



CORRESPONDENCE

Paracentral acute middle maculopathy after uneventful ocular surgery with local anaesthetic blocks

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TO THE EDITOR:

I was struck by the account of 9 patients with central retinal artery occlusion (CRAO) soon after eye surgery [1]. Vasoconstriction from local anaesthetic was linked to the arterial insufficiency.

Usually, CRAOs present as faint perifoveal pallor, or as whitened maculae with a cherry-red spot. For 2 patients that had perifoveal pallor the authors supplied fundus photos and optical coherence tomography (OCT) scans. The perifoveal pallor correlated—on OCT—with a band of hyperreflectivity in the middle depth of the macula. Such hyperreflectivity denotes ischaemia, and is termed ‘paracentral acute middle maculopathy’ (PAMM). It is an OCT sign that was described a decade ago in the 2010s.

Perusal of the 2 cases of CRAO (1 and 7), however, finds that, not only the middle macula, but the inner macula is also hyperreflective. This extensive loss of optical clarity on OCT is due to gross retinal hypoperfusion [2]. To fathom these OCT signs one returns to the retinal angioarchitecture.


The superficial capillary plexus of the retina branches downward into the intermediate and deep capillaries [3]. The deep capillaries feed the mid-depth of the macula and are the terminus of the arterial input. As end-microvessels they are the first to suffer ischaemia in states of retinal hypoperfusion.

Thus mild retinal hypoperfusion is apparent as hyperreflectivity in the middle depth of the macula (ie ‘PAMM’). One model of acute mild ischaemia is well-perfused CRVO, and its PAMM lesions were reported in 2014 in a paper of ethereal erudition [4].

On a worsening of retinal hypoperfusion the hypoxia sweeps upward into the inner macula [2]. And so the inner macula becomes hyperreflective. Concordantly, in severe ischaemia the middle and inner macular layers are very hyperreflective. A further peculiarity of the ischaemic assault is that these retinal layers swell due to the pooling of water in hypoxic cells.

When eyeing acute panretinal ischaemia, on OCT, one must pay heed to the *inner* layers of the macula. During mild ischaemia—eg, non-ischaemic CRVO—the inner macula is normoreflexive. During

severe ischaemia—eg, ischaemic CRVO or a CRAO—the inner macula is hyperreflective [5]. Cases 1 and 7 are exhibits of CRAO but, as stated, their OCTs do not show hyperreflectivity limited to the middle macula (ie, do not show ‘isolated PAMM’). Rather, past a middle macula that is hyperreflective, their inner macula is also hyperreflective, an optical change that one would expect amid the vast, blood-depriving signature of CRAO.

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REFERENCES

1. Paracentral acute middle maculopathy after uneventful ocular surgery with local anaesthetic blocks. Eye Eye. 2021. <https://doi.org/10.1038/s41433-021-01481-6>.
2. Furashova O, Matthe E. Retinal changes in different grades of retinal artery occlusion: an optical coherence tomography study. IOVS. 2017;58:5209–16.
3. An D, Yu P, Freund Bailey K, Yu D-Y, Balaratnasingam C. Three-dimensional characterisation of the normal human parafoveal microvasculature using structural criteria and high-resolution confocal microscopy. IOVS. 2020;61:3.
4. Rahimy E, Sarraf D, Dollin ML, Pitcher JD, Ho AC. Paracentral acute middle maculopathy in nonischemic central retinal vein occlusion. AJO. 2014;158:372–80.
5. McLeod D. Misery perfusion, diffusive oxygen shunting and interarterial watershed infarction underlie oxygenation-based hypoperfusion maculopathy. AJO. 2019;205:153–64.

COMPETING INTERESTS

The author declares no competing interests.

ADDITIONAL INFORMATION

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