference in midline shift (before minus after hemicraniectomy) was predictive of mRS (r2=0.15; p<0.01).
- Improved NPi scores were associated with lower mRS for left eye (r2 = .63, p<.001) and right eye (r2 = .67; p<.001).

Conclusion
Improvement in NPi after hemicraniectomy is correlated with better patient outcomes at discharge.

References

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