Optic Nerve Measurement on MRI in the Pediatric Population: Normative Values and Correlations


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Background

Few articles in the literature have looked at the diameter of the optic nerve on MRI imaging, especially in children, in whom observations are subjective and no normative data exist.

Objectives

The aim of this study was to establish a database for optic nerve diameter measurements on MRI imaging in the pediatric population.

Methods

This was a retrospective study on the MRI imaging of pediatric subjects (younger than 16 years of age) at the Department of Diagnostic Radiology at the American University of Beirut Medical Center. The optic nerve measurements were obtained by 3 raters on axial and coronal sections at 3 mm (retrobulbar) and 7 mm (intracanalicular) posterior to the lamina cribrosa.

Results

Of 211 scans of patients (422 optic nerves), 377 optic nerves were measured and included. Ninety-four patients were female (45%) and the median age at MR imaging was 8.6 years (interquartile range, 3.9–13.3 years). Optic nerves were divided into 5 age groups: 0–6 months (n = 19), 6 months–2 years (n = 44), 2–6 years (n = 46), 6–12 years (n = 120), and 12–18 years (n = 109). An increase in optic nerve diameter was observed with age, especially in the first 2 years of life. The measurements did not differ with eye laterality or sex.

Table 3: Optic nerve diameter measurements at each of the retrobulbar and intracanalicular levels on axial and coronal MRIs.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>No.</th>
<th>Mean [mm]</th>
<th>6–12 mo.</th>
<th>2–6 yr.</th>
<th>0–6 mo.</th>
<th>12–18 yr.</th>
<th>6–12 mo.</th>
<th>2–6 yr.</th>
<th>0–6 mo.</th>
<th>12–18 yr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>211</td>
<td>2.15 ± 0.56</td>
<td>2.04 ± 0.04</td>
<td>2.09 ± 0.04</td>
<td>2.08 ± 0.05</td>
<td>2.04 ± 0.04</td>
<td>2.08 ± 0.05</td>
<td>2.04 ± 0.04</td>
<td>2.08 ± 0.05</td>
<td>2.04 ± 0.04</td>
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<tr>
<td>Retrobulbar</td>
<td>94</td>
<td>2.15 ± 0.56</td>
<td>2.04 ± 0.04</td>
<td>2.09 ± 0.04</td>
<td>2.08 ± 0.05</td>
<td>2.04 ± 0.04</td>
<td>2.08 ± 0.05</td>
<td>2.04 ± 0.04</td>
<td>2.08 ± 0.05</td>
<td>2.04 ± 0.04</td>
</tr>
<tr>
<td>Intracanalicular</td>
<td>117</td>
<td>2.20 ± 0.60</td>
<td>2.12 ± 0.04</td>
<td>2.15 ± 0.04</td>
<td>2.14 ± 0.05</td>
<td>2.12 ± 0.04</td>
<td>2.15 ± 0.05</td>
<td>2.12 ± 0.04</td>
<td>2.15 ± 0.05</td>
<td>2.12 ± 0.04</td>
</tr>
</tbody>
</table>

* Values include the significance of the intergroup comparison using ANOVA.

FIG 1. Optic nerve mid-axial measurement.