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 gentleman 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 16cc 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 nor radiation was given.

The patient's PSA nadired at 0.66 ng/ml in Mar 2019 but started to rise. In July 2020, the patient's PSA was 2.3. 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 2 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. 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 an MRI brain and CT of the thorax, abdomen and pelvis. These were all negative. He completed external beam radiation (intensity modulated radiotherapy technique) with 20Gy in 5 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 resolution of the CT and MRI scans which 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 tumours effecting the eye are located in the choroid (90%), and only 1-4 percent of eye tumours effect the lens and vitreous combined1. Most metastatic tumours 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 humour 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 tumours

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 tumours 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 tumour 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 tumour cells, it may also be due to the poor vascularization of the vitreous, which limits PSA from entering the bloodstream

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 tumour 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 tumours can allow for a proper treatment plan, potentially involving systemic therapy, radiation and/or surgery.

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FIGURES AND TABLES

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).

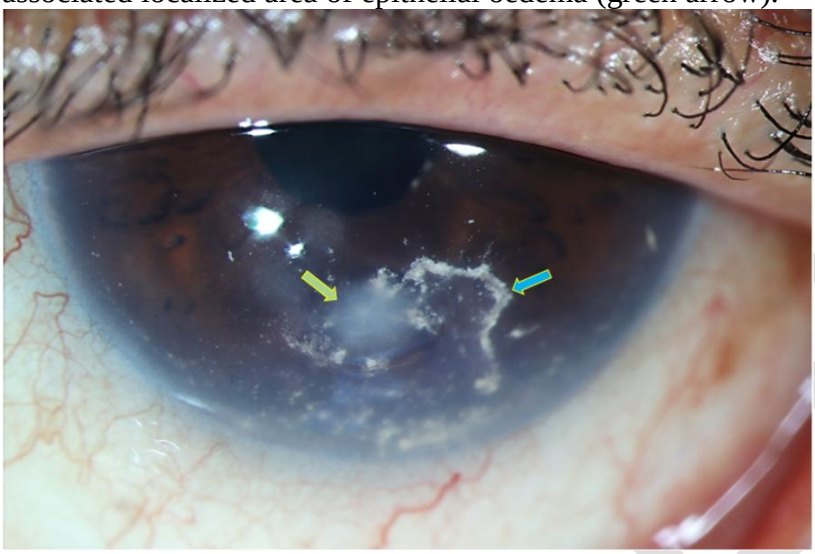

Figure 1B. Optical Coherence tomography (OCT) of the cornea (anterior segment cube 512x 128) showing horizontal (upper image) and vertical (lower image) scans of the cornea demonstrating corneal epithelial deposits (blue arrows) and bullous epithelial oedema (green arrows).

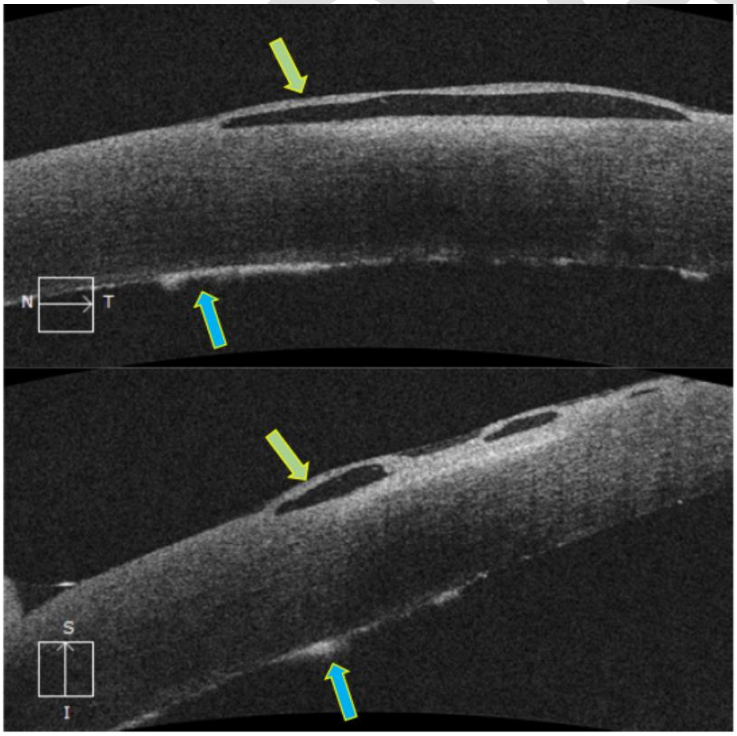

Figure 1C. B-scan Ultrasonography image showing significant refractile vitreous deposits representing adenocarcinoma metastasis.