Case - A rare ocular recurrence of prostate cancer

Adenocarcinoma metastasis to the vitreous

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INTRODUCTION

To our knowledge, this case of metastatic prostatic cancer in the vitreous has yet to be reported elsewhere. The patient's history of prostate cancer, along with his prostate-specific antigen (PSA) and imaging results, are documented in this report. He presented symptoms similar to those of a vitreous disease, which initiated the imaging due to the possibility of metastatic cancer in this area.

CASE REPORT

A 68-year-old male with Lynch syndrome, type 2 diabetes mellitus, dyslipidemia, and hypertension presented in 2017 with an elevated PSA of 5.0 ng/ml. Digital rectal examination was normal. Transperineal biopsy identified adenocarcinoma Gleason 3+4=7 with 4/9 cores positive, 20% surface area involvement, and 5% high-grade component. His prostate volume was 16 cc and International Prostate Symptom Score (IPSS) was 6/35. Based on the above, he had a favourable intermediate-risk localized prostate cancer.

He consented to the Canadian Clinical Trials Group (CCTG) PR.19 trial and was randomized into the single-fraction high-dose rate (HDR) arm. He received HDR brachytherapy, 19 Gy to the prostate and 29.7 Gy to the visible MR nodule in August 2017. No androgen deprivation therapy (ADT) was used.

In May 2019, the patient was diagnosed with a T1 N0 left-sided adenocarcinoma of the colon and had a low anterior resection with clear margins. No adjuvant chemotherapy or radiation was given.

The patient's PSA nadired at 0.66 ng/ml in March 2019 but started to rise. In July 2020, the patient's PSA was 2.3. Prostate-specific membrane antigen positron emission tomography (PSMA PET) scan showed prostatic uptake only, and prostate biopsy confirmed Gleason 3+4 disease in 2/10 cores. He was salvaged under the JUPITER protocol and underwent a focal HDR. The radiation treatment involved 31.1 Gy in two fractions; he completed treatment in December 2020. No ADT was used.

The patient's PSA fell after salvage to a nadir of 0.017 ng/ml in November 2024.

In early 2025, the patient presented with occasional blurred vision in his left eye. A community ophthalmologist saw him and referred him to the Ocular Oncology Clinic at Princess Margaret Cancer Centre for a biopsy of a vitreal lesion. Clinical examination showed refractile vitreous debris, query asteroid hyalosis (Figures 1A-C). The iris, eyelids, cornea, and anterior chamber were all normal. These findings were clinically not reflective of intraocular lymphoma. The patient received a vitreous fine needle aspiration in February 2025. The biopsy showed rare columnar cells with basally oriented nuclei. On immunohistochemistry performed on cytospins, these columnar cells appeared to be diffusely positive for CK7 and focally positive for NKX3.1. CK20, TTF-1 (8G7G3/1); AR and CDX2 were negative. These findings were most consistent with prostatic adenocarcinoma.

He was staged with a magnetic resonance imaging (MRI) of the brain and computed tomography (CT) of the thorax, abdomen, and pelvis. These were all negative. He completed external beam radiation (intensity-modulated radiotherapy technique) with 20 Gy in five fractions to his left eye in May 2025. His PSA was 0.025 ng/ml in March and 0.032 ng/ml in June 2025. No systemic therapy has been started at this point; he will be followed clinically and biochemically.

DISCUSSION

Metastatic disease to the vitreous is exceedingly rare with case reports of metastases arising from breast, melanoma, and lung primaries. To our knowledge, this

is the first reported case of prostate cancer metastasizing to the vitreous.

The majority of reported cases of metastases to the vitreous are in patients with known widely disseminated metastatic disease. In our patient, MRI of the head and CT scan of the chest, abdomen, and pelvis demonstrated no additional site of metastases. It is conceivable that additional sites of metastases were present at the time of diagnosis, but were beyond the resolution of the CT and MRI scans that were performed on the patient. There were no bone scan nor PSMA PET-CT tests; however, given his low PSA, he was below the threshold for ordering the test, and bone scan would likely also be negative.

Studies have shown that most metastatic tumors affecting the eye are located in the choroid (90%), and only 1–4% of eye tumors affect the lens and vitreous combined.[1] Most metastatic tumors originating from the prostate are found in bones (36%) and lymph nodes (19%), and virtually all will be proceeded with a rising PSA.[2]

Metastasis to the vitreous is a rare occurrence due to its lack of blood supply.[1] The vitreous humor is composed of water, collagen, and hyaluronic acid, and there are no blood vessels within the vitreous itself. The retina, on the other hand, has a more frequent metastatic disease occurrence rate. This is a result of its large blood supply from the central retinal artery (inner retinal layers) and the choroid (outer retinal layers). The choroid is a layer of the eye located between the sclera and the retina that is a very common site when tumors metastasize to the eye. It receives a large amount of blood supply from the short and long ciliary arteries, which are branches from the ophthalmic artery.

The pathophysiology of metastatic disease to the vitreous is poorly understood. It is hypothesized that tumors can spread to the vitreous through the optic nerve, retina, or via direct extension from existing choroidal metastatic disease. A vitreal hemorrhage could potentiate invasion of the vitreous cavity. Vitreous metastasized tumor cells are potentially dangerous because they can invade surrounding areas. They may adhere to the retina and grow as pre-retinal masses. Fortunately, this was not the case with this patient. As previously mentioned, the PSA level in our patient was very low. While this could indicate a small number of tumor cells, it may also be due to the poor vascularization of the vitreous, which limits PSA from entering the bloodstream

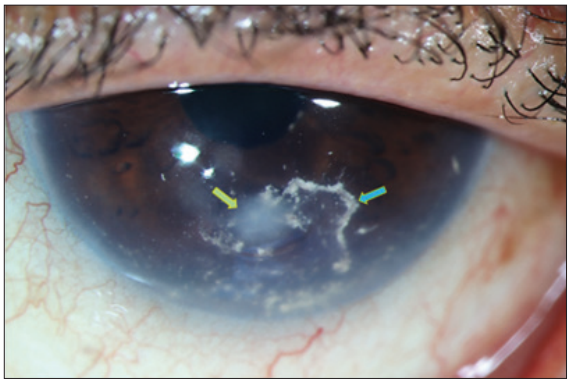

Figure 1A. Anterior segment photograph shows the malignant keratic precipitates appearing as white irregular crystalline deposits on the corneal endothelium (blue arrow) with associated localized area of epithelial oedema (green arrow).

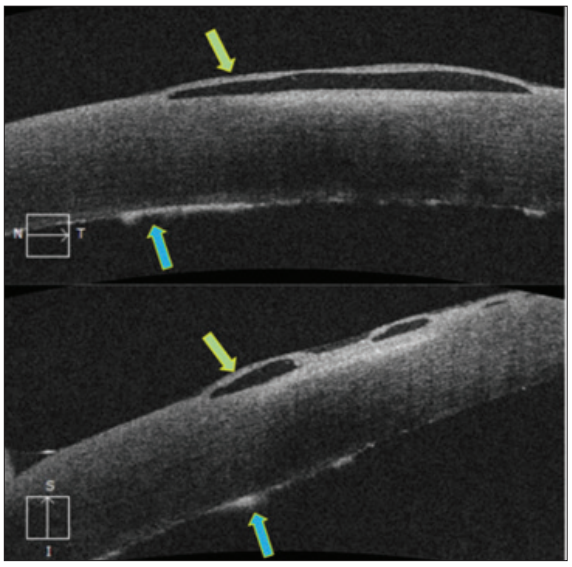

Figure 1B. Optical Coherence tomography (OCT) of the cornea (anterior segment cube 512x 128) showing horizontal (upper image) and vertical (lower image) scans of the cornea demonstrating corneal epithelial deposits (blue arrows) and bullous epithelial oedema (green arrows).

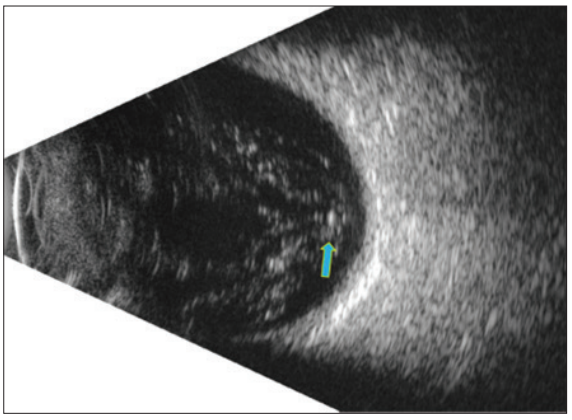

Figure 1C. B-scan Ultrasonography image showing significant refractile vitreous deposits representing adenocarcinoma metastasis.

CONCLUSIONS

To our knowledge, this is the first report of metastatic prostate cancer involving the vitreous. While this circumstance is still very rare, it should be known that it is a possible outcome for patients with a metastasizing prostate cancer. Once a vitreous tumor is identified, it is important to ensure there has been no further spread of the cancer causing further damage to the structures of the eye. The few cases of vitreous metastases that have been reported are usually in the context of widely metastatic disease. Early identification of metastasizing tumors can allow for a proper treatment plan, potentially involving systemic therapy, radiation, and/or surgery.

COMPETING INTERESTS: The authors do not report any competing personal or financial interests related to this work.

This paper has been peer-reviewed.

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