A retrospective study of visual outcome in children treated for retinoblastoma between 2000 and 2021

Dr Emilia Cirillo Laaksonen MD\(^1\), Dr Stephanie Kletke MD\(^1\), Dr Brenda Gallie MD\(^1\), Dr Helen Dimaras PhD\(^1\), Dr Ashwin Mallipatna MD\(^1\)

\(^1\) Department of Ophthalmology and Vision Sciences, Faculty of Medicine, University of Toronto and The Hospital for Sick Children Toronto, Ontario, Canada

**Introduction**

- Retinoblastoma (RB) is the most common intraocular malignancy tumor of childhood (1 in 15,000-20,000 live births).\(^2\,3\)
- Saving the child’s life is the primary goal of RB treatment, with the secondary goal being salvaging the globe and restoration of vision if possible. (4,5)
- Survival rate is greater than 95% in high-income countries, with timely diagnosis and treatment. (3)
- With current treatment options, up to 47% of patients with RB can be salvaged if not recorded as such (4,5).
- With patients (4,5) restoring vision if possible. (4,5)
- Saving the child’s life is the primary goal of RB treatment, (1 in 15,000-20,000 live births.)
- About 25 children are diagnosed annually with RB, and approximately 40% of these children are enrolled at the Hospital for Sick Children (HSC).

**Objectives**

- **Primary Objective:** to define specific clinical features that can predict visual impairment (VI) in establishing long-term visual prognosis in RB patients.
- **Secondary objective:** to review if age of diagnosis, treatment for amblyopia and features on visual field are associated to the final visual outcome.

**Methods**

Study Design: retrospective Chart Review.

**Included:** RB diagnosed between 2000-2021 at HSC.

**Excluded:** Treated elsewhere, visual acuity (VA) not recorded or insufficiently assessed.

**Data Collected:**
- International Intraocular Retinoblastoma Classification (IIRC) (3).
- Laterality.
- BCVA (best corrected visual acuity) and age at last visit.

**Data Evaluation:**
- Descriptive statistics were used for total number of patients, percentage of total cases categorized according to VI classification from 0 to 5.
- We looked at BCVA logMAR for the salvaged affected eyes for each IIRC group, and found the VI classification from 0-5. Both salvaged and enucleated eyes are represented.

**Results**

**Figure 1. Patient flow chart**

We identified 311 charts, of which 233 (74.9%) were eligible for the following reasons: care received elsewhere (18/78), unreliable or insufficient VI (60/78), including blink response, fixation response and evaluation (VA).

336 affected eyes were divided into each corresponding IIRC and then classified according to VI.

- Mean age at last follow up was 10.1yrs (median=8.7, SD=5.9).
- Of the 233 children eligible, 0% of unilateral (0/130) and 28% of bilateral (29/103) children were moderately or severely visually impaired.

**Among the salvaged eyes:**
- 83/137 (60.6%) had logMAR BCVA <0.48.
- 27/32 (84.4%) in IIRC A and 33/51 (65.7%) IIRC B had good vision.
- 20/32 (62.5%) in IIRC D had a VA of 0.48-1.
- 1/2 in IIRC E had good visual outcome and 1/2 had VA of 1.78-2.8.

**Table 1. log MAR BCVA per each IIRC group**

<table>
<thead>
<tr>
<th>IIRC Group</th>
<th>Overall (Enucleated)</th>
<th>Best Corrected Visual Acuity (BCVA) of Affected Eyes (logMAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>32</td>
<td>&lt;0.3 &lt;0.3-0.48 &lt;0.48-1 &lt;1-1.3 &lt;1.3-1.78 &lt;1.78-2.8 NLP</td>
</tr>
<tr>
<td>B</td>
<td>51 (6)</td>
<td>27 3 2 2 2 2 3 0</td>
</tr>
<tr>
<td>C</td>
<td>12 (14)</td>
<td>7 0 1 1 2 1 0 14</td>
</tr>
<tr>
<td>D</td>
<td>40 (119)</td>
<td>7 3 2 0 3 5 2 119</td>
</tr>
<tr>
<td>E</td>
<td>2 (60)</td>
<td>1 0 0 0 1 0 60</td>
</tr>
<tr>
<td>Total</td>
<td>137 (199)</td>
<td>75 8 32 3 7 10 2</td>
</tr>
</tbody>
</table>

**Conclusions**

- A majority of eyes salvaged have good vision after treatment.
- Eyes with group A and B IIRC have better visual outcome.
- Future steps: vision outcomes per salvaged eye are presented here, however further study of associations with tumor location and foveal involvement is ongoing in order to find clinical predictors of visual impairment in RB patients.
- Multivariate regression analysis is pending.
- Knowing the predictors may guide the treatment course towards the best possible visual outcome.

**References**


Contact: emilia.cirillolaaksonen@sickkids.ca, ashwin.mallipatna@sickkids.ca