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COLOR CHANNEL EMPHASIS IN MULTIMODAL ANALYSIS OF LIPEMIA RETINALIS

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INTRODUCTION

Lipemia retinalis (LR) is a rare condition characterized by high levels of triglycerides in the blood, which give the retinal vessels a "milky" or "creamy" appearance. In severe instances, the fundus adopts a salmon color. Although often asymptomatic, LR can indicate severe hypertriglyceridemia and may be associated with conditions such as diabetes mellitus, acute pancreatitis, and other metabolic disorders. [1] Multimodal retinal imaging analysis is crucial for the assessment and monitoring of this condition. [2] Separating a color image into RGB channels is a non-invasive and cost-free technique that allows the analysis of the interaction of different wavelengths of light with the retinal tissue, adding information to the multimodal analysis of the retina.

OBJECTIVE

To describe multimodal retinal imaging in a case of lipemia retinalis, focusing on RGB color channels.

CASE REPORT

A 38-year-old woman with type 2 diabetes mellitus presented to the ophthalmologist referring a 4-month history of headaches and decreased vision in the left eye. She had eruptive xanthomas on her elbows and knees. Upon examination, best-corrected visual acuity was 20/20 in the right eye and 20/30 in the left eye. Fundus examination (Fig. A and B) revealed a salmon-colored retina and white-creamy vessel appearance in both eyes, hard exudates and flame-shaped hemorrhages in the right eye's inferior temporal arcade and exudates in the both eye's macula. Laboratory tests revealed a total serum cholesterol level of 1,539 mg/dL, a triglyceride level of 17,955 mg/dL, and an HbA1c level of 11.8%. Red, green and blue-channels (Fig. C,D and F) exhibited hyper-reflective retinal vessels. The Optical coherence tomography (OCT) showed point-like hyper-reflections in the retina, corresponding to the cross-section of retinal blood vessels, medium reflections in the choroid big vessels with back-shadowing (Fig. F and G).

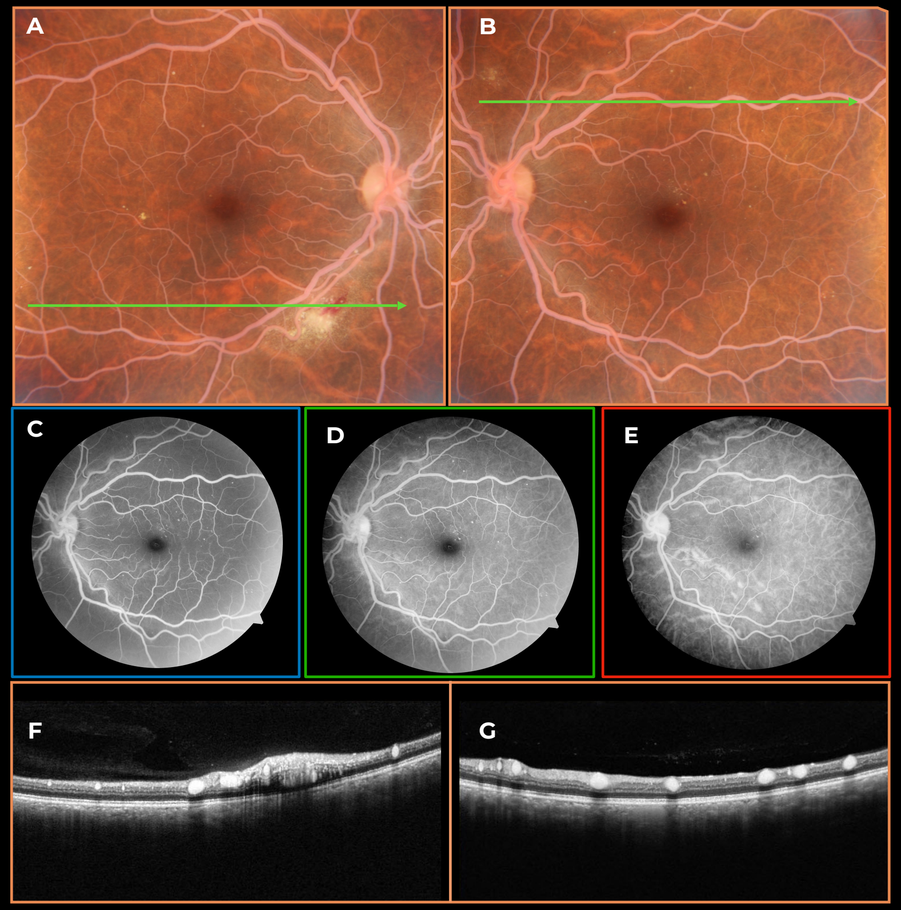

FIGURE: A, B Fundus photographs of a 38-year-old woman with lipemia retinalis showing normal optic disc, whitish retinal vessels, exudates and flame-shaped hemorrhage in inferior temporal arch of the right eye, exudates in the macula in both eyes and a salmon-pink retina. **C** Blue-channel image **D** Green-channel image **E** Red-channel image shows hyper-reflective retinal vessels simulating a fluorescein angiography. **F** The Optical coherence tomography (OCT) shows point-like hyper-reflections in the retina, corresponding to the cross-section of retinal blood vessels, medium reflections in the choroid big vessels with back-shadowing; The green arrows highlighted in the color fundus images, indicating pathological hyper-reflective retinal vessels, in addition to the increased retinal thickness in the right eye. on B scan.

DISCUSSION

LR is an ocular finding associated with elevated plasma levels of triglycerides. The exact epidemiology of lipemia retinalis (LR) is not known, also diabetes and hypertension are common associations [1, 3] The ocular findings result from light scattering induced by triglyceride-loaded chylomicrons in the plasma. [5] RL shows specific changes in fundus color photography at presentation(Fig. A and B). The color fundus images were splitted into three color channels (blue, green, and red). Typically, retinal vessels and recent hemorrhages are also characterized by a markedly low signal owing to a phenomenon of absorption by blood constituents, such as hemoglobin. [6] However, in LR, blue-channel image (Fig.C) green-channel image (Fig. D) and red-channel image (Fig. E) shows hyper-reflective retinal vessels, similar to a fluorescein angiography image. Also, the Optical coherence tomography (OCT) shows point-like hyper-reflections in the retina, corresponding to the cross-section of retinal blood vessels, medium reflections in the choroid big vessels with back-shadowing; Green arrows on the color fundus images (Fig. A and B), indicating pathological hyper-reflective retinal vessels on B scan. (Fig. F and G).

CONCLUSION

Retinal lipemia presents characteristic findings on color retinography, color channels, and OCT exams. Ophthalmologists should be attentive to these signs to make an early differential diagnosis and direct the patient to appropriate treatment promptly.

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