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Colorectal carcinoma presenting in the orbit: mass effect from an uncommon cause

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Abstract

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Author contributions

Christopher P. Long, BS made substantial contributions to the conception and design of this case, contributed to the drafting and editing of the manuscript, and approved the final version, to be published.

Tianlun Lu BS MS made substantial contributions to the conception and design of this case, contributed to the drafting and editing of the manuscript, and approved the final version to be published.

Lilangi S. Ediriwickrema, MD made substantial contributions, to the conception and design of this case, contributed to the drafting and editing of the manuscript, and approved the final version to be published.

Jonathan H. Lin, MD, PhD made substantial contributions to the conception and design of this case, contributed to the drafting and editing of the manuscript, and approved the final version to be published.

Bobby S. Korn, MD, PhD made substantial contributions to the conception and design of this case, contributed to the drafting and editing of the manuscript, and approved the final version to be published.

Don O. Kikkawa, MD made substantial contributions to the conception and design of this case, contributed to the drafting and editing of the manuscript, and approved the final version to be, published.

Catherine Y. Liu, MD PhD made substantial contributions to the conception and design of this case, contributed to the drafting and editing of the manuscript, and approved the final version to be published.

Disclosure statement

The authors report no commercial or proprietary interest in any product or concept discussed in this article.

Statement of ethics

Subjects have given their written informed consent to publish this case (including publication of images).

An 84-year-old male with previously documented poor medical follow-up presented with progressive painless proptosis of the right eye. Right upper eyelid ptosis, limited motility, proptosis, and inferomedial displacement of the right globe were noted on the exam. Computed tomography (CT) imaging revealed a right retrobulbar extraconal heterogenous mass with ill-defined borders. Biopsy revealed a malignant adenocarcinoma with tumor markers suggestive of a colorectal primary. A rectal mass was identified during a systemic workup. After biopsy, the patient was diagnosed with stage IV metastatic rectal adenocarcinoma. He began palliative radiation therapy shortly following diagnosis.

Keywords

Colorectal adenocarcinoma; mass effect; orbital mass; orbital metastasis; proptosis

Introduction

Benign and malignant orbital tumors account for 20% of all orbital conditions.[1] In a large case series of 1264 patients who presented with orbital masses, 36% were malignant.[2] Metastases accounted for 7% of all lesions, consistent with the range of 1–13% reported in the literature.[3] Despite being the third most common cause of cancer, colorectal carcinoma rarely metastasizes to the orbit.[4] Here, we present a rare case in which an orbital metastasis, confirmed via orbital biopsy, was the initial presenting sign of colorectal carcinoma.

Case presentation

An 84-year-old male without prior known ocular history presented with several weeks of progressive proptosis of the right eye. The patient had a history remarkable for dementia, alcohol abuse, hypertension, and recurrent basal cell carcinoma of the right ear status post-multiple resections and was noted to have poor medical follow up for each of these conditions.

On examination, best-corrected visual acuity was 20/400 and 20/70 in the right (OD) and left (OS) eyes, respectively. Intraocular pressures were 19 OD and 14 OS. There was a right relative afferent pupillary defect with proptosis and inferomedial displacement of the right globe (Figure 1A). The patient had right upper eyelid ptosis, reduction in extraocular motility in all gazes OD and full movement OS (Figure 1B). No edema, erythema, or tenderness to palpation were noted. Cranial nerves V and VII were intact and symmetric OU. There was resistance to retropulsion OD and the dilated fundus exam was remarkable only for mildly tortuous vessel OD. There was moderate nuclear sclerosis in both eyes.

Computed tomography (CT) orbital imaging with contrast demonstrated a 4.5 × 3.5 x 4.0 cm mass with ill-defined borders in the right extraconal orbit, resulting in the inferior medial displacement of the globe and significant optic nerve displacement medially (Figure 2A, 2B). Notably, the lateral and superior orbital walls were eroded due to extradural extension of the mass into the anterior cranial fossa.

Right lateral orbitotomy with incisional biopsy of the lesion was performed via a temporal lid crease incision. Pathology results showed malignant adenocarcinoma with positive CDK20 and CDX2 molecular markers, as well as negative PSA, TTF1, and CK7 markers, which suggested metastasis from a gastrointestinal or biliary primary (Figure 3A–D). Next-generation sequencing of the tumor DNA extracted from the biopsy revealed mutations in several genes, including inactivating mutations in the APC and TP53 genes. APC and TP53 mutations are seen in approximately 73% of colorectal carcinomas.[5] Microarray analysis of tumor DNA also showed characteristic alterations in colorectal cancer, including loss of heterozygosity in a region of chromosome arm 8p with high copy gain of another region on 8p, and loss of heterozygosity of 17p in a region where TP53 is located. This strongly suggested metastasis to the orbit from a colorectal primary.[5]

As part of a systemic workup to identify the source of primary malignancy, CT of the chest, abdomen, and pelvis was performed, but demonstrated no definitive evidence of malignancy. Upper endoscopy and colonoscopy were performed. A rectal mass was noted on colonoscopy and a biopsy was obtained. Histopathological analysis revealed moderately differentiated adenocarcinoma, resulting in a diagnosis of stage IV metastatic rectal adenocarcinoma. Given the rapid progressive visual decline, the patient was urgently referred for oncological evaluation. Following multi-disciplinary review and consultation, the patient and their family elected to proceed with palliative orbital radiation therapy and consideration of palliative systemic chemotherapy.

Discussion

Colorectal carcinoma is the third most common cause of cancer and the third leading cause of cancer mortality in the United States.[6] Metastasis occurs in approximately 30% of the cases of colorectal carcinoma, which is similar to breast, prostate, and lung metastatic rates (30%, 35%, and 38%, respectively).[7–10] In addition, previous studies have estimated as many as 20% of the patients with colorectal carcinoma have already developed the metastatic disease at the time of diagnosis.[11]

Colorectal metastasis to the orbit, however, is extremely rare with less than 20 reported cases worldwide, four of which presented with ocular symptoms as the first sign of underlying disease, as in this case.[4] Even more rare, are orbital metastases confirmed histologically via orbital biopsy as demonstrated here.[4,12] Meanwhile, metastasis from breast, prostate, and lung accounts for approximately 53%, 12%, and 8% of metastatic orbital lesions, respectively.[13] Colorectal cancers typically spread via hematogenous routes and commonly infiltrate the liver, lung, and bone.[7] It is unclear at present why orbital metastasis is so rare. Previous reports have posed theories, but further evidence is needed to confirm.[12]

Genetic analysis of the orbital lesion in this study revealed two of the most common gene alterations seen in colorectal cancer and was helpful in supporting the diagnosis. It is unclear whether the additional mutated genes found in this tumor conferred additional risks, and further studies are required.

Management of orbital metastases currently involves a multidisciplinary approach including radiation and chemotherapy, and at times surgical debulking in settings of visual morbidity. Unfortunately, the prognosis is poor for most tumor origins, with five-year survival following orbital metastasis reported to be less than 20%.[14] Genetic analysis of metastatic lesions can potentially guide future use of targeted immunotherapy or chemotherapy, which may be useful in unresectable cases such as this one. Additionally, efficient workup and prompt diagnosis, as in this case, can lead to improved treatment outcomes, and improved quality of life for patients.

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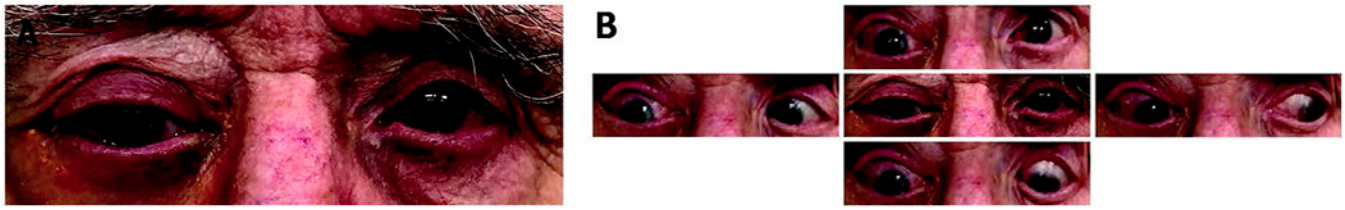

Figure 1.

External photographs at presentation. A) Primary gaze, revealing right upper eyelid ptosis, proptosis, and chemosis. B) Extraocular motility reveals significant limitation in all fields of gaze.

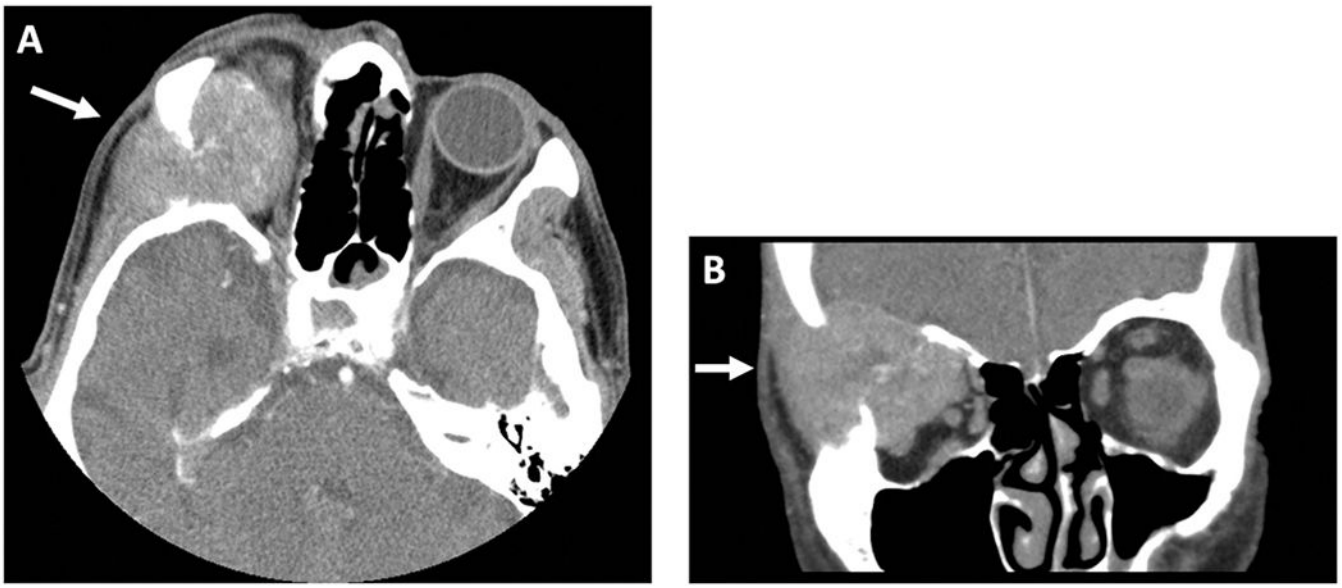

Figure 2.

CT Orbit with contrast at presentation. A) Axial view demonstrating a mass with ill-defined borders in the right extraconal orbit with significant optic nerve displacement medially. B) Coronal view demonstrating lateral and superior orbital wall erosion, in the setting of extradural mass extension.

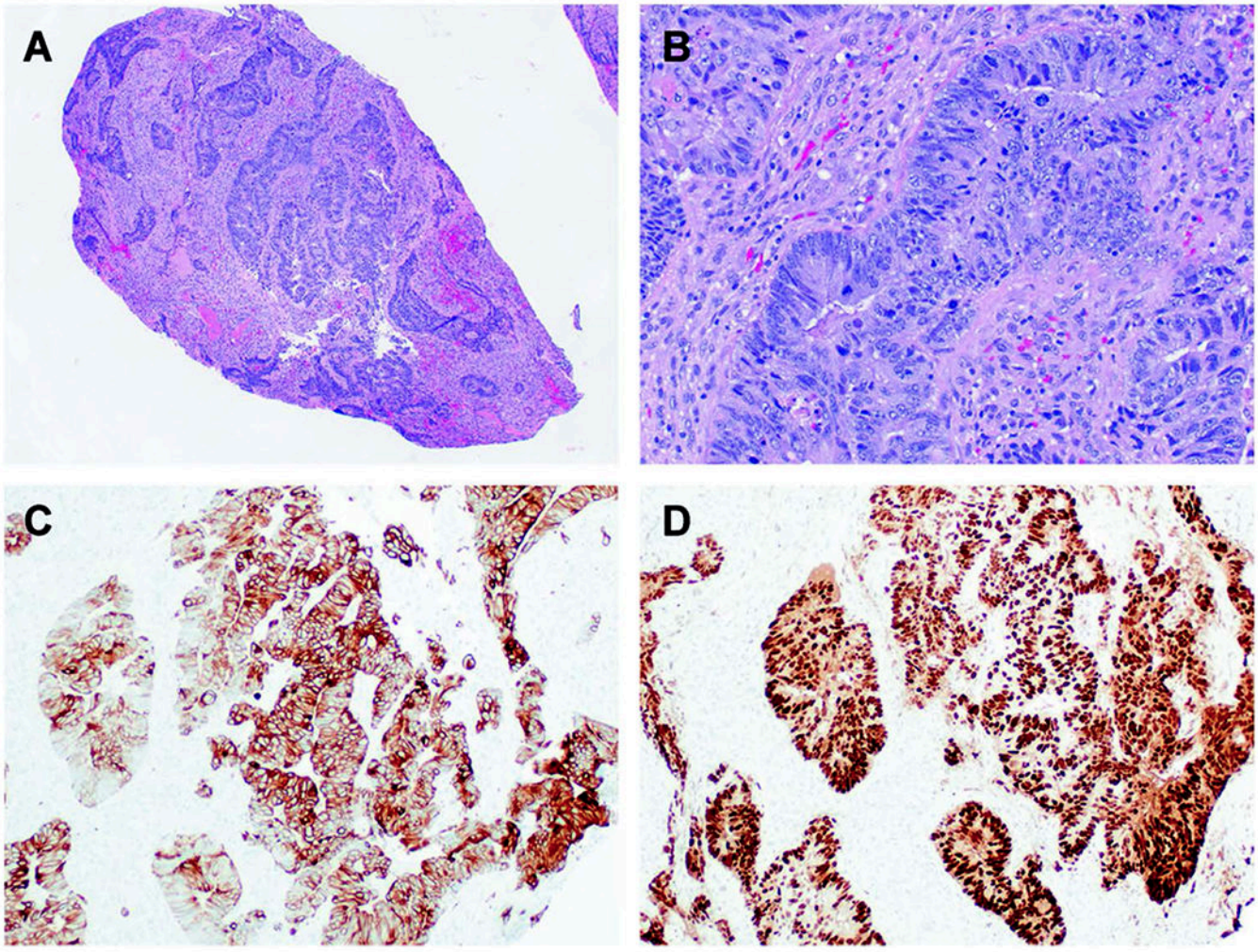

Figure 3.

Histopathology of biopsy. A) Low-power H&E image (10x) shows infiltration of malignant adenocarcinoma in orbital biopsy. B) High-power H&E image (40x) shows karryorhexis and mitotic activity in malignant adenocarcinoma tumor cells. C) Cytokeratin 20 (20x) immunostain highlights malignant adenocarcinoma tumor cells. D) CDX2 (20x) immunostain highlights malignant adenocarcinoma tumor cells.