



## Case Report

# Lipaemia retinalis in hyperlipidemia, uncontrolled diabetes mellitus

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### ABSTRACT

A 52-year-old male patient presented with a chief complaint of diminution of vision over the past two months. He is a known case of type -2 diabetes mellitus for 25 years but has not been taking his medication regularly. Ocular examination revealed visual acuity of 6/18 in both the eyes, xanthelasma, arcus senilis, posterior segment examination revealed creamy white discolouration of the retinal vessels. Routine blood investigation revealed high level of triglycerides (1550 mg/dl), cholesterol (615 mg/dl), LDL-C 10 mg/dl, HDL-C (187 mg/dl), and with HBA1C of 14.4%. Hence, diagnosed this case as lipaemia retinalis. The patient was referred to a physician for treatment, and after treating with statins, lipid-lowering therapy, and blood sugar control, the patient was reviewed every month; six months later, the patient had normal retinal vessels and improved visual acuity, in addition to normal triglyceride, cholesterol, and blood glucose levels.

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## 1. Introduction

Lipaemia retinalis is a very rare condition first described by Heyl in 1880, characterised by the discolouration of the retinal blood vessels to a creamy-white colour in hyper triglyceridemia condition. In mild cases, only the peripheral blood vessels are affected; however, in severe cases, the fundus turns salmon-coloured. The fundal appearance can be explained by increased chylomicron concentrations in blood vessels. Vision is usually not affected in this condition.<sup>1,2</sup>

## 2. Case History

A 52-year-old male came with a chief complaint of diminution of vision over the past 2 months. The patient had 2 episodes of giddiness in the past two months associated with generalised weakness. The patient is a known case of type 2 diabetes mellitus but not on regular medication,

patient's general physical examination and vitals are within normal limits.

On ocular examination, the best corrected visual acuity in both the eyes was 6/18, colour vision was normal, extraocular muscle motility was full and free, eyelids examination revealed xanthelasma on the nasal side of the upper lid, and anterior segment examination showed arcus senilis.(Figure 1, Table 1) Posterior segment examination revealed a creamy white appearance of retinal vessels.(Figure 2, Table 2) The ocular coherence tomogram revealed enlarged and hyper-reflective retinal vessels and hyperreflective spots in the inner retinal layer.(Figure 3) So diagnosed as Lipaemia retinalis.

On routine blood, examination revealed high levels of triglycerides of 1550 mg /dl, high cholesterol levels of 615 mg/dl, HDL-C OF 187 mg/dl, LDL-C of 10 mg/dl, total cholesterol/HDL-C ratio of 3, LDL/HDL-C ratio of 0.1 and random blood sugars of 450 mg/dl, HBA1C of 14.4%, other blood examination are within normal limits.

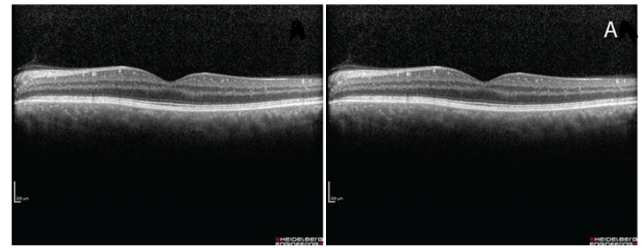
The patient was referred for a general physician's opinion, and diagnosed with uncontrolled diabetes and

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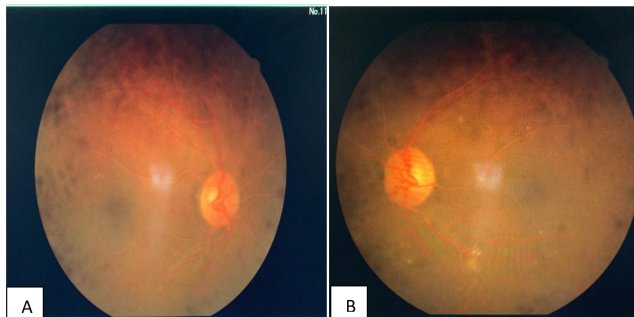
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**Table 1:** Ocular examination

Anterior Segment	Right Eye	Left Eye
Best Corrected Visual Acuity	6/18	6/18
Colour Vision	25/25	25/25
Extra Ocular Movements	Full and Free	Full and Free
Eye Lids	Xanthelasma (Upperlid-nasally)	Xanthelasma (Upperlid- nasally)
Conjunctiva	Normal	Normal
Cornea	Arcus Senilis	Arcus Senilis
Anterior Chamber	Normal Depth	Normal Depth
Iris	Normal Colour and Pattern	Normal Colour and Pattern
Pupil	3-4 mm, Round and Reacting To Light	3-4mm, Round and Reacting to Light
Lens	Clear	Clear

**Fig. 1:** Showing xanthelasma and arcus senilis**Fig. 3:** Ocular coherence tomogram revealed enlarged and hyper reflective retinal vessels and hyper reflective spots in the inner retinal layer**Table 2:** Posterior segment

Posterior Segment	Right Eye	Left Eye
Media	Clear	Clear
Cup Disc Ratio	0.3	0.3
Disc	Normal	Normal
Vessels	Creamy white Appearance of Retinal Vessels	Creamy white Appearance of Retinal Vessels
Foveal Reflex	Present	Present

**Fig. 2:** A): Fundus photo of right eye showing creamy white appearance of retinal vessels; B): Fundus photo of left eye showing creamy white appearance of retinal vessels

type 1 hyperlipidaemia. The patient was advised admission and treated with insulin infusion on admission day, later discharged on 3rd day with insulin injections subcutaneously according to Capillary blood glucose, atorvastatin 40 mg, fenofibrate 400 mg once daily were started along with dietary modifications.

Fruits, vegetables, whole grains, legumes, nuts, fish, and low-fat dairy products (instead of refined or processed foods, red meats, highly concentrated sweets, eggs, and butter) as well as omega-3 fish oil and the use of medium-chain triglyceride oil were associated with improvements in lipid profile when combined with advice from a dietician.

Blood testing indicated a depletion in fat-soluble vitamins caused by the latter, and vitamin D and E supplements were given as part of a multidisciplinary treatment plan. Volanesorsen, which was well tolerated, was also started in an effort to reduce her serum triglyceride level. Her triglyceride levels in the blood dropped.

The patient was reviewed every month, after 6 months, on ocular examination, visual acuity is 6/6 in both the eyes, and fundus examination revealed normal appearing retinal vessels. Blood investigation revealed controlled blood sugars and triglycerides and cholesterol.

### 3. Discussion

Lipemia retinalis is a rare manifestation of hyperlipidaemia. This results directly from increased

triglyceride and/or chylomicron levels in the retinal arteries. Like primary hyperlipidaemia, lipaemia retinalis is rare and mostly occurs in people with types I, IV, and V hyperlipidaemia who did not even have hypertriglyceridemia. Uncontrolled diabetes mellitus is a major contributor to secondary hyperlipidaemia, commonly chylomicronaemia, which in turn leads to lipaemia retinalis.<sup>3,4</sup>

Discoloration of the retinal vessels, one of the distinctive fundus alterations, is most frequently seen when plasma triglyceride levels are above 900 mg/dl. Depending on the plasma triglyceride level, this can range in colour from salmon-pink to creamy-white.<sup>3</sup>

The pathological presentation of lipaemia retinalis is caused by the presence of triglyceride-laden chylomicrons circulating in the retinal arteries, which scatter light and result in a turbid appearance. As chylomicrons have a high level of triglycerides (95%), lipaemia retinalis is characterised by an elevated triglyceride level.<sup>3,5</sup>

At triglyceride levels between 900 and 1600 mg/dl, early indications of lipaemia retinalis are restricted to the periphery of the retina, where the capillaries appear thin and creamy. As the triglyceride level rises to between 1,600 and 2,300 mg/dl, the arteries in the posterior pole turn creamy and the lipaemia spreads towards the optic disc. At a triglyceride level more than 2300 mg/dl, retinal arteries and veins take on a creamy-white appearance, while comparable changes in the choroidal vessels give the fundus a salmon-colored hue.(Table 3)<sup>3,5</sup>

The stages of lipaemia retinalis described by VINEGER AND SACHS are classified. According to this classification, our patient exhibited grade II abnormality and a triglyceride level of 1550 mg/dl. It should be emphasised that not all individuals with elevated triglyceride or chylomicron levels exhibit lipaemia retinalis, pointing to potential additional influencing actors including haematocrit and vascular translucency. As Asian populations have been found to have more severe signs of metabolic syndrome, we also consider the impact of ethnicity.<sup>3,5</sup>

**Table 3:**

I	Early	White and creamy peripheral vessels
II	Moderate	Creamy-coloured vessels extending towards optic disc
III	Marked	Salmon-coloured retina, all vessels having milky aspect

Vision is initially normal, but may be affected by advanced cases as it was in our patient. Nevertheless persistent lipaemia retinalis can result in severe, irreversible visual loss. Rapid detection and reversal are therefore necessary and have been demonstrated to enhance prognosis. In high-risk patients, a low-fat diet can be utilised for therapy as well as primary and secondary prevention of lipaemia retinalis.<sup>6,7</sup>

There are currently no particular drugs available for treating lipaemia retinalis. Lipid-lowering therapy including fibrates, nicotinic acid, and n-3 polyunsaturated fatty acid can reduce triglyceride levels by up to 50%, which may cause a quick reversal of aberrant findings. Volanesorsen, a new pharmacological medication, has been demonstrated to drastically reduce triglyceride levels. Recent research has identified APOC3glycoprotein, which is produced in the liver and to a lesser extent in the small intestine, as a critical regulator of plasma triglyceride levels. APOC3 is a strong inhibitor of lipoprotein lipase, which reduces triglyceride levels by inhibiting lipolysis. It has also been found to impede hepatic lipase activity, hence enhancing VLDL synthesis and secretion and preventing the clearance of triglyceride-rich lipoproteins.<sup>6,7</sup>

The most often documented side effects of volanesorsen were injection site reactions and thrombocytopenia. Improvement of the lipid profile may help prevent acute consequences of hypertriglyceridemia, such as acute pancreatitis and cardiovascular events. Optimisation of glycaemic control in patients with poorly controlled diabetes is crucial for the management of diabetes. As in this case, effective management lowered the plasma triglyceride levels and resulted in the complete resolution of fundoscopic findings and other symptoms of chylomicronaemia syndrome. This highlights the importance of involving dieticians and a wider multidisciplinary team. For patients with severe hypertriglyceridemia, exchange transfusion has been advocated as a treatment option. Furthermore, it has been shown that surgical intervention, such as ileal bypass surgery, is beneficial for modifying the lipid profile. However, surgical operations should only be considered if the patient does not respond to standard medical treatments.<sup>6,7</sup>

Given the potential visual impairments and systemic problems of lipaemia retinalis and severe hypertriglyceridemia, we recommend routine screening for lipaemia retinalis in all patients with familial hypercholesterolemia in order to prevent morbidity and mortality from this illness.<sup>8</sup>

#### 4. Conclusion

Lipaemia retinalis is often an asymptomatic, however, this case demonstrates an uncommon presentation of lipemia retinalis with atypical visual acuity deterioration and excellent specificity for raised triglyceride and chylomicron levels.

Lipaemia retinalis is frequently misdiagnosed due to the fact that it typically does not cause visual symptoms and manifests initially in the peripheral retina. Persistent lipaemia retinalis and hypertriglyceridemia may cause irreversible visual impairments and potentially serious systemic problems if not treated promptly.

Given that lipaemia retinalis is a significant ocular predictor of future cardiovascular disease, it is of vital importance for clinicians to recognise the signs and symptoms in order to commence treatment early.

## 5. Source of Funding

None.


## 6. Conflict of Interest


None.

## References

1. Heyl AG. Intraocular lipaemia. *Trans Am Ophthalmol Soc.* 1880;3:54–66.
2. Tso MO, Jampol LM. Pathophysiology of hypertensive retinopathy. *Ophthalmology.* 1982;89(10):1132–45.
3. Alexander LJ. Ocular signs and symptoms of altered blood lipids. *J Am Optom Assoc.* 1983;54(2):123–6.
4. Lu CK, Chen SJ, Niu DM, Tsai CC, Lee FL, Hsu WM. Electrophysiological changes in lipaemia retinalis. *Am J Ophthalmol.* 2005;139(6):1142–5.
5. Yuan G, Al-Shali KZ, Hegele RA. Hypertriglyceridemia: Its etiology, effects and treatment. *CMAJ.* 2007;176(8):1113–20.
6. Leaf DA. Chylomicronemia and the chylomicronemia syndrome: a practical approach to management. *Am J Med.* 2008;121(1):10–2.
7. Schaefer EW, Leung A, Kravarusic J, Stone NJ. Management of severe hypertriglyceridemia in the hospital: A review. *J Hosp Med.* 2012;7(5):431–8.
8. Nagra PK, Ho AC, Dugan JD. Lipemia retinalis associated with branch retinal vein occlusion. *Am J Ophthalmol.* 2003;135(4):539–42.

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