Research Article

A Review of High Myopia

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Abstract
Myopia is variably defined as a refractive error equal to or more than -0.25 to -1.00 dioptres (D) (Logan et al., 2005) and can be graded according to severity and age of onset
The severity of myopia is generally classified as low (-0.50 to -2.99 D), moderate (-3.00 to -5.99 D) or severe (more than or equal to -6.00) (Cumberland et al., 2007, Dirani et al., 2008. Owing to the high axial length, highly myopic eyes frequently suffer from fundus vascular lesions such as macular hemorrhage and choroid neovascularization (Cho et al., 2016, Costanzo et al., 2016). Lacquer cracks in the Bruch membrane, and chorioretinal atrophy also occur (Fujiwara et al., 2009).
Keywords: Myopia, axial length, neovascularization

Introduction
High myopia refers to a condition in which individuals have an axial length exceeding a certain threshold (typically ≥25.5 or 26.50 mm), a corresponding refractive error (of at least –5.0 diopter) and is accompanied by characteristic pathological changes (Silva, 2012)

Various forms of myopia have been described by their clinical appearance (Goss et. al., 1988).
1- Simple Myopia: In emmetropic eyes, axial length and optical power are inversely correlated. Simple myopia, which is much more common than the other types of myopia, is defined as spherical equivalent of −0.50 to −eyes, a (D); in many patients it is less than 4 or 5 D. Astigmatism may occur in conjunction with simple myopia (Wong et al., 2015).
2- Nocturnal Myopia: It occurs only in dim illumination, nocturnal or night myopia is primarily caused by increased accommodative response associated with low levels of light, these gradually diminished as prespyopia is approached (Charman, 1996).
3- Pseudomyopia: ~~Pseudomyopia~~ it is the result of an increase in ocular refractive power due to overstimu-lation of the eye's accommodative mechanism or ciliary spasm (Goldstein and Schneekloth, 1996).
4- Degenerative Myopia: A high degree of myopia associated with degenerative changes in the posterior segment of the eye is known as degenerative or pathological myopia (Curtin, 1985, Amos, 1987).
5- Induced Myopia: Induced or acquired myopia is the result of exposure to various pharmaceutical agents, variation in blood sugar levels, nuclear sclerosis of the crystalline lens, or other anomalous conditions. This myopia is often temporary and reversible.

Similarly, myopia has also been classified according to the axial length (AL) into low to moderate myopia (AL 25.1 ± 1.1mm) and high myopia (AL 27.1±1.1mm) (Lam et al., 2007).

Visual acuity loss is associated with choroidal neovascularization (CNV) but also with progr-essive atrophic changes in the macula, usually by the fifth decade. In younger patients a rapid visual acuity loss is more common and associated with the development of CNV. These membranes may develop more frequently in the presence of lacquer cracks or patchy atrophy (Hayashi et al., 2010) and thus detailed ophthalmological examination is required for every myopic patient. The fundus finding that is most commonly seen with low to moderate degrees of myopia (less than -6 diopters) is a scleral or choroidal crescent located adjacent to the optic nerve head (Fig. 1)

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Fig. (1)- Peripapillary crescent in low to moderate myopia which is associated with increased axial length (Vongphanit et al., 2002)

In patients with higher degrees of myopia, more substantial fundus changes may occur. Myopic retinopathy refers to a cluster of signs that indicate degeneration of chorioretinal tissues associated with the excessive axial elongation of the myopic eye. According to the Blue Mountains Eye Study, myopic retinopathy is defined as the presence of staphyloma, lacquer cracks, Fuch's spot and chorioretinal thinning or atrophy (Vongphanit et al., 2002)

Tessellated (Tigroid) Fundus:

Axial elongation leads to hypoplasia of the retinal pigment epithelium (RPE), which reduces the pigment, allowing the choroidal vessels to be seen. This is referred to as tessellated fundus (Ohno-Matsui et al., 1998) (Fig.2)

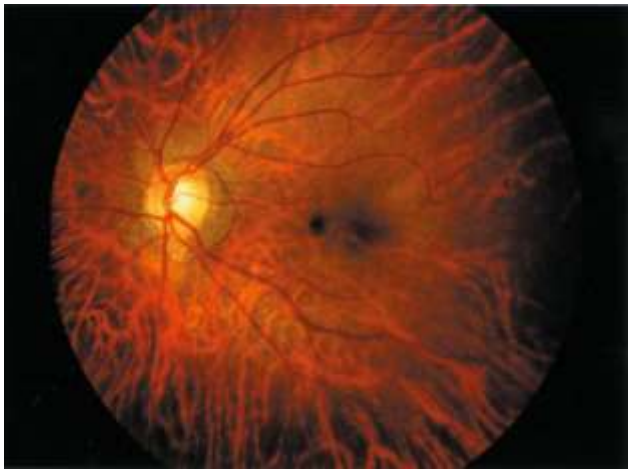

Fig. (2)- The tessellated fundus showing the underlying choroidal vessels with a crescent (Tokoro, 2012)

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Chorioretinal atrophy:
Tokoro classified chorioretinal atrophy into diffuse and patchy types (Ohno-Matsui et al., 1998). Diffuse chorioretinal atrophy appears as an ill-defined yellowish lesion in the posterior fundus of highly myopic patients.

Patchy chorioretinal atrophy is the second most common predisposing finding for the development of CNV.

Lacquer cracks:
Clinically, they appear as fine, irregular, yellow lines in the posterior fundus of high myopes which might be crisscrossing.

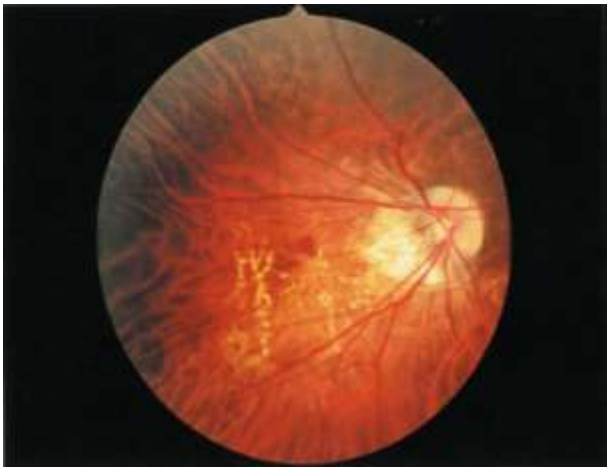

Fig. (3)- Lacquer cracks are fine irregular yellow lines, that crisscross (Tokoro, 2012)

Posterior Staphyloma:
A posterior staphyloma is a protrusion of the posterior shell of the globe that frequently is found in highly myopic eyes and is considered to be a hallmark lesion.

Among the other serious complications of progressive myopia are vitreous syneresis and rhegmatogenous retinal detachment that results from peripheral tears.

Peripheral retinal lesions:
The major peripheral chorioretinal changes associated with pathologic myopia are lattice degeneration, snail track degeneration, white-without pressure, pigmentary degeneration, paving stone degeneration, retinal holes and retinal tears (Lai et al., 2008).

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