Visual field loss in an elderly vasculopath: clinical significance of multimodal imaging

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DESCRIPTION

A 74-year-old man presented with acute onset right superonasal visual field loss and blurred vision. He had no other focal neurological symptoms, headache, jaw claudication or scalp tenderness. Medical history included coronary artery bypass grafting, hypertension and hypercholesterolaemia. Inpatient stroke work-up revealed >70% internal carotid stenosis on Doppler ultrasound, normal neuroimaging and inflammatory markers.

Visual acuity (VA) was 6/9 in each eye, with normal colour vision and no relative afferent pupil defect. Confrontational visual fields detected monocular right eye superonasal quadrantanopia with full left eye visual field. Anterior segments were unremarkable and intraocular pressures were normal. Fundal examination showed a segmental Hollenhorst plaque in the inferotemporal primary retinal arteriole with associated intraretinal oedema (figure 1A). Fundus fluorescein angiography (FFA) confirmed the diagnosis of inferotemporal branch retinal artery occlusion (BRAO) (figure 1B); arm-to-eye time was delayed (30 s) suggesting ipsilateral carotid insufficiency. Optical coherence tomography (OCT) showed paracentral acute middle maculopathy (PAMM) corresponding to the ischaemic area, which was clearly delineated on *en face* infrared reflectance imaging (figures 1C and 2).

BRAO has an estimated incidence of 5 per 100 000.^{1 2} It is caused by an acute interruption of arterial blood flow to the inner retina leading to ischaemic damage.³ The subjective symptoms (ie, reduced VA and/or field loss) depend on the retinal area affected; this patient retained normal VA as his fovea was spared. Retinal arterial emboli are visualised in 62% of BRAO, often occurring at bifurcation points, with temporal retinal arteries being involved in 98% of symptomatic cases.⁴ In an on-call setting, comprehensive multimodal imaging may not be readily available; however, OCT can prove invaluable, confirming/quantifying inner retinal oedema.⁵ PAMM is an OCT feature of inner retinal ischaemia, showing broad hyperreflective bands at the plane of the inner nuclear layer in affected zones (figure 2). PAMM may be seen in several inner retinal ischaemic conditions including branch/central RAO, retinal vein occlusion (RVO) and diabetic retinopathy (DR).⁶ While OCT angiography may serve as a non-invasive modality to demonstrate reduced flow in the affected quadrant, it cannot directly suggest carotid disease by delay in arm-to-eye time as in FFA.⁷

Treatment options for BRAO are limited, with results of thrombolysis being equal/worse than

Figure 1 (A) Colour fundus photograph (Optos 'California', Optos PLC, Scotland, UK) of the right eye demonstrating a Hollenhorst plaque occluding the right primary inferotemporal branch retinal arteriole with white appearance of retinal oedema in the relevant distribution. There is an incidental inactive chorioretinal scar at the superotemporal vascular arcade. (B) Mid-phase (circa 50 s) fundus fluorescein angiogram (Optos 'California') of the right eye showing absent filling of the inferotemporal retinal arterioles and venules, consistent with BRAO. (C) *En face* infrared reflectance optical coherence tomography image (Carl Zeiss MediTec, Dublin, California, USA) at the mid-retinal segmentation plane, clearly delineating the distribution of the inner retinal area supplied by the occluded arteriole. BRAO, branch retinal artery occlusion.

observation.⁸ Prognosis is dependent on whether BRAO is permanent (74% present with VA $\geq$ 6/12, maintained in 89% of these) or transient (94% present with VA $\geq$ 6/12, maintained in 100%).⁹ Retinal or anterior segment neovascularisation is rare (<0.1%) due to either spontaneous reestablishment of inner retinal perfusion and/or rapidity of the ischaemic insult versus the gradual ischaemic stress of RVO/DR.^{3 9} Treatment of systemic risk factors (ie, hypertension, smoking, dyslipidaemia) protects against further life-threatening ischaemic events (eg, stroke) and the North American Symptomatic Carotid Endarterectomy Trial demonstrated benefit from carotid endarterectomy if >70% carotid stenosis was present.¹⁰

Figure 2 (A–D) Paracentral acute middle maculopathy (PAMM): spectral-domain OCT images (Carl Zeiss MediTec, Dublin, California, USA) demonstrating hyperreflective bands at the level of the inner nuclear layer, corresponding with the planes indicated in E). This is a sign of inner retinal ischaemia secondary to BRAO in this case. BRAO, branch retinal artery occlusion; OCT, optical coherence tomography.

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Learning points

- ▶ Although stroke must be excluded in elderly arteriopathies, visual field defects may also be caused by localised ophthalmic pathology (eg, monocular field defect due to retinal vascular occlusion, retinal detachment, optic neuropathy).
- ▶ *En face* optical coherence tomography (OCT) and OCT angiography are very useful diagnostic adjuncts to more invasive imaging techniques (eg, fundus fluorescein angiography, indocyanine green angiography) especially in an on-call setting.
- ▶ Systemic management is the mainstay of treatment; branch retinal artery occlusion may prove as a warning sign, allowing medical (eg, hypertension, cholesterol, diabetes mellitus) and/or surgical (eg, carotid endarterectomy) management.

Effective treatment for the retinal sequelae of BRAO is limited, but VA is maintained in the majority. BRAO should be considered a trigger for systemic vascular risk factor management and secondary prevention of further ischaemic events.

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