

Eye signs in systemic hypertension

JUSTIN O'DAY AM, FRANZCO, FRACP

Ocular signs can be presenting features of elevated blood pressure and may indicate the need for prompt medical treatment.

Case presentation 1

A 31-year-old man presented to his GP after an optometrist noted retinal haemorrhages, cotton wool spots and hard exudates in both eyes during a routine examination. The GP considered that the changes were consistent with diabetic retinopathy, but a normal glucose tolerance test excluded this possibility. Referral to an ophthalmologist was then arranged.

At ophthalmology review, the patient had no visual symptoms. He was taking no medications and had no history of serious illness, but a past tendency to

hypertension was evident. He had experienced a transient episode of hypertension related to a psoriasis treatment a few years ago, and he had been refused permission to donate blood because his blood pressure was 'too high' two months ago. His GP had followed the patient up after the most recent episode and found his blood pressure to be only mildly elevated (140/85 mmHg). No treatment for hypertension had been instituted.

On examination, the patient's visual acuity in both eyes was 6/4. Exudates were observed at the posterior pole, particularly between the disc and macula (Figure 1). In addition, his blood pressure was extremely elevated: 210/120 mmHg. He was admitted to hospital for treatment to control the hypertension and further assessment.

Hospital records confirmed the patient's past tendency to hypertension. Three years ago he had been admitted

for treatment of psoriasis. While on cyclosporin, he had developed hypertension and was treated briefly with an ACE inhibitor. His blood pressure normalised when the cyclosporin was discontinued.

During the current admission, an underlying cause of the patient's hypertension was sought and renal biopsy revealed IgA nephropathy, with 50% of the glomeruli sclerosed. His blood pressure was medically controlled, and he was discharged home on amlodipine (2 mg once daily), metoprolol (100 mg twice daily) and ramipril (10 mg daily).

Comment

The most common cause of retinopathy is diabetes, but hypertension should always be considered a possibility. The end organ damage revealed on ocular examination was the prime reason for this patient's admission to hospital for aggressive antihypertensive treatment. It is important to remember that accelerated hypertension may develop quite suddenly, particularly in young people.

Scattered retinal haemorrhages, hard exudates (lipid deposition) and soft exudates (cotton wool spots, axoplasmic stasis) are all signs of systemic hypertension. Collagen vascular diseases such as systemic lupus erythematosus may show similar retinal changes.

Dr O'Day is Associate Professor, Department of Ophthalmology, University of Melbourne; Head of Neuro-ophthalmology, Royal Victorian Eye and Ear Hospital; and an Ophthalmologist in private practice in Melbourne, Vic.



Figure 1. Soft exudates (long arrow) and microaneurysms (short arrow).



Figure 2. A retinal venule being deviated by a crossing arteriole (long arrow) and microaneurysms (short arrow). There are focal areas of arteriolar sclerosis (arrowheads).

Categorising ocular signs of hypertension

The ocular signs of hypertension can be classified according to severity using the system of Keith and Wegener. However, this system is of limited practical value because the first two categories reflect mild long-standing hypertension whereas the other two represent acute severe hypertension. I prefer a system based on the nature of the hypertension causing histological changes within the retinal vessels.

Longstanding hypertension

Moderate longstanding hypertension causes hyalinisation of the retinal arterioles, leading to calibre irregularities of the retinal vessels (Figure A). There may be nipping of the venule where there is a common adventitial sheath between the arteriole and venule. The sheath of the retinal vessel may then develop the appearance of a copper or silver wire, depending on the degree of hyalinisation.

The same retinal changes occur with ageing, and they therefore need to be assessed to see whether they are consistent with an individual's age. If not, raised blood pressure of at least five years' duration is likely. This type of blood pressure needs to be treated less aggressively because sclerotic changes may exist within the vessels inside the central nervous system and postural hypotension can result from aggressive antihypertensive treatment.

Accelerated hypertension

Severe hypertension produces fibrinoid necrosis of the vessel wall, which is the same abnormality that occurs in collagen diseases such as systemic lupus erythematosus and polyarteritis nodosa. Flame-shaped haemorrhages represent leakage from smaller vessels that have sustained fibrinoid necrosis and are thereby weakened. Cotton wool spots are areas of axoplasmic stasis secondary to ischaemia (Figure B). Hard exudates occur where there has been leakage of plasma from the retinal vessels; fluid has been pumped out of the retina by the pigment epithelium and the remaining lipid precipitates. In severe forms of hypertension, optic disc swelling may also occur.



Figure A. Retinopathy due to longstanding hypertension, with variation in the arteriolar calibre (white arrow) and A/V nipping (black arrow).



Figure B. Retinopathy due to accelerated hypertension. Cotton wool spots (soft exudates, long arrow) and lipid accumulation (hard exudates, short arrow) are visible.

Case presentation 2

A 52-year-old man presented because he was developing difficulty reading. A clinical examination revealed that he required a reading addition to his glasses prescription for presbyopia, but also showed the presence of retinal changes. He had elevated blood pressure, which was frequently about 140/90 mmHg, and dyslipidaemia (serum total cholesterol 6.0 mmol/L, LDL cholesterol 3.7 mmol/L, and triglycerides 2.4 mmol/L).

A fundus examination showed an increase in the light reflex along the retinal arterioles, particularly in the superior right quadrant, and a bend in a retinal venule where it crossed the arteriole that was consistent with thickening of the common adventitial sheath at that point

(Figure 2). In addition, a number of microaneurysms were present next to the macula.

A glucose tolerance test was performed. Results were:

- fasting blood glucose, 6.8 mmol/L
- one-hour postprandial blood glucose, 14.4 mmol/L
- two-hour postprandial blood glucose, 12.5 mmol/L.

The patient was diagnosed with diabetes. Antihypertensive medication and a diabetic diet were prescribed.

Comment

The changes in this patient's fundus are due to longstanding hypertension and latent diabetes. The findings of sclerosis along the retinal vessels together with

arteriovenous crossing changes are consistent with hypertension. Microaneurysms, however, can be present either in retinal arteriolar sclerosis or as a manifestation of impaired glucose metabolism.

Key points

Patients with systemic hypertension should be examined for retinal changes that would suggest longstanding hypertension or accelerated hypertension, and the diagnosis should also be considered in patients with symptoms of blurred vision and retinopathy. It is important to remember that the hypertension may become quite severe in a very short period of time. **MT**

DECLARATION OF INTEREST: None.