Advances in Ophthalmology and Optometry 2 (2017) 87–100

ADVANCES IN OPHTHALMOLOGY AND OPTOMETRY

Advances in Management of Retinoblastoma

Reema Syed, MD, Aparna Ramasubramanian, MD*

Department of Ophthalmology and Visual Sciences, University of Louisville, 301 E Muhammad Ali Boulevard, Louisville, KY 40202, USA

Keywords

• Retinoblastoma • Leucocoria • Intra-arterial chemotherapy
• Intravitreal chemotherapy • Pediatric oncology

Key points

- There has been a paradigm shift in the management of retinoblastoma. In the era of newer treatments, the Reese-Ellsworth classification has been replaced by the International Classification and the TNM classification.
- Ultrasound remains the gold standard for diagnosis, but optical coherence tomography and ultrasound biomicroscopy add key information for diagnosis and treatment. Standardized MRI protocols have aided in screening for advanced retinoblastoma and pineoblastoma.
- Systemic chemotherapy remains to be the primary treatment for bilateral retinoblastoma, but unilateral patients can be safely treated with intra-arterial chemotherapy.
- Vitreous seed persistence or recurrence can be effectively and safely treated with intravitreal melphalan, which has decreased the need for enucleation.
- Extraocular retinoblastoma is still seen in developing countries and is treated with a combination of surgery (enucleation or exenteration), chemotherapy, and radiation therapy.

The authors have nothing to disclose.

This work was supported in part by an unrestricted institutional grant from Research to Prevent Blindness (RPB - 1944), New York, NY.

*Corresponding author. *E-mail address:* Aparna.ramasubramanian@louisville.edu

http://dx.doi.org/10.1016/j.yaoo.2017.03.005

CURRENT MANAGEMENT OF RETINOBLASTOMA

Introduction

Retinoblastoma is the most common primary intraocular malignancy in children, leading to death within 1 to 2 years if left untreated [1]. Retinoblastoma has been a focus of the medical community during the past few decades, and rapid advances in the field have occurred. Aggressive multidisciplinary approach and paradigm shifts in the management of retinoblastoma have greatly improved survival.

Previously, external beam radiotherapy (EBR) was extensively used to avoid enucleation. However, well-recognized side effects, such as second cancers in the field of radiation, particularly if given in the first year of life, have limited its use to salvage treatment to avoid enucleation [2]. Nowadays, there is a trend away from enucleation and EBR toward focal treatments. Such treatments include primary intravenous chemotherapy (IVC) followed by tumor consolidation, with measures such as thermotherapy, cryotherapy, and plaque radiotherapy [3]. These globe-salvaging therapies with chemoreduction and focal consolidation have improved survival after diagnosis to 95% to 97% in developed countries, with many children maintaining functional vision [1].

Concerns about the side effects of multidrug systemic chemotherapy protocols stimulated the development of novel approaches for selectively delivering chemotherapy to the globe. Intra-arterial chemotherapy (IAC) has received much recent attention. Over the past few years, IAC has surfaced as a promising treatment alternative for advanced and refractory retinoblastomas [4,5]. In addition, novel therapeutic directions are actively being pursued for treatments that decrease associated risks of systemic chemotherapy. Furthermore, novel imaging modalities are increasingly used that aid in the diagnosis and management of retinoblastoma. This article discusses the advances in the management of retinoblastoma.

Retinoblastoma classification

The Reese-Ellsworth classification, developed in the 1950s, predicted the chance of eye salvage by external beam radiation. It now has been replaced by the International Classification of Retinoblastoma (ICRB) (Table 1) [6]. This presurgical classification has been found predictive of treatment success following IVC, as well as following IAC [7,8]. Ocular tumors are separated into 5-letter groups from A to E of increasing disease progression. The grouping is based on specific ophthalmoscopic features, such as the presence of vitreous or subretinal seeding. Each group has a corresponding risk of treatment failure and subsequent enucleation, with the lowest risk in group A and the highest risk in group E [6].

The eighth edition of tumor, node, metastasis (TNM), and heritability cancer staging for retinoblastoma is predicted by a retrospective international survey to best predict the salvage of the eye(s), metastasis, and death [7] (Table 2). This system, the only system that includes heritability of the tumor into staging, is mainly used in countries in which cases of retinoblastoma are often advanced and the cancer has spread outside the eye.