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Rectal adenocarcinoma in the eye: An unexpected destination

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Abstract

Colorectal cancer ranks third in cancer incidence in the United States, commonly metastasizing to the liver and lungs. Despite its high prevalence, colorectal cancer with intraocular metastasis is exceedingly rare, with only a few cases reported in the literature. This study presents a 58-year-old male, previously treated for rectal adenocarcinoma with liver and lung metastases, who developed choroidal metastasis causing visual impairment. Despite radiotherapy, moderate improvement was observed, and subsequent disease progression led to systemic chemotherapy. Intraocular metastasis, primarily affecting the choroid, is infrequent, often originating from breast and lung cancers. The presented case, originating from primary KRAS wild-type rectal cancer, adds to the limited gastrointestinal-tract-related occurrences. This report underscores the importance of recognizing intraocular metastasis in colorectal cancer, contributing valuable insights for improved understanding and potential guidance for future clinical decisions. Choroidal metastasis carries a poor prognosis, emphasizing the need for tailored management strategies.

Keywords

Visual impairment, metastasis, choroid, colorectal cancer

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Introduction

Excluding skin cancers, colorectal cancer (CRC) ranks as the third most common cancer in both men and women (and the fourth overall) and stands as the second leading cause of cancer-related deaths in the United States.[1] Approximately 20% of individuals diagnosed with CRC present with distant metastases at the time of diagnosis, while an additional 30% experience the development of metastases as their disease progresses. CRC predominantly metastasizes to the liver (77%), peritoneum (25%), lungs (22%), and bone (4%).[2] Intraocular metastasis is uncommon and rarely documented,[3] with the choroid being the most prevalent site due to its rich vascular network supplied by the posterior ciliary artery. Additional locations for ocular metastasis include the orbit, accounting for a significant portion, followed by the ciliary body, iris, and eyelid.[4] Our study presents a 58-year-old male, previously treated for rectal adenocarcinoma with liver and lung metastases, presented with choroidal metastasis causing visual impairment. After radiation, there was minimal improvement. Subsequent disease progression necessitated systemic chemotherapy, maintaining good health. Despite multiple metastases, the patient's overall condition and vision remained stable during follow-up. This report aims to shed light on this rare entity and alert physicians to the potential for intraocular metastasis in CRC.

Case presentation

A 58-year-old male patient with no prior ocular history presented to the ophthalmology clinic in November 2023, following 3 weeks of visual disturbance and a gradual decrease in the visual acuity of the right eye. The ocular examination noted no ptosis, no eye proptosis, with mild right eye

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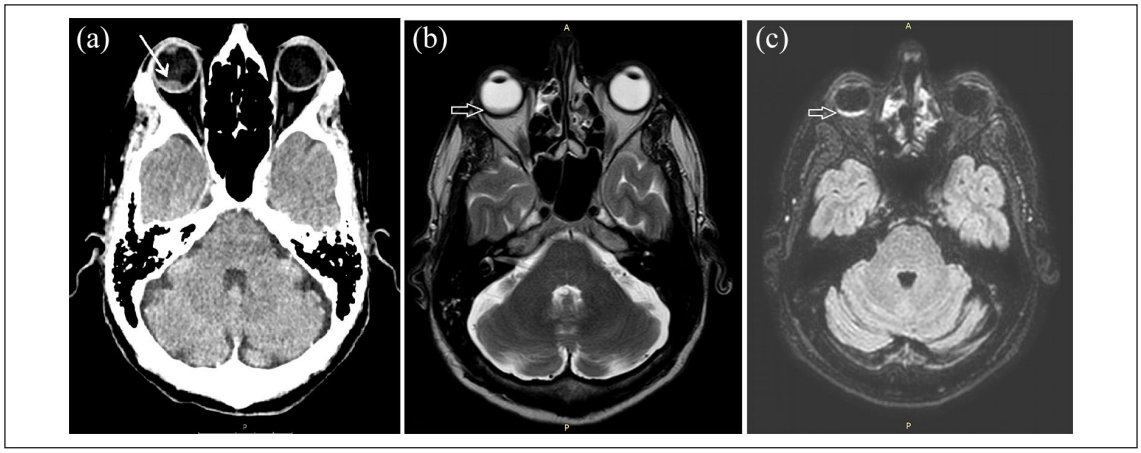

Figure 1. (a) Brain computed tomography demonstrated a fusiform-shaped choroidal tumor to the temporal side of the globe causing exudative retinal detachment, these findings were typically consistent with choroidal metastasis (arrow). Axial brain magnetic resonance imaging, (b) T2 weighted image and (c) diffusion-weighted magnetic resonance imaging, revealed a choroidal mass in the right eye (arrow).

conjunctival erythema. Visual acuity in the right eye was 6/24, with a normal left eye exam. Fundoscopic examination of the right eye revealed a large superior multifocal amelanotic creamy yellow choroid tumor. B-scan ultrasound demonstrated a fusiform-shaped choroidal tumor measuring 6 mm in elevation and 15 mm in diameter with moderate–high internal reflectivity, causing exudative retinal detachment. There was no extraocular extension. These findings were typically consistent with choroidal metastasis.

This patient had a history of rectal adenocarcinoma (pT3N0Mx) diagnosed in May 2021. A colonoscopy was done at the time and showed a large nonobstructing mass 10 cm from the anal verge. The patient underwent open tumor resection in September 2021. Histopathology from the tumor, measuring $4 \times 3 \times 2$ cm, showed moderately differentiated adenocarcinoma with free margins. The molecular panel showed wild KRAS, NRAS, and BRAF, stable MSI, negative HER-2, and PDL-1. The tumor showed expression of CDX2, patchy CK20, and was negative for CK7. The patient kept on regular follow-up, and no adjuvant treatment was given until April 2022 when a positron emission tomography (PET) scan showed a single liver metastatic lesion measuring 3.7×2.6 cm. The patient underwent a right liver lobectomy in June 2022, with pathological evidence of moderately differentiated adenocarcinoma, free margins, and negative lymph nodes. The patient received six cycles of adjuvant oxaliplatin and capecitabine (XELOX) chemotherapy but stopped due to significant side effects, including neuropathy and prolonged thrombocytopenia.

A follow-up PET scan in June 2023 showed right lung nodules measuring 1.7×1.4 cm, with the largest liver lesion measuring $4.2 \times 2.8 \times 3.8$. The patient underwent video-assisted thoracoscopic surgery (VATS) with lung nodule resection and mediastinal LN sampling, which confirmed metastatic disease. The patient started on 7 cycles of cetuximab (ERBITUX) plus irinotecan, fluorouracil, and leucovorin (FOLFIRI). A computed tomography (CT) scan in October 2023 showed stable disease. After complaining of decreased visual acuity in the right eye, brain imaging was done and showed right choroidal metastasis (Figure 1). The patient underwent external beam radiotherapy (EBRT) comprising 30 Gy administered in 10 fractions, delivered using two beams of 6-MV photons. The patient's vision began to improve gradually after radiation therapy. A CT scan and magnetic resonance imaging (MRI) in December 2023 showed disease progression according to response evaluation criteria in solid tumors (RECIST) guideline, with new lung and liver metastatic lesions and malignant thrombosis in the inferior vena cava (IVC) (Figure 2). However, he did not report any deterioration in vision. Tumor marker carcinoembryonic antigen (CEA) was 24 (normal $\leqslant$3.0 µg/L), and CA19-9 was 1.7 (normal range 0–37 units per milliliter).

The patient started on systemic chemotherapy with intravenous 5-fluorouracil (5FU), leucovorin, oxaliplatin (FOLFOX), and bevacizumab (Avastin) in two-weekly cycles with good tolerability. He will be on regular follow-up after the fifth cycle of (FOLFOX and Avastin). Overall, the patient was feeling well without other systemic complaints, and the Eastern Cooperative Oncology Group[5] performance status was 0.

Discussion

Metastatic tumors are the most common intraocular malignancy, reaching the eye through hematogenous dissemination. The choroid, considered a highly vascular structure, is the most frequent site of intraocular metastasis.[6,7]

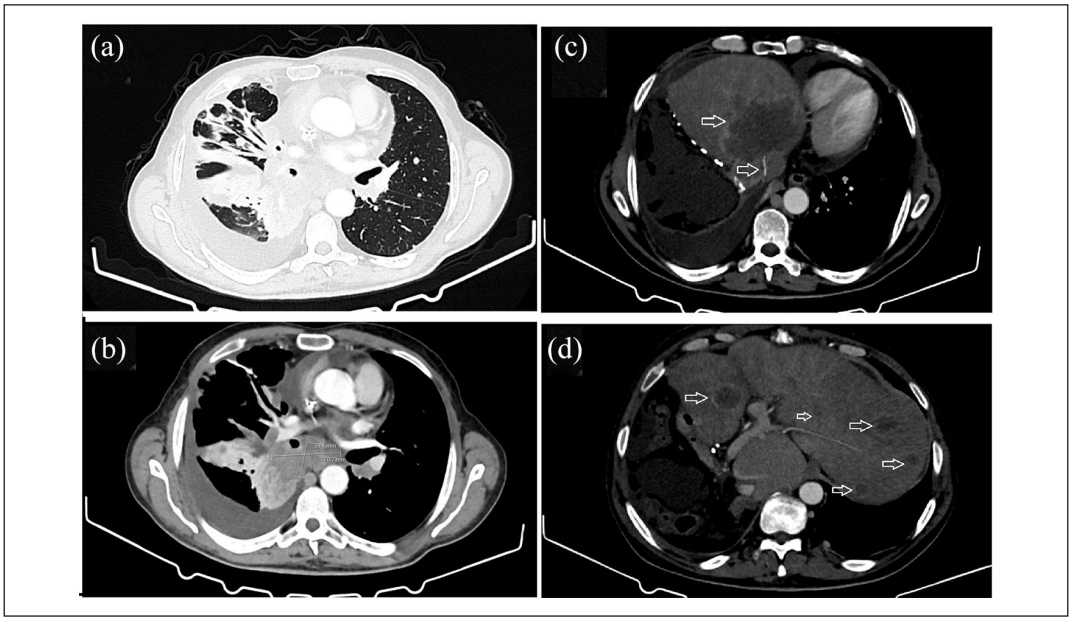

Figure 2. (a) Computed tomography (CT) scan lung window, marked increase in the sizes and count of the previously mentioned bilateral pulmonary, subpleural, and perifissural nodules, measuring up to 1.3 cm in the left upper lung lobe. (b) Mediastinal window, several enlarged mediastinal lymph nodes (pretracheal, subcarinal), infiltrating the right hilum and encasing the right main bronchus, measuring collectively up to 7.5 cm in maximum axial dimension (Compared to 3.4 cm in the previous exam), with newly noted mild right-sided pleural effusion and mild pericardial effusion. Surgical clips noted that the right upper lobe is suggestive of previous procedure/video-assisted thoracoscopic surgery. (c) Abdominal CT scan showed a marked increase in the size of the previously mentioned peripherally enhancing mass infiltration with necrotic center noted at the central hepatic region adjacent to hepatic venous confluence, measures up to 9×7 cm (compared to 5.6×4.1 cm in the previous exam) (*upper arrow*), invading the immediate suprahepatic part of the IVC going with malignant thrombosis (*lower arrow*), associated with heterogeneous liver enhancement (nutmeg appearance) during the venous phase suggesting hepatic congestion. (d) Newly noted multiple liver metastatic lesions with similar characteristics (*multiple arrows*).

In an analysis of 420 patients with a total of 950 uveal metastases, the choroid was affected in 88% of instances, while the iris and ciliary body were involved in 9% and 2% of cases, respectively.[6] Another review of 1111 patients with uveal metastasis showed almost the same results.[8] The most common primary sources of choroidal metastasis are breast and lung, accounting for frequencies of (40%–47%) and (21%–29%), respectively. Meanwhile, the gastrointestinal tract accounts for only (4%) of cases.[6,9] In the current case, the patient diagnosed with choroidal metastasis originates from primary KRAS wild-type rectal cancer. We conducted searches on PubMed and Google Scholar to identify similar cases of choroidal metastasis from rectal cancer, uncovering 15 additional cases beyond our own. Table 1 summarizes the findings.

The main ocular symptoms that prompt an ophthalmology consultation include blurred vision, decreased visual acuity, double vision, floaters, flashes, ocular pain, glare, and eye movement disorder. However, it is worth noting that approximately 11% of patients present without ocular symptoms.[4,6,20] In the present case, the patient presented to the ophthalmology clinic with a complaint of visual disturbance and a gradual decrease in visual acuity over 3 weeks. Choroidal metastases typically manifest as a plateau or flat-shaped creamy white or pale-yellow mass, often accompanied by subretinal fluid and serous retinal detachment.[6,23]

Several ancillary tests aid in the diagnosis, including angiography, autofluorescence Imaging, ultrasonography, optical coherence tomography, MRI, and CT.[23,24] In cases of choroidal metastasis from CRC, the identification of choroidal metastasis commonly coincided with the presence of metastases in another organ, especially the lungs, liver, and bones, in the majority of cases.[3,18,20]

The treatment option for choroidal metastasis depends on several factors, including overall health, life expectancy, and visual function, as well as the number of choroidal lesions, their location, and laterality.[7,25] Treatment options for choroidal metastases encompass systemic chemotherapy, radiotherapy, intravitreal bevacizumab, photodynamic therapy, observation, or even enucleation.[20,23] Enucleation is typically reserved as a therapeutic choice for advanced-stage intraocular malignancies with extensive ocular involvement and severe eye pain due to glaucoma.[20] When systemic therapy proves insufficient, opting for short hypofractionated EBRT is advisable. For patients with an extended life expectancy, it is recommended to combine

Table 1. An overview of the characteristics of previously published studies on choroidal metastasis originating from rectal primary cancer.

Author	Year	Sex/ age	Symptom	Treatment	Other sites of metastasis	Survival time (months)
Cole et al.[10]	1985	F/48	Blurred vision	CT, RT	Lung	4
Tano et al.[11]	1989	M/30	Blurred vision	Enucleation	Bone, skin	4
Endo et al.[12]	1997	F/49	Flashes	Enucleation	Liver, lung	3
Fujiwara et al.[13]	2004	M/53	Vision loss	CT, RT	Liver, lung, bone	1
Linares et al.[14]	2004	M/47	Blurred vision	CT, RT	Liver, lung	9
Sashiyama et al.[15]	2010	M/49	Vision loss	CT	Lung, bone	11
Neale et al.[16]	2010	M/43	Blurred vision	NA	Lung, pelvis, brain	NA
Miyake et al.[17]	2012	M/74	Vision loss	CT	Liver, lung	8
Tei et al.[18]	2014	M/60	Floaters	RT, CT, SYS BEV	Lung	Alive after 27 months
Kawhaja et al.[3]	2015	F/60	Flashes, decrease in visual acuity, and scotoma in the temporal half	CT, RT, SYS BEV	Lung, adrenal gland, bone, brain	32
Boss et al.[19]	2016	F/68	Flashes, floaters	IVT BEV	Lung, cerebellum	NA
Cruzado-Sanchez et al.[20]	2020	M/64	Eye pain and vision loss	Enucleation	Lung	6
Amisha et al.[4]	2021	M/44	Eye pain and vision loss	CT, RT	Liver, lung	Lost to follow up
Gaillard et al.[21]	2022	F/35	Scotoma	CT, RT, SYS BEV	Liver	NA
Khan et al.[22]	2022	M/27	Headache, decreased vision, and periorbital pain	RT	NA	NA
Present case	2024	M/58	Visual disturbance and decrease in visual acuity	CT, RT, SYS BEV	Liver, lung	5 months after diagnosis, the patient is still alive

CT: chemotherapy; F: female; IVT BEV: intravitreal bevacizumab; M: male; NA: not available; RT: radiotherapy; SYS BEV: systemic bevacizumab.

EBRT with systemic therapy. EBRT stands out as the most frequently utilized treatment for metastatic choroidal tumors.[24] Our patient underwent treatment with radiotherapy in addition to systemic chemotherapy involving intravenous 5FU, FOLFOX, and bevacizumab (Avastin). Choroidal metastasis carries a very poor prognosis, with a median duration from diagnosis to death of 6 months, ranging from 0.5 to 47 months.[26]

Conclusion

In conclusion, this rare case highlights the infrequency of CRC metastasizing to the choroid, emphasizing the importance of recognizing ocular manifestations. Despite minimal improvement with radiotherapy and chemotherapy, the patient maintained overall health and stable vision, offering insights into the unpredictable clinical course of intraocular metastasis. This case contributes to understanding and managing such occurrences in CRC.

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Authors contributions

E.E.L., M.I.A., and Q.A.A. contributed to data collection, data entry, data interpretation, design of the study, and drafting of the manuscript. S.M. contributed to the drafting and supervision of the manuscript. F.A. contributed to the design of the study, data interpretation, and supervision of the work. All authors have read and approved the final manuscript. Each author has participated sufficiently in the work to take public responsibility for the content.

Data availability statement

The data used to support the findings of this study are included in the article.

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Ethics approval

Our institution does not require ethical approval for reporting individual cases or case series.

Informed consent

Written informed consent was obtained from the patient(s) for their anonymized information to be published in this article.

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