Retinal Manifestations of High Myopia

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High myopia is defined a refractive error of –6.0 Diopter or more. Individuals with such high myopia, have an elongated, stretched out eyeball, which leads to certain anatomical and pathological changes, specifically in the retina. We will be elaborating on these retinal changes in this article, approaching them from posterior, i.e. macula to anterior, i.e. peripheral retina. The treatment approach of these lesions however has not been elaborated on in this article.

A. Macula

Myopic macular degeneration, is used to describe broadly multiple changes in macula seen in myopia.

1. ***Posterior Staphyloma*** – It is the outward protrusion of all layers of the globe. Has been classified by Curtin, where type I to V are basic, and VI to X are compound[1].
2. ***Myopic chorioretinal atrophy:*** It can be diffuse or patchy. Diffuse gives a yellowish appearance to the fundus. Patchy myopic chorioretinal atrophy is seen due to complete loss of photoreceptors, Retinal Pigment Epithelium (RPE), choriocapilllaries. The inner retina is in direct contact with the sclera. Areas of patchy myopic chorioretinal atrophy have a corresponding absolute scotoma.
3. ***Lacquer Cracks:*** These are linear ruptures in Bruch's membrane, seen as yellow lines in posterior pole. A new crack developing may manifest as sub-retinal bleed. Alternatively, the lacquer cracks can be precursors of myopic CNV.

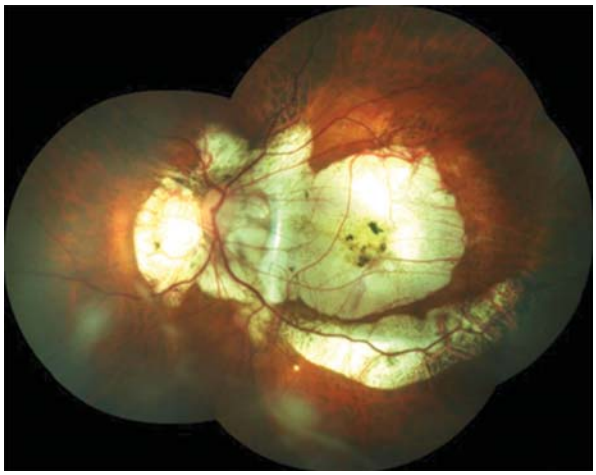

Figure 1: *Left eye fundus photo of a patient with pathological myopia, showing most of the posterior segment manifestations. The optic disc is tilted, there is posterior staphyloma involving the macula, and optic disc (Type IX – Curtis); pigmentary changes in fovea suggestive of resolved choroidal neovascular membrane (CNVM). Also as a part of myopic macular degeneration, is severe patchy chorioretinal atrophy and sclera can be seen.*

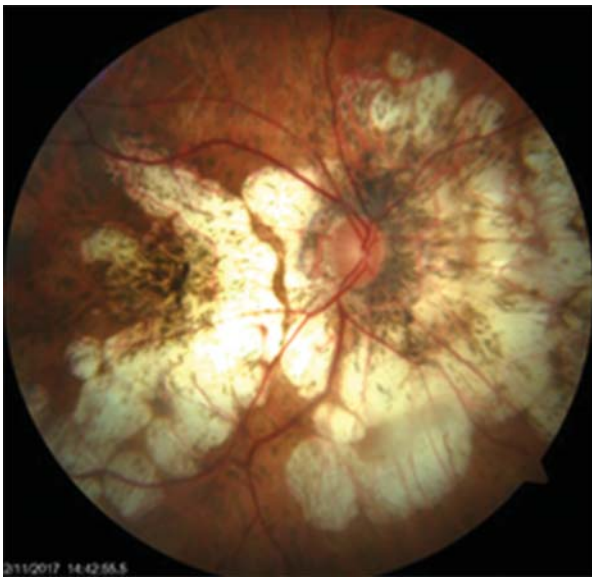

Figure 2: *Right eye myopic fundus, with patchy chorioretinal atrophy and Foster-Fuch spot.*

4. ***Myopic Choroidal Neo-Vascularization (CNV):*** Myopic CNV is caused due to thinning in RPE, and subsequent growth of choroidal neo-vessels. It may often present with sudden vision loss due to subretinal bleed. OCT is often not very useful to demonstrate the CNV, as the retinal layers are thinned out. Fluorescein angiography on the other hand, is able to show hyperflorescence in the area of CNV. Although in some cases the hyperflorescence may be blocked due to the subretinal bleed[2].

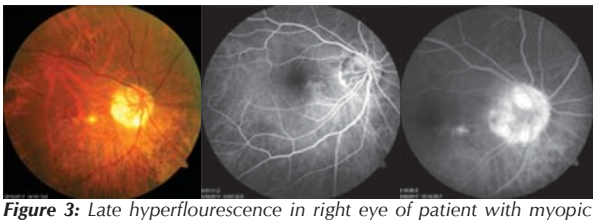

Figure 3: *Late hyperflourescence in right eye of patient with myopic CNV. Also note the peripapillary atrophy with window defect.*

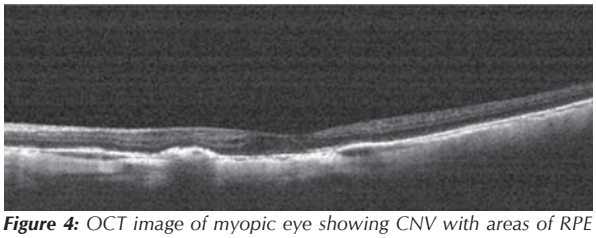

Figure 4: *OCT image of myopic eye showing CNV with areas of RPE atrophy.*

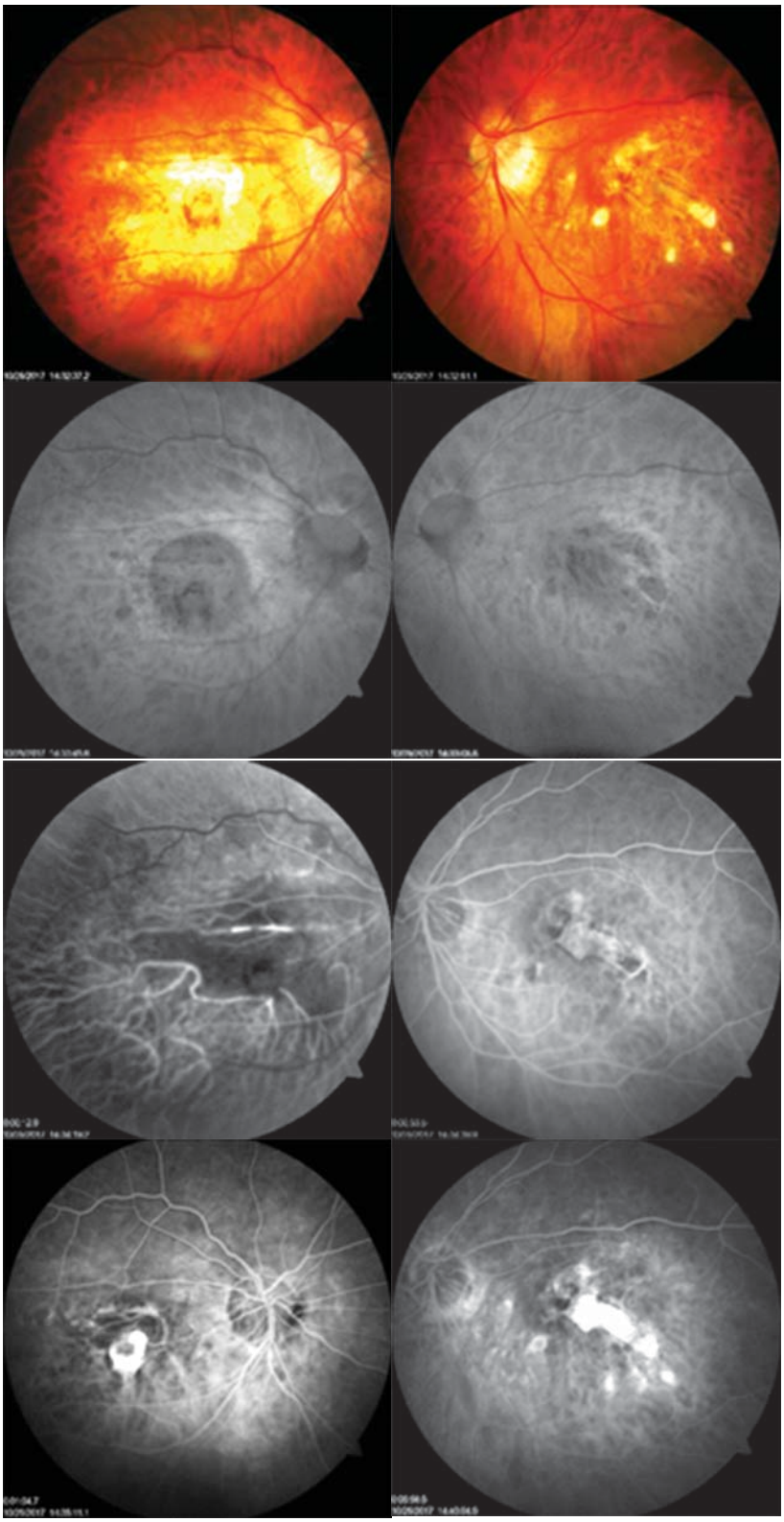

Figure 5: *Bilateral myopic CNVM with hyperflourescence in late phase. Also note the window defects in areas of patchy chorioretinal atrophy.*

Foster Fuchs spots: are seen as areas of hyperpigmentation at posterior pole. They are believed to arise from RPE hyperplasia following regression of CNV, or pigmentation in response to resorption of subretinal hemorrhage.

5. Myopic Traction Maculopathy (MTM)

A relatively newly recognized entity, MTM includes a spectrum of findings

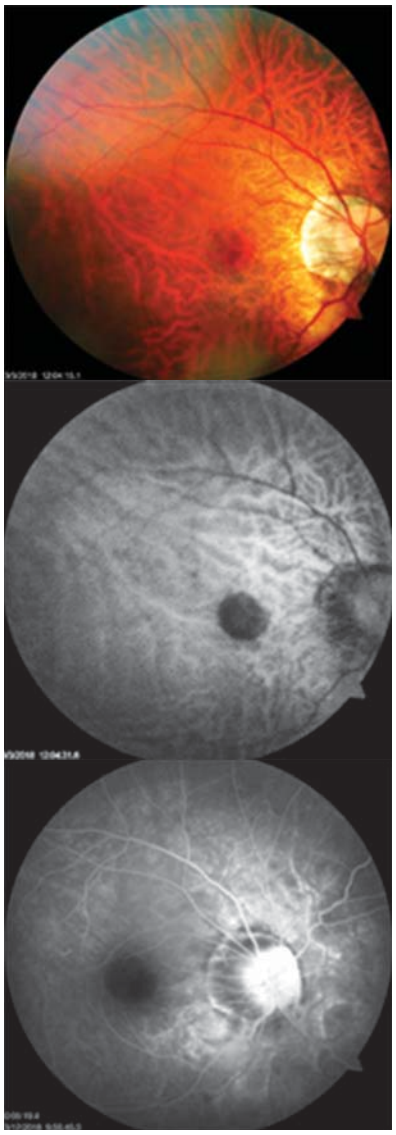

Figure 6: *Right eye posterior pole image showing myopic CNVM, with subretinal "coin shaped" hemorrhage. Seen more distinctly on fundus autoflorescence. On fluorescein angiography, the hyperflourescence of the underlying CNVM has been blocked by the subretinal bleed, in the right eye.*

seen on OCT in eyes with high myopia. These include vitreo-macular traction, macular schisis, epiretinal membrane. The pathogenesis of MTM is complex. Pre-retinal factors include, the incomplete separation of the posterior vitreous. The attached hyaloid and thickened internal limiting membrane (ILM) cause an inward or centripetal force. While, the posterior staphyloma, elongated eye lead to a centrifugal force. As result traction and macular schisis develop. Treatment ranges from observation, to surgical removal of the membrane, traction[3].

6. Dome Shaped Macula: Is a finding seen mostly on OCT, and is

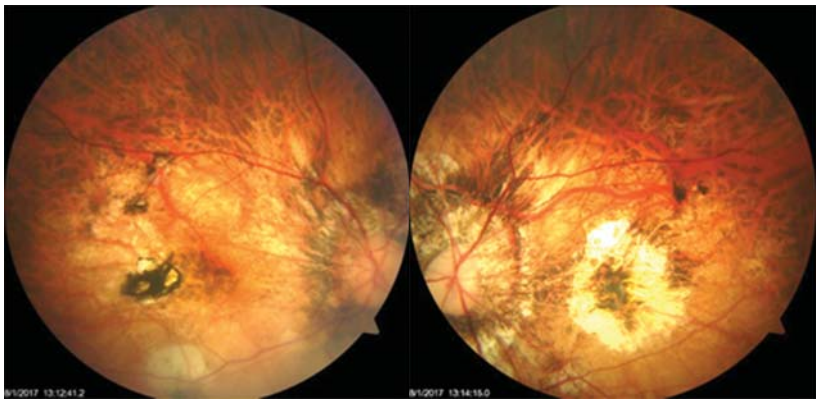

Figure 7: *Foster-Fuch spot at posterior pole. Patient had been previously treated with anti-vascular endothelial growth factor intravitreal injections for myopic CNV.*

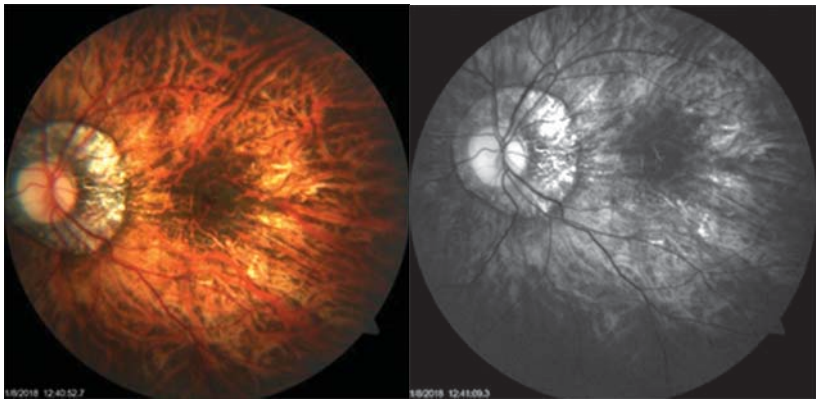

Figure 8: *Fundus image of the left eye, with myopic macular degeneration. Showing diffuse chorioretinal atrophy, and lacquer cracks temporal to the fovea. The retina surrounding the optic disc is also thinned out, called peripapillary atrophy.*

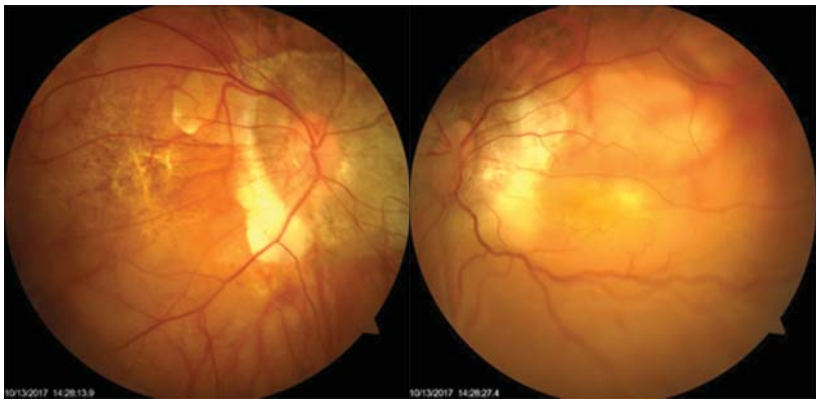

Figure 9: *Patient with high myopia who developed retinal detachment in the left eye as a consequence of peripheral retinal degenerations. Right eye fundus photograph shows a posterior staphyloma around optic disc with patchy chorioretinal atrophy.*

often associated with serous macular detachment. Most often it remains stable in terms of macular profile and visual acuity[4].

B. Optic disc: The optic disc in myopic eyes has various characteristic findings. The optic disc is often tilted. Owing to the stretching of the eyeball, there is associated peripapillary atrophy. This atrophy may sometimes only be temporal to the disc, called the temporal crescent.

C. Retinal Periphery: The peripheral retina in myopic eyes also shows various degenerative changes.

1. Retinal lattices are the most common, and represent thinned out peripheral retina. Initially non-pigmented, when long standing typically undergo pigmentation. They may have retinal holes. The vitreous is very adherent on the edge of the lattice, and liquefied over it. They predispose towards retinal detachment. Retinal laser delimitation is recommended if patient is experiencing flashes, floaters, or if past history of retinal detachment in other eye.
2. Snail track degeneration, represents extensive lattices, especially in very high myopia.
3. White without pressure (WWOP): is common in high myopia and represents vitreous condensation.
4. Pavingstone degeneration is outer retinal thinning (as against inner retinal thinning in lattices). They do not predispose towards retinal detachment, and need not be treated with prophylactic retinal laser.

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