Beyond childhood: A case report of unilateral retinoblastoma in an atypical age group

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ABSTRACT

Retinoblastoma, a rare paediatric retinal cancer, is exceptionally uncommon in adults, with over 90% of cases diagnosed before age five. This case report describes a 17-year-old male from Kenya who presented with a two-month history of right eye swelling, vision loss, and pain. Initially misdiagnosed and treated traditionally, he was later evaluated at Kenyatta National Hospital (KNH). Imaging and biopsy confirmed unilateral retinoblastoma, a rarity at his age. The patient underwent high-dose chemotherapy and external beam radiation therapy, achieving significant tumour reduction. This highlights the potential for effective treatment in late-presenting retinoblastoma with aggressive management. The case underscores the importance of clinical suspicion in atypical age groups and the impact of socioeconomic and healthcare access disparities on outcomes. Retinoblastoma, though rare in adults, should be considered when symptoms align, enabling early detection and intervention. Written informed consent was obtained from the patient.

Key words: Retinoblastoma, Adolescent oncology, Adult-onset retinoblastoma, Ocular tumour, Delayed diagnosis

INTRODUCTION

Retinoblastoma, a malignant tumour of the retina, is the most common intraocular cancer in the paediatric population. It predominantly affects children under five years of age, with a mean age of two years for unilateral cases and one year for bilateral case[1]. Globally, over 90% of retinoblastoma cases are diagnosed before the age of three. However, in Africa, late presentations are more common, with a mean age of 36 months for bilateral cases and 25 months for unilateral cases[2].

The global incidence of retinoblastoma is approximately 1 in 16,000 live births[3], while in Kenya, the incidence is slightly lower at 1 in 17,000 live births[2]. Although retinoblastoma is rare in older children and adults, a case series of 400 children with retinoblastoma reported that 34 (8.5%) patients were older than five years, and only 3 (0.8%) were older than 15 years[4]. Late presentations are exceptionally rare, with the oldest reported case being a 74-year-old female[5]. Over the past century, there have been approximately 59 isolated reports of retinoblastoma in patients aged 15 years or older.

Despite its rarity, retinoblastoma should not be overlooked as a differential diagnosis for intraocular tumours in older children and adults. This case report aims to contribute to the existing body of knowledge on late- onset retinoblastoma and highlight the importance of considering this diagnosis in patients presenting with suggestive symptoms, regardless of age. Early suspicion and timely intervention are critical to improving outcomes in these rare but challenging cases.

CASE PRESENTATION

A 17-year-old male presented to Kenyatta National Hospital (KNH) with a two-month history of progressive right orbital swelling, white discharge, and right temporal headache. He had a prior history of ocular trauma in April 2021 after being struck in the right eye by vegetative material. Initial management included tetracycline ointment and traditional eye drainage, which resulted in temporary relief.

In June 2021, he developed severe pain and loss of vision in the right eye. At Kajiado County Hospital, he was diagnosed with endophthalmitis and corneoscleral perforation and underwent right eye evisceration. Postoperatively, he was discharged on antibiotics and advised to follow up, though this was not completed.

Two years later, in November 2023, he developed a progressively enlarging, painful orbital mass with persistent white discharge. On examination, a 7×7cm fungating right orbital mass with surrounding lymphadenopathy was noted (Figure 1). The left eye was normal with visual acuity of 6/6.

Non-contrast CT revealed a heterogeneous, hyperdense orbital mass with invasion into preseptal tissues (Figure *2*). Incisional biopsy and histopathology suggested a malignant epithelial tumour with papillary

features. Immunohistochemistry confirmed the diagnosis of retinoblastoma (Vimentin+, CD56+, Synaptophysin focal+, negative for AE1/AE3, Desmin, Myogenin, CD99, and WT1). Metastatic workup, including MRI, bone marrow aspirate, and CSF studies, was negative.

Due to the tumour's haemorrhagic nature, surgical excision was deferred. The patient underwent 12 cycles of high-dose Vincristine, Etoposide, and Carboplatin (HDVEC) with interim external beam radiotherapy (45 Gy). He tolerated treatment well, aside from manageable pancytopenia and nausea. By November 2024, the mass had significantly reduced to 2×2cm.

The mother was informed about the publication process and the use of images, and she was assured that her child's personal information would remain confidential. Once she understood, she provided consent for their use.

Figure 1: Clinical photograph of the right orbit. This shows a large, fungating, associated whitish discharge. The mass measures approximately 7cm×7cm and exhibits irregular margins

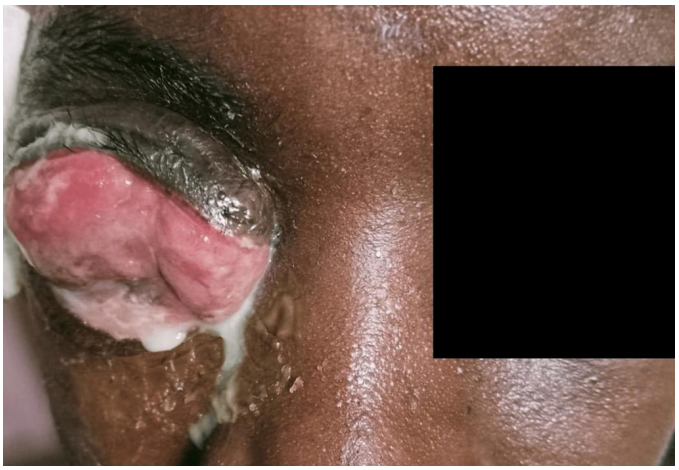
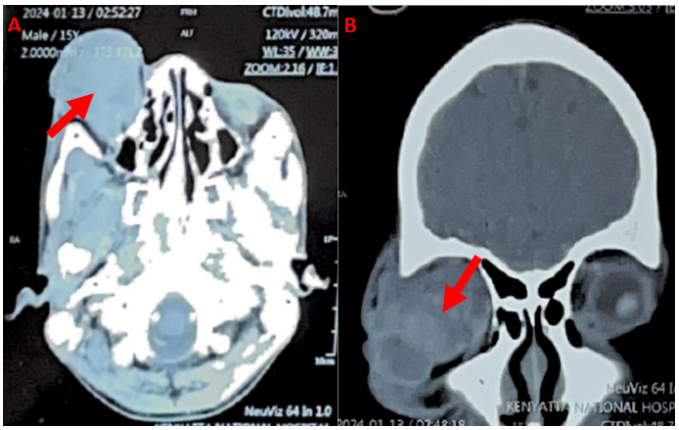


Figure 2(A) and 2(B): Showing transverse and coronal non-contrast CT of head and orbit: The red arrow shows a heterogeneously enhancing exophytic soft tissue mass in the right orbit. The mass has a well-defined border with the surrounding fat and bony orbit but showed invasion of the preseptal tissues. It exhibited irregular margins and pre-contrast hyperdensities, suggestive of haemorrhage.



Note: The image was obtained at the age of 16 years during the patient's presentation to the hospital, with an eye patch in place over the right eye. The red arrow corresponds to the site of the retinoblastoma.

DISCUSSION

This case report highlights the rare presentation of retinoblastoma in a 17-year-old male, a demographic far outside the typical age range for this paediatric malignancy. Globally, over 90% of retinoblastoma cases are diagnosed in children under five years of age, making adult-onset retinoblastoma exceedingly rare and often overlooked in differential diagnoses for intraocular pathologies in older patients. This case underscores the importance of maintaining a high index of suspicion for retinoblastoma, even in atypical age groups, to avoid diagnostic delays and improve outcomes.

Several theories have been proposed to explain the development of retinoblastoma in adults. The first theory suggests that persistent embryonal retinal cells may undergo malignant transformation[6]. The second theory, based on Knudson's "two-hit" hypothesis, involves mutations in the Rb-1 gene, where an initial mutation is followed by a "second hit," leading to genomic instability and tumourigenesis[7]. A third theory posits that retinoblastoma may develop earlier in life, undergo spontaneous regression, and reactivate in adulthood[8]. These theories provide a framework for understanding the rare occurrence of retinoblastoma in older patients.

In adults, retinoblastoma often presents differently than in children. While paediatric cases typically present with leukocoria and strabismus, adult cases may manifest as a white intraocular mass, vitreous haemorrhage, or neovascular glaucoma, often mimicking uveitis or other inflammatory conditions[5]. This patient's presentation, characterized by eye swelling, vision loss, and pain, aligns with these atypical symptoms.

Imaging and histopathological findings, including a heterogeneous mass with retinal detachment and absence of calcifications, further supported the diagnosis of retinoblastoma in this age group.

Histopathological analysis remains the gold standard for diagnosing retinoblastoma. Well-differentiated tumours may exhibit Flexner-Wintersteiner rosettes and fleurettes, associated with a better prognosis, while undifferentiated tumours lack these features and are linked to poorer outcomes[9]. Immunohistochemistry (IHC) can aid in diagnosis, with tumour cells often staining positive for markers like non-specific enolase markers such as CD56 and Synaptophysin[10].

Treatment typically involves enucleation, but in this case, the tumour's highly vascular nature precluded surgical intervention initially. Instead, the patient underwent high-dose chemotherapy and external beam radiotherapy, resulting in significant tumour reduction[11].

This highlights the potential for aggressive multimodal therapy in managing late-presenting retinoblastoma, even in resource-limited settings.

The prognosis for retinoblastoma in older patients is generally poor, with delayed diagnosis and advanced disease at presentation contributing to higher mortality rates. Socioeconomic factors, limited healthcare access, and low awareness of the disease further exacerbate outcomes, particularly in low- and middle- income countries[12]. This case illustrates the critical need for early diagnosis, patient education, and adherence to treatment to improve survival and quality of life.

A key limitation of this report is the unavailability of immunohistochemistry (IHC) slides. Although the IHC was performed at Aga Khan University Hospital, Kenya, we encountered persistent challenges in retrieving the slides due to institutional bureaucracy. This limited our ability to include pathological slide images and conduct further independent reviews.

CONCLUSIONS

Retinoblastoma, though rare in adults, should be considered in the differential diagnosis of intraocular tumours, regardless of age. A multidisciplinary approach, including clinical suspicion, advanced imaging, histopathology, and aggressive treatment, is essential for optimizing outcomes in these challenging cases. Increased awareness and improved access to diagnostic and therapeutic resources are crucial to addressing the disparities in retinoblastoma care globally.

Ethics and consideration

Prior to beginning the process, the patient and his family were fully informed about the nature of the publication, including the use of clinical images. It was clearly explained to both the mother and the son that the patient's identity would be protected at all times. All clinical images used were fully de-identified to ensure confidentiality.

Disclosure

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REFERENCES

1. Verma R, Singh A, Chopra S, Gupta Y, Adewara BA. Adult-onset retinoblastoma: An uncommon and challenging diagnosis. *Oman J Ophthalmol.* 2023;**16**(2):382–384.
2. Nyamori JM, Kimani K, Njuguna MW, Dimaras H. The incidence and distribution of retinoblastoma in Kenya. *Br J Ophthalmol.* 2012; **96**:(1):141-143. doi: 10.1136/bjophthalmol-2011-300739. Epub 2011 Oct 25. PMID: 22028473.
3. Kaewkhaw R, Rojanaporn D. Retinoblastoma: Etiology, modeling, and treatment. *Cancers MDPI AG.* 2020; **12**: 1–23.
4. Andres Quiroz-Gonzalez E, Angel Quiroz-Reyes M, Gonzalez-Gonzalez C, Loaeza-Castrejon R, Haro-Morlett L, Bautista-Barba A, *et al*. Unilateral retinoblastoma presentation in a Latin-American teenager: A case report and literature review. *Intern J Ophthalmol Visual Sci.* 2021; **6**(4):267.
5. Grossniklaus HE. Retinoblastoma. Fifty years of progress. the LXXI Edward Jackson memorial lecture. *Am J Ophthalmol.* 2014; **158**(5):875-891.e1.
6. Singh L, Kashyap S. Update on pathology of retinoblastoma. *Intern J Ophthalmol.* 2018; **11**: 2011–16.
7. Knudson AG. Mutation and cancer: Statistical study of retinoblastoma. *Proc Natl Acad Sci.* U.S.A. 1971; **68**(4):820-823. https://doi.org/10.1073/pnas.68.4.820
8. Sharifzadeh M, Ghassemi F, Amoli FA, *et al*. Retinoblastoma in adults: A Case report and literature review. *J Ophthalmic Vis Res.* 2014; **9**(3):388-391. doi: 10.4103/2008-322X.143382. PMID: 25667742; PMCID: PMC4307670.
9. Rojanaporn D, Attaseth T, Dieosuthichat W, Leelawongs K, Pakakasama S, Anurathapan U, *et al*. Clinical presentations and outcomes of retinoblastoma patients in relation to the advent of new multimodal treatments: A 12-year report from single tertiary referral institute in Thailand. *J Ophthalmol*. 2020; **2020:** :4231841. doi: 10.1155/2020/4231841. PMID: 33005446; PMCID: PMC7508219.
10. Schaiquevich P, Francis JH, Cancela MB, Carcaboso AM, Chantada GL, Abramson DH. Treatment of retinoblastoma: What is the latest and what is the future. *Frontiers Oncology.* 2022; **12**: 822330. doi: 10.3389/fonc.2022.822330. PMID: 35433448; PMCID: PMC9010858.
11. De Jong PTVM, Mooy CM, Stoter G, Eijkenboom WMH, Luyten GPM. Late-onset retinoblastoma in a well-functioning fellow eye. *Ophthalmology.* 2006; **113**(6):1040–44.
12. Gallie BL, Helen Dimaras R, Kimani K, O Dimba EA, Gronsdahl P, White A, *et al.* Retinoblastoma. *The Lancet* [Internet]. 2012; **379**:1436–46. Available from: www.thelancet.com