Pediatric cataract surgery following treatment for retinoblastoma: a case series and systematic review

Stephanie N. Kletke, MD, FRCSC, Ashwin Mallipatna, MBBS, Kamiar Mireskandari, MBChB, FRCSEd, FRCOphth, PhD, Brenda L. Gallie, MD, FRCSC, Asim Ali, MD, FRCSC

Department of Ophthalmology and Vision Sciences, The Hospital for Sick Children, University of Toronto, Toronto, Canada.

BACKGROUND

- Globe salvage therapies for retinoblastoma (RB) may induce secondary cataract.
- Cataract may preclude tumor evaluation and limit visual development.
- Previous reports of cataract surgery in eyes treated for RB focus on outcomes of radiation-induced cataract.
- Unique intraoperative findings not previously reported and surgical guidelines not established.

PURPOSE

To determine the visual and refractive outcomes, and ocular and systemic complications of cataract surgery in eyes treated for retinoblastoma.

STUDY DESIGN

1. Retrospective, single-institutional, consecutive case series
2. Systematic review indexed by Medline (OVID), Embase, Web of Science and Cochran, from inception – August 2020

ELIGIBILITY CRITERIA

- Children ≥18 years of age with retinoblastoma who underwent surgery for secondary cataract between 2000 – 2020, with minimum 6-month follow-up
- Peer-reviewed English-language publications focused on cataract surgery in children treated for RB, with ≥1 reported outcome

OUTCOME MEASURES

1. Visual
2. Refractive
3. Intraoperative findings
4. Complications
5. Metastasis

REFERENCES


CASE SERIES

Retinoblastoma Demographics
- 15 eyes of 15 children met inclusion criteria
- Mean age at diagnosis: 12 mo (median, 14; IQR, 4-19)
- RB laterality: bilateral (93%), unilateral (7%)
- Staging AJCC 8th Edition (study eye):
  - cT1: 26% - H0*: 7%
  - cT2: 67% - H1: 93%
  - cT3: 7%

RESULTS

Primary intraocular lens (IOL) 14 (93%)
Biometry
Immersion A-scan (12), Contact A-scan (1), IOL-Master (1)
IOL power formula
Holladay (11), Hoffer Q (1), unspecifed (2)
Primary posterior capsulotomy (PPC) 6 (40%)
Anterior vitrectomy (AV) 5 (33%)
Combined with posterior segment surgery 2 (13%)

Visual Outcomes
- 100% improved fundus view, 73% (11/15) improved vision
- Final BCVA: 1.0 logMAR or better in 6 eyes (40%)
- Factors limiting VA: macular tumor/scar (13), chronic/previous RD (9), keratopathy (5), optic neuropathy (4), macular edema (2), chronic uveitis (1), amblyopia (1)

Refractive Outcomes
- Mean absolute predictive refractive error (n=6): 1.4±1.3 D

Table 1. Surgical Technique

Table 2. Post-operative Ocular Complications

Visual axis opacification 11 (73%)
Capsular phimosis 5 (33%)
Zonulopathy 4 (27%)
Fibrin 3 (20%)
IOL decentration/tilt 2 (14%)
Macular edema 1 (7%)

Table 2. Post-operative Ocular Complications

Ocular and Systemic Outcomes
- Intraocular RB recurrence: 1 (7%)
- Treated by PPV/tumor endoresection
- Globe salvage: 14 (93%)
- 1 eye enucleated for chronic RD/phthisis bulbi
- No extraocular extension or metastases at mean 74 mo (median, 78; IQR, 25-126) follow-up.

CONCLUSIONS

- Modern retinoblastoma therapies, including intravitreal chemotherapy and vitrectomy, cause secondary cataract.
- Following cataract surgery, intraocular RB recurrence risk is low and extraocular spread is rare.
- While surgery improves tumor visualization, macular tumors, RD, optic neuropathy and keratopathy limit visual prognosis.
- Challenges include biometry limitations and higher incidence of zonulopathy.

Correspondence: stephanie.kletke@sickkids.ca

Dr. Ali is a consultant for Santen. The other authors have no financial interests to disclose.