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CASE REPORT

Choroidal melanoma in a 7-year-old child treated by trans-scleral local resection

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Abstract
Purpose To report a choroidal melanoma in a 7-year-old child treated by trans-scleral local resection and adjuvant brachytherapy with a family history of neurofibromatosis type I (NF1) and cutaneous melanoma.
Patient and methods A 7-year-old child was referred for treatment of a choroidal tumor in her left eye with a differential diagnosis of melanoma, neurilemmoma, leiomyoma, and neurofibroma. Trans-scleral local resection and, subsequently, adjuvant brachytherapy were performed.
Results Histopathology and immunohistochemistry of the specimen diagnosed an amelanotic melanoma of spindle cell type, with a moderately high number of mitoses (7/40 HPF). Multiplex ligation-dependent probe amplification (MLPA) analysis showed two copies of chromosome 3, three copies of the short arm of chromosome 6, and two copies of chromosome 8, strongly suggesting a good prognosis. Postoperative ophthalmic evaluation at 6 months showed no visible tumor and flat retina with visual acuity (VA) of 6/60.
Conclusions Trans-scleral local resection with adjuvant brachytherapy in children is possible using the same techniques as for adults. Although the follow-up is short, our patient retained the eye with good vision and our cytogenetic studies allowed us to reassure the mother.

Keywords Trans-scleral local resection · Brachytherapy · Children · Choroidal melanoma

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Introduction

Uveal melanoma is exceedingly rare in children [1–3]. This report presents the case of an amelanotic choroidal melanoma in a child who underwent trans-scleral local resection and adjunctive brachytherapy. Interestingly, the patient had a family history of neurofibromatosis type I (NF1) and cutaneous melanoma. This case report serves as a reminder that uveal melanomas can occur in children and demonstrates that trans-scleral local resection is possible using the same surgical and anesthetic methods as used in adults.

Patient and methods

A 7-year-old girl was referred to the Liverpool Ocular Oncology Centre in December 2008 for treatment of a choroidal tumor in her left eye. The child's mother had segmental cutaneous neurofibromatosis and her mother, grandmother, and maternal uncle had suffered from cutaneous melanoma. The mother also had excision of a dysplastic cutaneous nevus and, at the age of 14 years, her brother was found to have two large cutaneous melanocytic nevi. This history was suggestive of the familial atypical mole and melanoma (FAMM) syndrome.

Upon examination, the vision was 6/60 with the affected eye, which was esotropic, and 6/6 with the right eye, which was healthy. No Lisch nodules were visible. The intraocular

pressure was normal. The tumor was amelanotic, situated supero-temporally, and associated with extensive exudative retinal detachment involving the macula (Fig. 1a). On ultrasonography, the tumor measured 15.8×11.7 mm in diameter with a thickness of 8.0 mm. Our differential diagnosis included melanoma, neurilemmoma, leiomyoma, and neurofibroma. Physical examination was unremarkable. Following discussion, it was decided to perform a trans-scleral local resection. One week before surgery, however, the child developed chickenpox. Because of the large size of the tumor, it was decided not to delay surgery, the infective period having passed.

Trans-scleral local resection was performed under hypotensive general anesthesia using methods that have previously been reported [4]. Briefly, extraocular muscles in the operative field were dis-inserted. A lamellar scleral flap was dissected, hinged posteriorly. The eye was partially collapsed by performing a limited pars plana vitrectomy, without infusion. The deep sclera was incised around the tumor. The choroid was gently opened by ripping the uveal tissue apart using two pairs of notched micro-forceps. The tumor was lifted out of the eye using the deep scleral lamella as a handle. Hemorrhage was minimized by systemic hypotension, lowering the blood pressure to 35/25 mmHg, and by applying bipolar cautery to the vortex vein and posterior ciliary arteries in the affected quadrant. Using a fresh set of instruments, the eye was closed with interrupted nylon sutures and re-formed with balanced salt solution, which was injected through the pars plana sclerectomy. Six weeks later, adjunctive brachytherapy was administered with a 25-mm ruthenium plaque, delivering 125 Gy to the sclera and 101 Gy to a depth of 1.0 mm. The adjunctive brachytherapy is administered routinely to all patients to reduce the chances of local tumor recurrence [5].

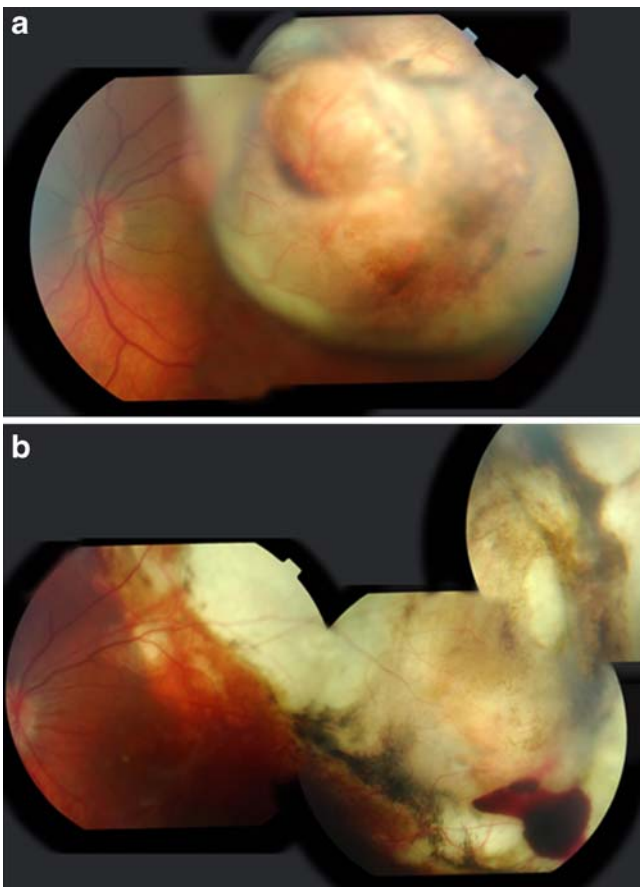

Fig. 1 **a** Supero-temporal, amelanotic tumor associated with extensive exudative retinal detachment involving the macula. **b** Fundus photograph 6 months postoperatively, showing a large choroidal coloboma following trans-scleral local resection and adjunctive brachytherapy

The surgical procedure was uncomplicated. Six months post-operatively, the visual acuity was 5/60 and ophthalmoscopy showed no visible tumor and no retinal detachment (Fig. 1b). One year post-operatively the ocular status was unchanged and the patient was in good health.

Pathological examination of the local resection specimen showed an amelanotic melanoma of spindle cell type (Fig. 2) with strong immunoreactivity for HSP-27. The number of mitoses was moderately high, approximately 7/40 high power fields. The surgical resection margins were free of tumor. Multiplex ligation-dependent probe amplification (MLPA) analysis showed two copies of chromosome 3, three copies of chromosome 6p, and two copies of chromosome 8. Taken together, these findings indicated a good prognosis for survival [6].

Discussion

The average age of Caucasian patients at presentation with uveal melanoma is 55 years. Uveal melanoma in patients less than 20 years old (i.e., 'young patients' [1]) varies between 0.6% as reported by Paul et al. [7] and 1.6% as described by Barr et al. [1]. This tumor is extremely rare in children under the age of ten [2]. Only one case series [2] and a few case reports have been published since 1980 reporting uveal melanoma in children. The clinical, histopathological features and treatment of uveal melanoma in children do not differ from those of adults [2].

Spindle-cell type may be more common in uveal melanomas developing in childhood (46%) [2]. This is lower than the spindle cell uveal melanoma prevalence in adults reported by COMS to be 9.0% [8], and may account for the finding that survival prognosis is better in children than in older patients.

The differential diagnosis of pediatric uveal melanoma includes medulloepithelioma, melanocytoma, neuroepithelial cysts, hemangiomas and hematomas, and acquired inflammatory masses.

In rare instances, uveal melanoma occurs in the presence of predisposing factors such as neurofibromatosis type 1, ocular or oculodermal melanocytosis, and the dysplastic nevus

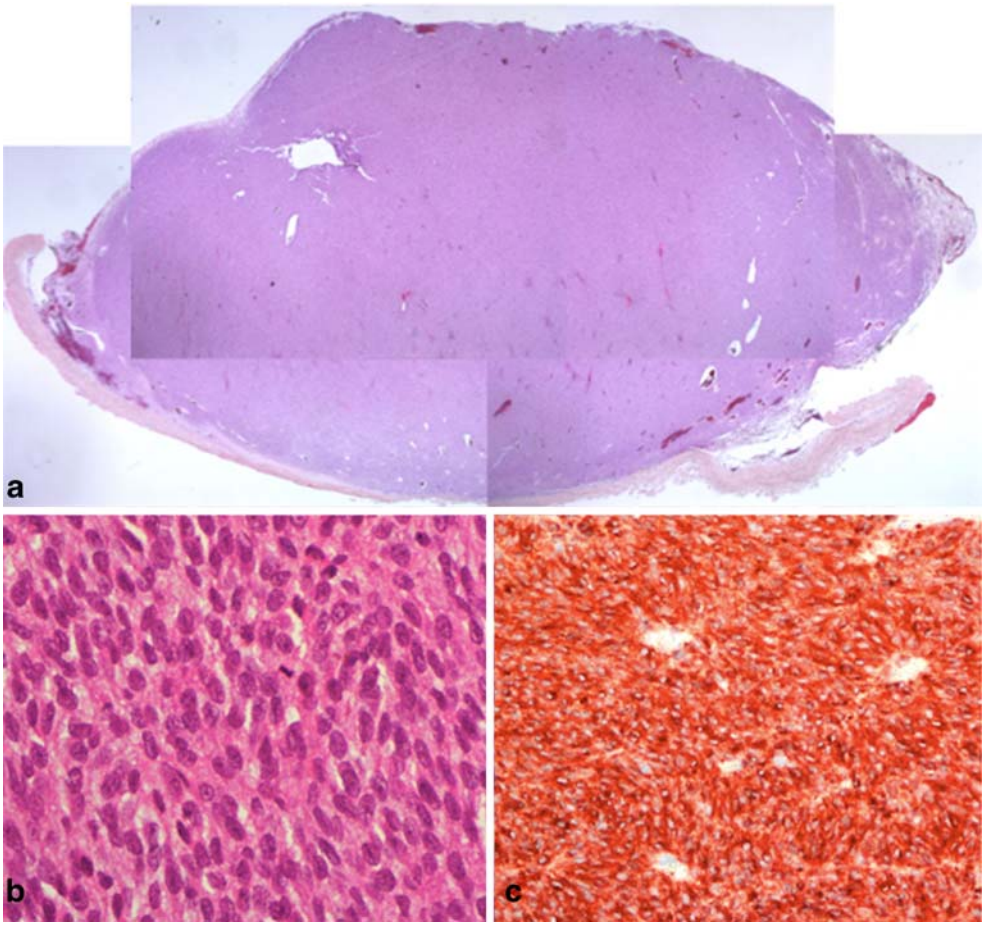

Fig. 2 **a** Low power micrograph of the local resection specimen (Hematoxylin and eosin, ×40 objective). **b** Hematoxylin and Eosin (H&E) demonstrating a spindle cell choroidal tumor with occasional mitotic figures. **c** MelanA stain showing immunoreactivity of the tumor cells (×20 objective; alkaline phosphatase-anti alkaline phosphatase, APAAP method)

syndrome. These suggest that there may be an inherited predisposition to develop this malignancy. In the case series reported by Singh et al. [2], oculodermal melanocytosis was observed to be nine times more common in young patients with uveal melanoma than in adults with this tumor.

Neurofibromatosis type I is characterized by autosomal dominant inheritance with complete penetrance but variable expression. Cutaneous melanoma has been reported in 0.1 to 5.4% of patients with NF1 [9]. However, a causal association of cutaneous melanoma with NF1 has yet to be established. The association of NF1 with uveal melanoma is believed to occur because of a common neural crest origin. An increased incidence of choroidal nevi has been reported in patients with NF1 [10]; this may explain the possible association between uveal melanoma and NF1. The family history of NF1, FAMM, and cutaneous melanoma is relevant.

To our knowledge, this is the first case in literature of trans-scleral local resection of a choroidal malignant melanoma in a child. This procedure was performed using the same surgical and anesthetic methods as for adults, with the same course intra-operatively and post-operatively. One year post-operatively, our patient retained the eye with good vision and our cytogenetic studies allowed us to reassure the patient and her family of a good prognosis for survival.

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