

Iris melanoma in a 12-year-old boy – a case report

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Abstract:

Introduction: Iris melanoma accounts for 8% of all uveal melanomas. Clinically, iris melanoma in children and adolescents differs from that in adults: it presents with smaller tumor size, reduced involvement of the filtration angle, and a lower incidence of secondary glaucoma. In pediatric and adolescent patients, it typically appears as a brown nodule and carries a better prognosis than in adults due to earlier detection and smaller dimensions.

Case report: A 12-year-old boy was admitted to the Department of Pediatric Ophthalmology in Białystok because of an iris nodule in the left eye, present since birth but recently increasing in size. Necessary additional examinations were performed, including slit-lamp examination, ultrasound biomicroscopy, anterior segment optical coherence tomography, gonioscopy, and tonometry. The patient was subsequently referred to the Department of Ophthalmology and Ocular Oncology in Krakow with suspected iris melanoma. After confirmation of the diagnosis (stage T1aNxMx), he underwent brachytherapy. A ¹⁰⁶Ru applicator was sutured onto the cornea and sclera of the left eye and removed after two days. Both procedures were performed under general anesthesia. No intraoperative or postoperative complications occurred. At the most recent ophthalmologic examination, eight months after the procedures, the patient had full visual acuity, clear optical media, and normal intraocular pressure in both eyes. The boy remains under close oncologic and ophthalmologic follow-up.

Conclusions: ¹⁰⁶Ru brachytherapy is an effective and safe treatment for iris melanoma, allowing preservation of good visual acuity in the treated eye.

Key words:

iris melanoma, children and adolescents, brachytherapy, complications.

Introduction

Iris melanoma accounts for 8% of all uveal melanomas. In children and adolescents, it represents 0.6–1.6% of all uveal melanoma cases [1]. In adolescents, it typically presents as a brown nodule and carries a better prognosis than in adults due to earlier detection and smaller tumor dimensions.

Shields et al. analyzed the incidence of uveal melanoma over a 40-year period and found that out of 8,101 eyes, only 317 (4%) involved the iris, and in 24 cases (8%), the patients were under 20 years of age [2]. Based on the limited number of publications on iris melanoma, its incidence is estimated at 0.4–0.6 cases per million people per year [2].

Clinically, iris melanoma in children differs from that in adults: it is smaller, shows less involvement of the filtration angle, and less frequently causes secondary glaucoma. As with all melanomas, early detection while the tumor is small is crucial for minimizing the risk of metastasis [3]. Children with melanoma generally have better systemic prognosis than older adults, which may partly be attributed to a stronger immune system [3].

Case report

A 12-year-old boy from an urban area, referred by his primary care physician on 29 May 2025, was admitted to the Pediatric Ophthalmology Department with Strabismus Treatment Center on 11 June 2025 for diagnostic evaluation and treatment of an iris lesion. The lesion had been present since birth, but according to the boy's father, it had begun to enlarge at an unspecified time. The boy reported no other symptoms.

Regarding family history, the patient's mother underwent gynecological surgery (oophorectomy and salpingectomy) for benign lesions; a maternal uncle was diagnosed with a central nervous system glioma at age 14 and treated surgically; the maternal grand-

mother had liver cancer; and the paternal grandmother had colorectal cancer.

Upon admission to the Department, examination showed: right eye (OD) visual acuity (VA) 1.0 with correction (−2.00 D sphere / −0.50 D cylinder axis 100°); left eye (OS) VA 1.0 with correction (−0.25 D cylinder axis 72°); near visual acuity 0.5 in both eyes; intraocular pressure: OD 18.8 mmHg, OS 18.9 mmHg.

Slit-lamp examination revealed a brown lesion at the iris root in the 3–4 o'clock position in the OS, elevated nasally, with a smooth surface and measuring approximately 2 mm (Fig. 1).

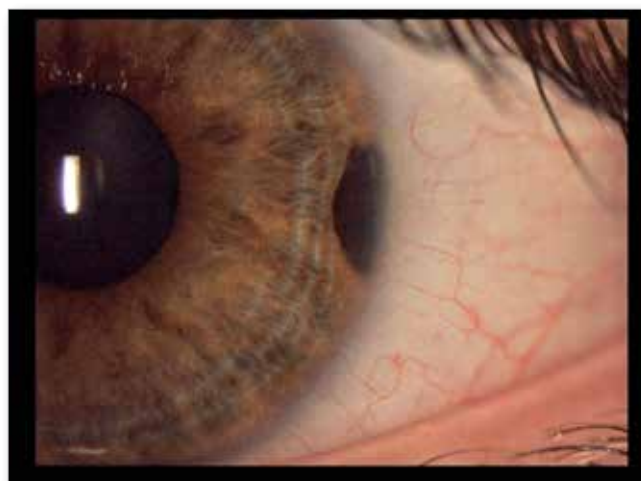


Fig. 1. Iris lesion in the OS on UBM.

The fundus of the eyes was normal. Ultrasound biomicroscopy (UBM) of the OS showed a moderately deep anterior cham-

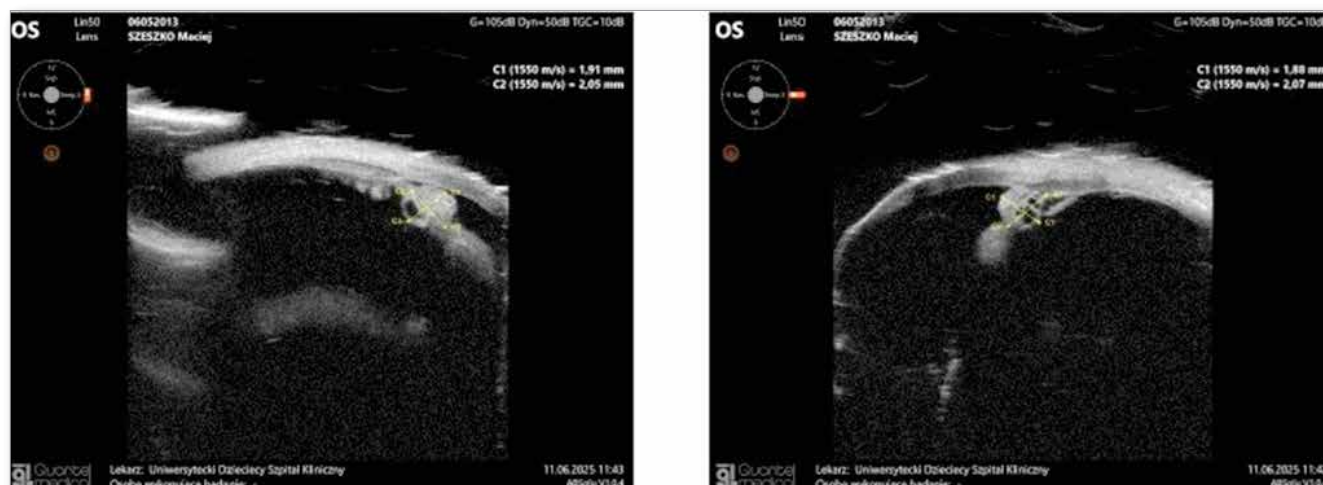


Fig. 2. Iris lesion in the OS on AS-OCT.

ber (3.49 mm), normal iris configuration, a preserved ciliary ring throughout its circumference, and normally configured ciliary processes. On the anterior surface of the iris at the 3–4 o'clock position, an isoechoic area (maximum dimensions: 3 x 2.87 mm), corresponding to the iris lesion seen on clinical examination, was identified. On the posterior surface of the lesion, there was a cluster of cysts with hypoechoic contents. The filtration angle was closed in the region of the lesion, while the iris insertion remained normal (Fig. 2).

Anterior segment optical coherence tomography (AS-OCT) of the OS demonstrated an isoreflective elevation corresponding to the iris lesion (Fig. 3).

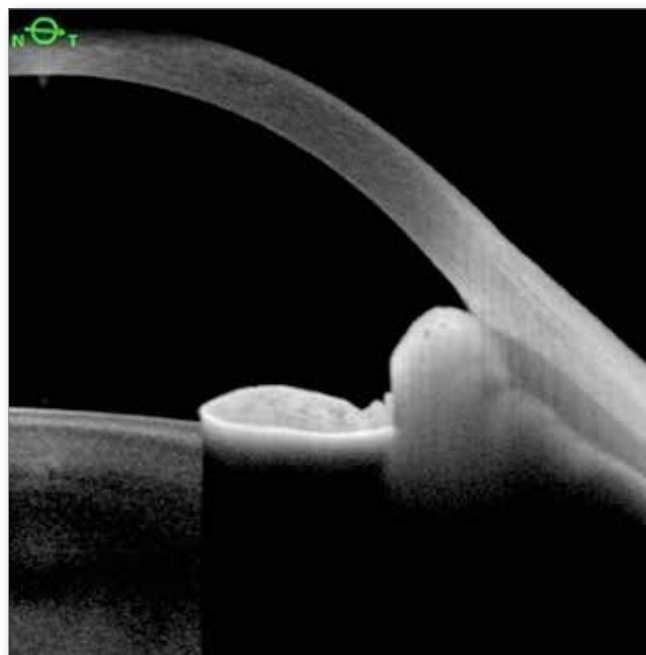


Fig. 3. Iris lesion in the OS on slit-lamp examination.

Gonioscopy of the OS showed closure of the filtration angle at the 3–4 o'clock position by the iris lesion, while the remaining portions of the angle were open in both eyes.

The boy was referred to the Ophthalmology Outpatient Clinic of the University Hospital in Krakow, where he was admitted on 16 June 2025. Ophthalmologists diagnosed iris melanoma of the OS (stage T1aNxMx). The patient was scheduled to undergo ¹⁰⁶Ru brachytherapy beginning on 2 July 2025, at the Clinical De-

partment of Ophthalmology and Ocular Oncology of the University Hospital in Krakow. On 25 June 2025, the boy was admitted to the University Hospital's Department of Pediatric Oncology for staging before initiation of brachytherapy (i.e., determination of the extent of the disease based primarily on the TNM system: tumor size, lymph node involvement, and metastases). The tumor was classified as T1a (confined to the iris and involving no more than 3 clock hours), N0 (no lymph node involvement), and M0 (no distant metastases). On 2 and 4 July 2025, at the University Hospital in Krakow (Department of Ophthalmology and Ocular Oncology), the ¹⁰⁶Ru applicator was sutured onto and, two days later, removed from, the cornea and sclera of the OS. The procedures were performed under general anesthesia.

The procedures and postoperative period were uncomplicated. On 7 November 2025, follow-up evaluation in Krakow showed favorable post-treatment clinical, gonioscopic, and UBM findings regarding the OS tumor status.

From July through December 2025, the boy was admitted monthly to the University Hospital's Department of Pediatric Oncology to assess potential complications of oncologic treatment and to perform follow-up laboratory and imaging studies. The most recent examinations, performed on 9 March 2026 to evaluate remission of the primary disease showed no abnormalities.

On 21 October 2025, a pigmented skin lesion in the right groin was excised with a margin of healthy skin. Histopathological examination confirmed a papillomatous melanocytic nevus.

Follow-up ophthalmologic examinations were performed in September 2025, November 2025, and February 2026. At each visit, distance and near visual acuity were normal, the IOP remained within the normal range, and there was mild irritation of the temporal bulbar conjunctiva of the OS. The cornea of the OS was normal. At the iris root in the 3–4 o'clock position in the OS, a brown lesion approximately 2 mm in size was present, elevated nasally, with clearly defined borders and a slightly irregular surface. The optical media of both eyes were clear, and the fundus was normal.

The boy remains under close oncologic and ophthalmologic follow-up.

Discussion

Diagnosis of iris melanoma relies on slit-lamp biomicroscopy supplemented by gonioscopy and high-frequency ultrasound biomicroscopy (UBM). Gonioscopy enables precise evaluation of the filtration angle and ciliary body structures. Anterior segment optical coherence tomography (AS-OCT) visualizes only the superficial structures of the tumor, particularly in pigmented lesions,

making it impossible to evaluate the posterior surface of the iris or ciliary body tumor. UBM remains the diagnostic gold standard, providing detailed structural imaging regardless of optical media clarity. Diaphanoscopy (transillumination) may assist in visualizing the tumor base [4]. Fine-needle biopsy, performed occasionally in small tumors to confirm the diagnosis, remains controversial because of the risk of systemic dissemination and a high rate of false-negative results [4].

Early detection and treatment of uveal melanoma in the early stages of its natural course are crucial for achieving the best possible prognosis. Local treatment aims to destroy the primary tumor or halt its growth, thereby preventing distant metastases. Available treatment modalities include radiotherapy, surgical excision, and – when tumors are too large – enucleation.

Radiotherapy is a highly effective treatment for iris and/or ciliary body melanoma. From the time treatment is administered, the tumor is damaged, reducing the likelihood of distant metastasis. Brachytherapy (BT) using plaques containing radioactive isotopes is the most commonly used method. Other modalities include local resection followed by secondary brachytherapy or enucleation. BT is a form of radiation therapy using applicators containing radiation sources sutured onto the surface of the eyeball at the base of the intraocular tumor. It is the most widely used and effective treatment for uveal melanoma (95–100% local control). Radioactive sources such as ^{125}I or ^{106}Ru are typically applied for 2–7 days. Survival rates following BT are comparable to those of patients undergoing enucleation. BT not only allows preservation of the eyeball but also, in many cases, maintains useful vision.

Following completion of treatment, close monitoring of both local and systemic status of the patient is necessary. Abdominal ultrasonography and liver function tests are recommended every 3–6 months, with annual chest imaging. Local status is evaluated via regular ophthalmic examinations supplemented by comparative ocular ultrasonography to assess changes in tumor size [4, 5]. In this patient, ^{106}Ru applicator was selected, resulting in a good local response and preservation of full visual acuity in the OS eight months after treatment. Literature data corroborate that ^{106}Ru brachytherapy is an effective intervention for iris melanoma, characterized by extremely low recurrence rates and acceptable visual acuity in the treated eye [6].

The primary challenge associated with radiotherapy for iris melanoma is radiation toxicity to adjacent healthy structures, particularly the lens and trabecular meshwork [7]. The most common complication is cataract, affecting 36–86% of patients, followed by glaucoma, observed in 2–33% of patients treated with BT [8]. Transient anterior uveitis, superficial corneal epitheliopathy, or IOP spikes may also occur [8].

In this patient, dermatologic examination revealed several pigmented nevi. The largest, measuring 5 x 6 mm and located in the right groin, was excised; histopathologic evaluation confirmed a papillomatous melanocytic nevus. Cutaneous nevi are a known risk factor for the development of melanoma [4]. Patients with atypical nevi have a 4.36–10.4-fold higher risk of developing this cancer compared with the general population [9].

Genetic factors may also play a role in iris melanoma development [3]. Mutations in the following genes have been identified

in patients with iris melanoma: *GNAQ*, *GNA11*, *EIF1AX*, *SF3B1* and the *BAP1* protein mutation [10].

Uveal melanoma is one of the cancers associated with a very poor prognosis because of its propensity for hematogenous distant metastases, primarily to the liver. Key factors associated with improved survival include early detection (when small tumor size minimizes metastatic risk), avoidance of misdiagnoses/inappropriate therapies, and treatment at centers with extensive experience in melanoma management [3, 11].

Clinical studies have shown that melanoma localized to the iris carries a lower risk of metastasis (due to lower biological activity and smaller tumor size, as the pigmented lesion is often visible without specialized instruments). Similarly, younger patient age is a factor associated with a lower risk of dissemination [2, 4, 12]. Shields et al., in an analysis of 8,033 cases of uveal melanoma, reported significantly better prognosis in younger patients [13]. The patient will remain under ophthalmologic and oncologic surveillance for the coming years.

Disclosure

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