

20TH ANNUAL CONGRESS OF THE
EGYPTIAN SOCIETY FOR THE GLAUCOMAS

ESG 2020
PHYSICAL / VIRTUAL

Visual Evoked Potential Changes with Surgery in Primary Congenital Glaucoma: A Pilot Study

Authors
Mai AbdelNabi Mohamed ElBahwash. MD, PhD
Alexandria University

Mahmoud Hassan Morsy. MD, PhD
Alexandria University


Amira Saad Mahmoud Hegazy. MBBCh
Damanhour Eye Hospital

Nader Hussein Lotfy Bayoumi. MD, PhD, FRCS (Glasgow)
Alexandria University


Financial Disclosure: None

1

Piloting VEP Changes with Surgery for PCG



- Childhood glaucoma is a major cause of blindness in children
- Primary congenital glaucoma (PCG) = elevated intraocular pressure (IOP) + corneal changes + optic nerve changes + axial length (AL) changes + visual field (VF) changes (if applicable)
- The optic nerve changes (increased optic nerve cupping) in PCG is reportedly attributed to posterior bowing of the lamina cribrosa rather than to true neuronal loss as evidenced by reversibility of the optic nerve cupping with successful control of IOP
- Whether these clinically visible optic nerve changes adversely affect optic nerve function is not yet ascertained subjectively by clinical examination (e.g. preferential looking, optokinetic nystagmus, etc) and objectively by electrophysiology, namely visual evoked potential (VEP, including pattern reversal, pattern onset/offset and flash) testing
- The VEP tracing demonstrates a number of deflections, namely negative (N) waves and positive (P) waves, the most useful practically of which are the P2 implicit time, N1-P1 and N2-P2 (amplitude)



2

Piloting VEP Changes with Surgery for PCG

The aim of this study was to report on the flash VEP findings in children with PCG at presentation before treatment, and to compare it longitudinally to the VEP findings of the same eyes with successful control of PCG after surgery

3

Piloting VEP Changes with Surgery for PCG



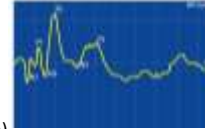
- **Methods**
- The study period → between June and December 2019 (33 confirmed PCG cases → only 13 enrolled in the study (care providers consent + was possible to obtain a reliable VEP trace)
- All study participants → office examination + EUA
- Flash VEP testing →
 - The Roland Consult electrophysiology and imaging machine (Roland Consult Stasche & Finger GmbH)
 - With the untested eye patched
 - The child resting comfortably in the arms of the mother/familiar care provider
 - Whenever possible, an attempt was made to test both eyes (to use the patient's natural patient's internal control)
 - When the child was not cooperative enough focus was kept on the eye with interest



4

Piloting VEP Changes with Surgery for PCG

- **Methods**
- Flash VEP testing →
 - The electrodes were placed according to the International society of Electrophysiology of vision System (ISCEV) standards
 - All patients were light-adapted (photopic conditions) and the pupils were not dilated
 - The VEPs were measured → Peaks were designated as negative and positive in a numerical sequence (N1, P1, N2, P2, N3 and P3)
- Surgery →
 - within 1 week of presentation
 - Combined trabeculotomy-trabeculectomy with mitomycin C (same surgeon)
 - Postoperative follow up visits → days 1 and 7 + monthly for 6 months.
- Postoperative VEP testing →
 - as soon as was feasible
 - Same as the preoperative VEP testing



5

Piloting VEP Changes with Surgery for PCG

- **Results**
- 11 (4 right) eyes → 8 (5 males) children
- Age of the study children →
 - at presentation (and preoperative VEP testing) → **3.5±1.6 (2.0 – 6.0) months**
 - at the postoperative VEP testing → **5.1±3.0 (2.5 – 12.7) months**
- None admitted to the neonatal intensive care unit (NICU)

6


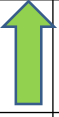

Piloting VEP Changes with Surgery for PCG

• Results

- 11 (4 right) eyes → 8 (5 males) children
 - There was a statistically insignificant reduction of P2 ($p=0.234$) and a statistically insignificant increase of N1-P1 ($p=0.149$) and a statistically insignificant increase in N2-P2 ($p=0.671$) postoperatively than preoperatively
 - There was a statistically significant correlation →
 - preoperative IOP and the preoperative N2-P2 (at presentation) ($r=-0.81$, $p=0.002$)
 - preoperative axial length and postoperative N1-P1 ($r=-0.62$, $p=0.04$)

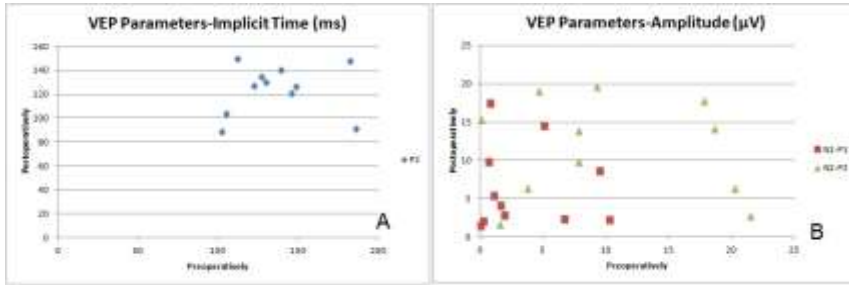
7

Piloting VEP Changes with Surgery for PCG

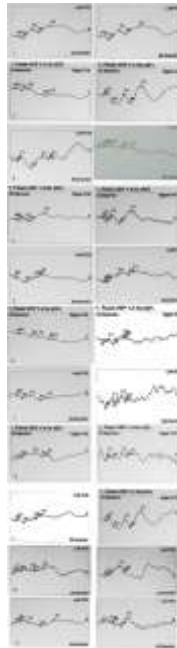
<i>Study Eyes Visual Evoked Potentials</i>		
(mean±SD, range, median)	<i>At Presentation</i>	<i>Postoperatively</i>
P2 (ms) 	136.3±28.1, 102.4 – 186.0, 129.6	123.3±20.9, 88.3 – 149.4, 126.8
N1-P1 (µV) 	3.5±3.8, 0.03 – 10.3, 1.6	6.5±5.5, 1.5 – 17.5, 4.1
N2-P2 (µV) 	10.3±7.9, 0.05 – 21.5, 7.8	11.6±6.5, 1.7 – 19.7, 13.9

8

Piloting VEP Changes with Surgery for PCG



9



10

Piloting VEP Changes with Surgery for PCG

- Limitations

- Small sample size (→ Difficulties inherent in obtaining a reliable VEP tracing in such young children, and especially so those suffering from PCG)
- No structural correlation with OCT (→ All study eyes presented with corneal oedema → precluded any posterior segment imaging)
- Longer follow up (→ sustainability of the optic nerve functional improvement with successful IOP control)

11

Piloting VEP Changes with Surgery for PCG

- Conclusion

- IOP elevation in PCG adversely affects the optic nerve function, but, at least in the short term, has no permanent detrimental effect on the optic nerve function as evidenced by the improvement of the VEP parameters

12

Thank you