Brief Communication

Reversible Ocular Manifestations in Systemic Hypertension; Simple Answers to Complex Problems

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ABSTRACT

This case series describes five patients with hypertensive retinopathy presenting at Al-Shifa Trust Eye Hospital, Rawalpindi. The cases illustrate the spectrum of ocular involvement secondary to systemic hypertension, ranging from optic disc edema and macular edema to serous retinal detachment. Although the clinical presentations varied, all patients had markedly elevated blood pressure and were promptly referred to for systemic evaluation and management. On follow-up, significant visual improvement was observed following adequate control of systemic hypertension, highlighting the potential reversibility of hypertensive retinopathy with timely and appropriate medical treatment.

Keywords: Hypertension, Hypertensive Retinopathy, Macular Edema, Vascular Endothelial Growth Factor A, Angiogenesis Inhibitors, Intravitreal Injections.

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INTRODUCTION

According to WHO, around 1.28 billion people between30 to 79 years of age globally suffer from hypertension (HTN) and about two-third of these live in developing countries.[1] It is estimated that 46% of hypertensive patients are unaware of their disease and only 42% of patients with HTN receive a timely diagnosis and treatment.[1]HTN can be linked to certain risk factors such as genetics, older age, excessive alcohol consumption, high-salt intake and being overweight or obese.[2]

Hypertensive retinopathy is characterized by flame-shaped hemorrhages, cotton wool spots, hard yellow exudates, vascular wall alterations, arteriovenous nipping, optic disc oedema, and arteriolar narrowing.[3]Theaim of treatment in such cases is to manage blood pressure and restore the damaged vision.

Hypertensive retinopathy is strongly linked to the severity and duration of systemic illness.[4] Other than retina, choroidopathy and optic neuropathy are also features of uncontrolled HTN.[5] Although acute rise in blood pressure typically causes reversible vasoconstriction of retinal vasculature, exudative vascular changes are caused by more severe or prolonged hypertension and result in endothelial damage and necrosis. Thickening of the arteriolar walls or arteriovenous nipping typically occurs after significant duration of elevated blood pressure. Smoking exacerbates the complications of hypertensive retinopathy.

Hypertension is a leading risk factor for several other retinal disorders, including diabetic retinopathy and retinal artery or vein occlusion. Patients with hypertensive retinopathy are at high risk of sustaining hypertensive damage to other end organs. The signs

and symptoms of hypertensive retinopathy differ according to whether the blood pressure increase is sudden or persistent. Hypertensive retinopathy related with chronic rise of BP is frequently an under diagnosed condition.

We report five cases of hypertensive retinopathy that were brought to our outpatient department (OPD) and were found to have undiagnosed hypertension.

Case 1

A 32-year-old otherwise healthy male presented with progressive painless decrease in vision for 2 months. His medical history was positive for occasional headaches and excessive lethargy for few months. He had previously undergone brain and orbital CT scans and was diagnosed with an unidentified case of papilledema. On ocular examination, his best corrected visual acuity (BCVA) in the right eye (RE) was 6/18 while in the left eye (LE) was 6/12. Retinal examination showed bilaterally swollen discs with significant peri-papillary exudation (Figure. 1a). OCT macula of the right eye also showed presence of subretinal fluid (Figure 1b). His blood pressure (BP) was 220/110 mmHg. Based on the ocular findings and blood pressure, he was diagnosed as a case of malignant hypertension and was referred to medical specialist for urgent BP control. At 1 month follow-up visit his symptoms had improved and optic disc swelling had started to resolve.

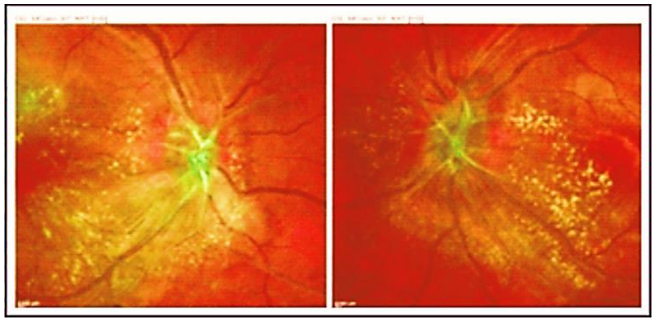

Figure 1a: *Disc swelling of both eyes associated with high blood pressure.*

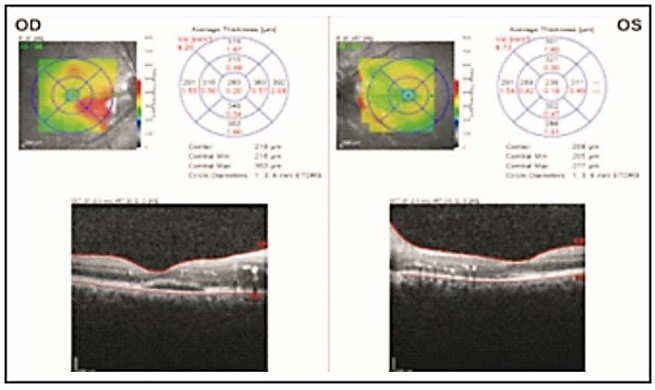

Figure 1b: *OCT macular cube shows retinal edema and sub-retinal fluid in the right eye.*

Case 2

A 23-year-old male with no previously known comorbidities presented with bilateral serous retinal detachments as a diagnosed case of Vogt-Koyanagi Harada disease (VKH). He had history of bilateral posterior sub-tenon Kenacort (Triamcinolone) injections two weeks back. On examination, the patient was a pale looking young boy with peri-orbital puffiness. He had BCVA of 6/24 in the right eye and 6/36 in the left. Fundus examination revealed bilateral swollen discs with cotton wool spots (Figure 2a). Intra-ocular pressures (IOP) were 45 and 40 mm Hg with Goldmann applanation tonometry for the right and left eye, respectively. OCT macula showed bilateral serous macular detachments (Figure 2b). His

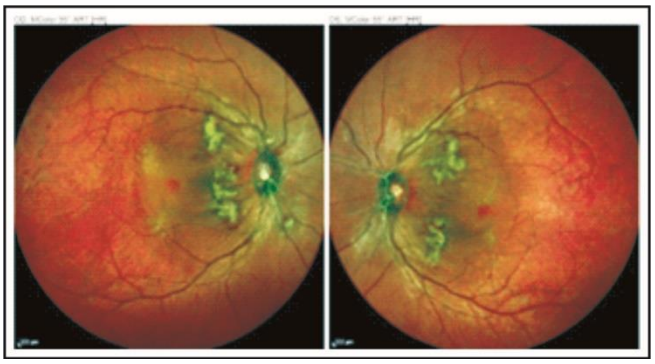

Figure 2a: *Retinal images showing bilateral swollen discs with cotton wool spots.*

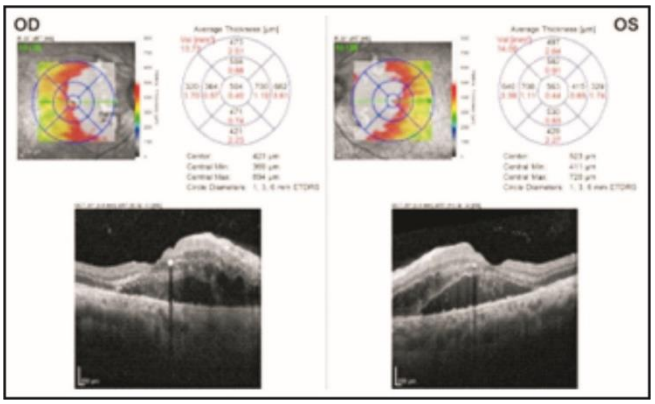

Figure 2b: *OCT macular cube shows exudative retinal detachments with retinal edema in both eyes.*

uveitic profile was negative for TB, sarcoidosis and toxoplasmosis. However, his Hb was 6.7. On systemic evaluation, his BP was 180/100mmhg with severely deranged renal function tests and a negative HIV serology. He was given topical anti-glaucoma drops for raised IOPs and referred to a medical specialist for anemia and BP management. He received blood transfusion and was diagnosed as a case of primary hypertension with acute kidney failure. He underwent renal dialysis after which his fundus findings showed remarkable improvement (Figure 2c).

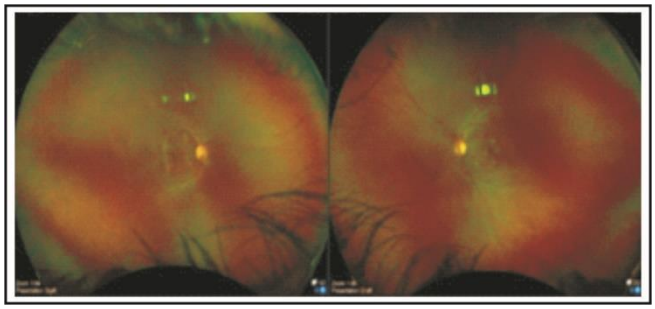

Figure 2c: *Resolved edema after dialysis.*

Case 3

A 15-year-old male with no known comorbidity, presented with persistent decrease vision in both eyes for the last 5 months. Examination showed bilateral persistent macular edema which was confirmed with OCT macular cube (Figure 3a). BCVA in the RE was 6/18 while in the LE was counting fingers close to face. There was recent history of 3 intravitreal bevacizumab injections in his LE. BP was 170/100 mmHg for which he was referred to medical specialist. On follow-up visit the macular edema was completely resolved with BCVA of 6/6 in both eyes (Figure 3b).

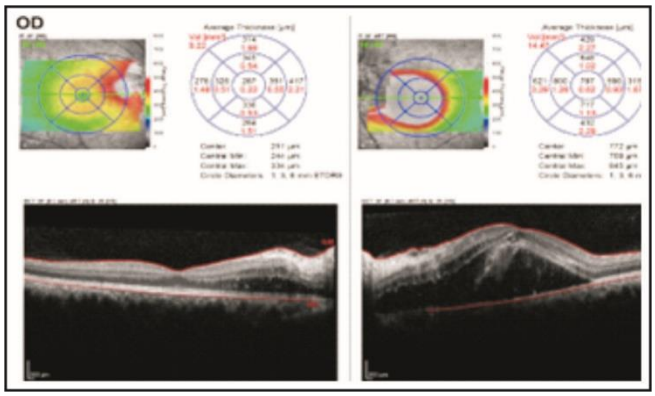

Figure 3a:*Macular edema confirmed with OCT macular cube.*

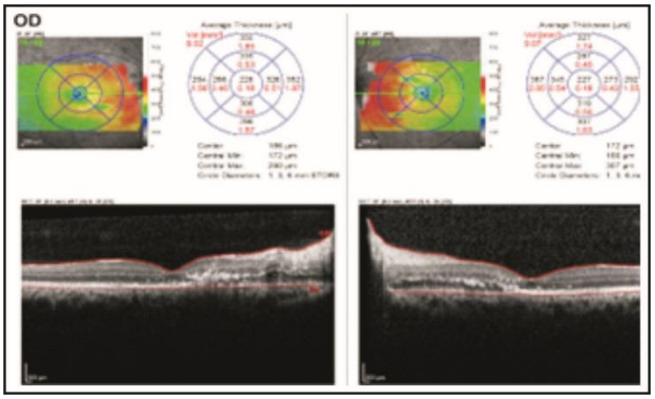

Figure 3b: *Resolving edema after control of hypertension.*

However, he was on dialysis due to renal failure and is currently awaiting a renal transplant.

Case 4

A 30-year-old pregnant female in her third trimester presented with 4 days' history of bilateral sudden painless loss of vision. She was diagnosed with pregnancy-induced hypertension and was taking some unknown medication. There was history of headache, weakness in lower limbs and urinary incontinence for few days. Her BCVA was counting fingers in both eyes with unremarkable anterior segments. However,

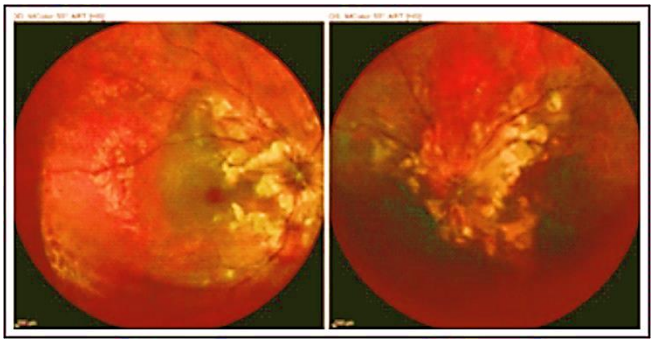

Figure 4a: *Retinal images of the patient showing cotton wool spots and disc edema.*

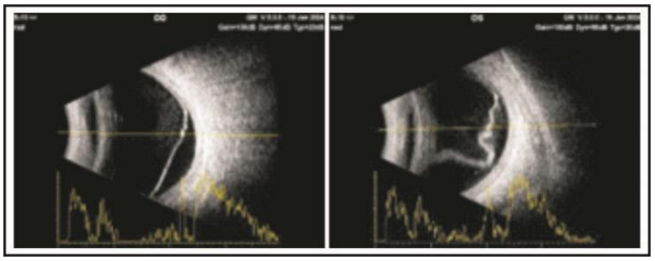

Figure 4b: *B-scan of the patient showing serous retinal detachment in both eyes.*

the posterior segment examination showed bilateral swollen discs with surrounding cotton wool spots and inferior exudative retinal detachments (Figure 4a). B scan ultrasonography confirmed retinal detachment in both eyes. (Figure 4b). Blood pressure 140/90 mmHg and she was labeled with toxemia of pregnancy. She was counseled that no ocular treatment was needed. She was referred to an obstetrician for further assessment and systemic investigations.

Case 5

A 56-year-old male with no known co-morbid presented with left central retinal vein occlusion (CRVO). He had history of at least 6 intravitreal bevacizumab injections during the last 6 months along with 1 session of pan retinal photocoagulation. On examination, his BCVA in RE was 6/6 while in the LE was 6/18. IOP in both eyes was 12 mm Hg without any history of pressure lowering drugs. Slit lamp examination showed bilateral phakia with flat retina in RE. LE showed mild disc pallor, laser marks and ghost vessels. (Figure 5). However, the underlying cause of his CRVO was never investigated. We carried out systemic investigations which included blood pressure measurement, a complete blood count (CBC), random blood glucose, lipid profile, thyroid function tests, and an electrocardiogram (ECG). His BP was 180/100mmhg on more than 2 occasions and was labelled as hypertensive. The patient was referred to a medical specialist for his BP management.

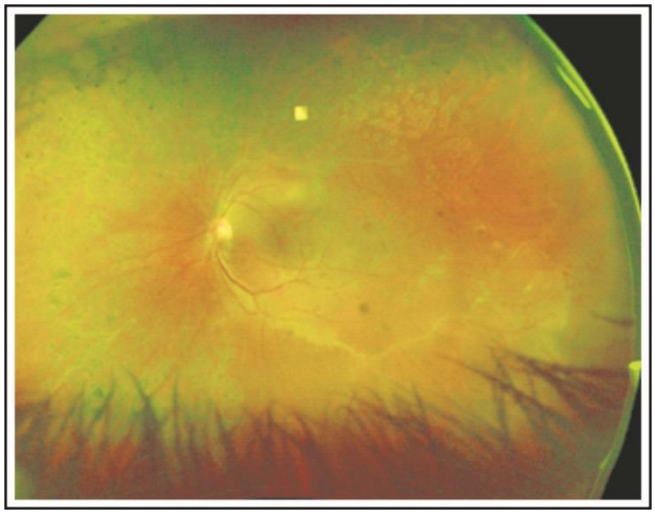

Figure 5: *Old case of CRVO with ghost vessels and laser marks on the retina.*

DISCUSSION

This case series highlights the importance of regular assessment of blood pressure in ophthalmology clinics for timely diagnosis and management of hypertension and its ophthalmic complications.

Hypertensive retinopathy is frequently underreported, particularly in primary care settings despite its implications for both vision and systemic health. Many hypertensive patients, especially in low-income countries, do not receive regular ophthalmologic evaluations. Despite high burden of hypertensive retinopathy, regular screening is probably absent due to lack of tools or training to perform fundoscopy, leading to missed diagnoses.[6] One of the reasons for missed diagnosis is the asymptomatic presentation. Hypertensive retinopathy often develops without symptoms in its early stages. Patients may not seek medical advice until vision is significantly impaired, by which time the damage may be irreversible. There is also a significant overlap with other retinopathies, making the diagnosis difficult. Differentiating hypertensive retinopathy from diabetic retinopathy or other ocular vascular diseases can be challenging without specialist input or imaging tools like OCT and fluorescein angiography.

Case1 in our study presented with typical signs of malignant hypertension. He presented with bilateral disc swelling and should have undergone blood pressure assessment before undergoing CT scan of the brain and orbit. Medical management of systemic hypertension resulted in resolution of the retinal signs.

Case 2 presented with bilateral serous retinal detachments and did not undergo basic systemic assessment of BP and blood sugar. Rather he was advised detailed uveitic profile which was negative. The patient was misdiagnosed as a case of Vogt Koyanagi Harada disease and was injudiciously advised bilateral posterior sub-tenon Kenacort injections which resulted in raised intraocular pressure. Serous detachments secondary to malignant hypertension do not need any ocular intervention. Appropriate and timely management of systemic hypertension results in reversal of ocular signs.[7]

Case3, a 15-year-old male in our study presented with bilateral persistent macular edema and a history of three intravitreal bevacizumab injections in the left eye. He was hypertensive and with acute renal failure for which and underwent dialysis which resulted in improvement of his visual symptoms. Mishra B et al,

reported a child with renal tuberculosis presenting with bilateral macular edema.[8]

Case4, a pregnant female with bilateral serous retinal detachments and bilateral disc swelling was not diagnosed appropriately and was offered Retinal surgery by her local ophthalmologist. She had toxemia of pregnancy and referred to an obstetrician for her BP management. For pregnant females, possibility of pre-eclampsia should always be borne in mind when there is presentation of sudden decrease in vision with headaches.[9]

Case 5had left CRVO for which he had undergone multiple intravitreal bevacizumab injections and pan retinal photocoagulation. He was unaware of his underlying systemic hypertension and was never advised BP assessment although systemic hypertension is one of the major risk factors for CRVO. It is therefore crucial to identify the cardiovascular risk factors in a patient with CRVO. This not only confers systemic benefit but also reduces the risk of recurrent CRVO.

In a Larkana case series of 288 hypertensive patients, 30.2% had hypertensive retinopathy. Most patients had early-stage hypertensive retinopathy with headache and blurred vision being the most common presenting symptoms.[10] This highlights the need for early screening and management of hypertension. Underdiagnosis is not just an issue of eye health. The retina offers a unique window into systemic vascular health. The presence of hypertensive retinopathy has been associated with an increased risk of stroke, left ventricular hypertrophy, and other cardiovascular events. It serves as a visible biomarker of end-organ damage and uncontrolled hypertension. Detecting hypertensive retinopathy at an early stage prompts more aggressive blood pressure management, prevents vision loss, and reduces the overall cardiovascular risk burden.

CONCLUSION

Hypertensive retinopathy remains underdiagnosed due to its asymptomatic nature and the lack of widespread screening protocols. Yet it holds critical information about a patient's cardiovascular health and risk of complications. As health systems move toward more integrated and preventive care, improving the detection of hypertensive retinopathy must be a priority, not just for preserving vision, but for safeguarding overall vascular health. General practitioners and ophthalmologists should collaborate to make sure that patients with hypertension receive prompt treatment and comprehensive screening to lower the risk of ocular and systemic morbidity.

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Conflict of interest: Authors declare no conflict of interest.

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Muhammad Amjad; Vitreoretina Surgeon: *Concepts, Manuscript review.*