Pediatric pupillography screening as a tool to detect ocular and neuro-ophthalmological pathology

Maria Carolina Ortube, MD(1,2)
Fatti Gianlucca, MD(2)
Ana Morales, MD(2)
Joan Prat Bartomeu, MD(2)

(1)Jules Stein Eye Institute, Department of Ophthalmology, University of California, Los Angeles.
(2)Hospital Sant Joan de Déu Barcelona

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“validate the pupillography as a sensitive screening tool in pediatric ophthalmology”
- **LATENCY**: time from activation of the light stimulus to the initial constriction (msec)
- **PEAK (previous) AND VALLEY (final)**
- **AMPLITUDE**: difference between the peak and valley (mm)
- **CONSTRICTION VELOCITY** (mm/sec)
- **REDILATION VELOCITY** (mm/sec)
METHODS

1) Computerized binocular Infrared dynamic pupillographer: 
   *Gazelab head-mounted pupillometer (BCNIInnova®)*

2) Hospital Sant Joan de Déu de Barcelona from April to June 2016.
3) Technique

- Regular illumination room: 342 ± 36 Lux
- Child looking a test ahead, in the wall.
- Light stimulus: direct ophthalmoscope
  - 1200 ± 100 Lux
  - 0.2-0.4 sec
- Pupil video recording: 2 minutes
- Light stimulus sequence:
A cohort of **239 children** underwent *dynamic pupillography* during regular clinic study visits:

- **Sex:** 115 female/ 124 male
- **Aged 4-17 years old** (10.6 ± 3.6 Mean/SD)
- **Race:**
  - White 90.8 %
  - Asian 7.9 %
  - Black 1.3 %
- **Ethnicity:** Latino (95 %)
## RESULTS: controls and diseases

<table>
<thead>
<tr>
<th>Control: N=46</th>
<th>Neurologic: N=75</th>
<th>Strabismus: N=33</th>
</tr>
</thead>
<tbody>
<tr>
<td>19 %</td>
<td>31 %</td>
<td>14 %</td>
</tr>
<tr>
<td>Amblyopia: N=22</td>
<td>Retina: N=19</td>
<td>Uveitis: N=16</td>
</tr>
<tr>
<td>9 %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes: N=9</td>
<td>Glaucoma: N=8</td>
<td>Orbital: N=4</td>
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</tbody>
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<thead>
<tr>
<th>Intracranial hypertension (HTIC) 13/75 17 %</th>
<th>Neurofibromatosis (NF1) 17/75 23 %</th>
<th>Visual Pathway Glioma (OPG): 11/75 15 %</th>
</tr>
</thead>
</table>

Statistical analysis SPSS 19.0 (Armonk, NY: IBM Corp.) & R 3.0.3
RESULTS: Neurologic Group & Control Group

- Logmar values: (p<0.001)
- Smaller Constriction velocity (p=0.0177)
- Smaller pupillary basal diameter (p=0.0243)
- Smaller reduction of pupillary diameter (p=0.0474)
- Smaller Amplitude: (p=0.0071).
- Smaller Redilation velocity (p=0.160) (III cranial nerve)

Statistical analysis SPSS 19.0 (Armonk, NY: IBM Corp.) & R 3.0.3
RESULTS: Neurologic Group

NF1 (n=17):
- Smaller pupillary basal diameter (p=0.0501)
- Smaller amplitude (p=0.027)
- Atypical involuntary pupillary movements and increased values for latencies.

HTIC (Tumors, VP Shunts) & OPG (gliomas) (n=24):

Smaller constriction velocity (p=0.028)

Statistical analysis SPSS 19.0 (Armonk, NY: IBM Corp.) & R 3.0.3
RESULTS: Retina Group

Coats disease, high myopia, cone dystrophy, Stickler syndrome, retinoschisis, ocular albinism (n=19)

- Logmar values: (p<0.001)
  Smaller constriction velocity (p:0.0295)

Statistical analysis SPSS 19.0 (Armonk, NY: IBM Corp.) & R 3.0.3
Conclusions

- Pupillography could be used as a screening tool in pediatric patients in order to detect visual pathology.

- Infrared pupillography can offer advantages as a fast non-invasive biosensor for visual and neurologic assessment.

- We are including pupillometry testing in regular controls of NF1 patients.
References:


