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Updates of pathologic myopia

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ABSTRACT

Complications from pathologic myopia are a major cause of visual impairment and blindness, especially in east Asia. The eyes with pathologic myopia may develop loss of the best-corrected vision due to various pathologies in the macula, peripheral retina and the optic nerve.

Despite its importance, the definition of pathologic myopia has been inconsistent. The refractive error or axial length alone often does not adequately reflect the 'pathologic myopia'. Posterior staphyloma, which is a hallmark lesion of pathologic myopia, can occur also in non-highly myopic eyes. Recently a revised classification system for myopic maculopathy has been proposed to standardize the definition among epidemiological studies. In this META-PM (meta analyses of pathologic myopia) study classification, pathologic myopia was defined as the eyes having chorioretinal atrophy equal to or more severe than diffuse atrophy.

In addition, the advent of new imaging technologies such as optical coherence tomography (OCT) and three dimensional magnetic resonance imaging (3D MRI) has enabled the detailed observation of various pathologies specific to pathologic myopia. New therapeutic approaches including intravitreal injections of anti-vascular endothelial growth factor agents and the advance of vitreoretinal surgeries have greatly improved the prognosis of patients with pathologic myopia. The purpose of this review article is to provide an update on topics related to the field of pathologic myopia, and to outline the remaining issues which need to be solved in the future.

Contents

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1. Introduction

Complications from pathologic myopia are a major cause of visual impairment and blindness, especially in east Asia (Chan et al., 2016; Foster and Jiang, 2014; Morgan et al., 2012; Wong et al., 2014). The eyes with pathologic myopia may develop visual loss due to various pathologies in the macula, peripheral retina and the optic nerve (Morgan et al., 2012). The deformity of the globe including posterior staphyloma may facilitate the development of these pathologies.

The definition of pathologic myopia has been inconsistent. The term “pathologic myopia” was originally described as myopia accompanied by characteristic degenerative changes in the sclera, choroid, and retinal pigment epithelium, with compromised visual function (Morgan et al., 2012; Tokoro, 1988). Excessive elongation of the globe and posterior staphyloma are believed to be important factors in the development of these degenerative changes in pathologic myopia (Moriyama et al., 2011b). However, the refractive error or axial length alone often does not adequately reflect the ‘pathologic myopia’. Posterior staphyloma, which is a hallmark lesion of pathologic myopia, can occur also in non-highly myopic eyes (Curtin, 1977, 1985; Wang et al., 2015a). Recently an international panel of researchers in myopia reviewed previous published studies and classifications and proposed a simplified, uniform classification system for pathologic myopia for use in future studies (Ohno-Matsui et al., 2015b). In this META-PM (meta analyses of pathologic myopia) study classification, pathologic myopia was defined as the eyes having chorioretinal atrophy equal to or more severe than diffuse atrophy.

Over the past two decades, advances in imaging technologies such as optical coherence tomography (OCT), wide-field imaging, and three-dimensional magnetic resonance imaging (MRI) have greatly enhanced our understanding in the ocular complications associated with high myopia. OCT enables the high-resolution in vivo assessment of the optic nerve and macula and new disease entities such as myopic traction maculopathy (Panozzo and Mercanti, 2004) and dome-shaped macula (Gaucher, 2008) have been described. New treatment technologies such as anti-angiogenesis therapy and small gauge vitrectomy have also enhanced the treatment outcomes of some complications associated with high myopia. However, despite these advancements, considerable challenges still exist in the management of irreversible vision loss in high myopia due to macular or optic nerve atrophy. This review will highlight our current understanding of the various ocular complications in high myopia as well as our current limitations in managing these conditions. To-date there is no proven method to prevent or retard the development or progression of these complications.

2. Epidemiology

The prevalence of pathologic myopia has been evaluated in several population studies, although some variations in the definition of pathologic myopia exist between studies (Asakuma et al., 2012; Gao et al., 2011; Hsu et al., 2004; Hu, 1987; Liang et al., 2008; Liu et al., 2010; Pan et al., 2013; Vongphanit et al., 2002b; Wong et al., 2014). Recently, these publications have been evaluated and summarized in an evidence-based systematic review (Wong et al., 2014). Prevalence of pathologic myopia from 4 studies in Asian populations ranged from 0.9% to 3.1%, while the Blue Mountains Eye Study (BMES) reported 1.2% in an Australian population (Vongphanit et al., 2002b). Furthermore, pathologic myopia has been reported as the primary cause of blindness or low vision in 7% in European populations (Cedrone et al., 2006; Klaver et al., 1998) and in 12–27% in Asian populations (Iwase et al., 2006; Xu et al., 2006; Yamada et al., 2010). The impact of pathologic myopia on vision and vision-specific quality of life is further amplified by the high likelihood of bilateral involvement in young individuals (Verkicharla et al., 2015). Among the pathologic changes, current treatment is only available for selected lesions, such as choroidal neovascularization and tractional maculopathy. No effective restorative treatment is currently available for eyes with progressive deterioration due to development of chorioretinal atrophy or optic neuropathy.

In addition to the severity of myopia, increasing age is also an important risk factor for the development of pathologic changes in high myopia (Chen et al., 2012c; Shih et al., 2006; Silva, 2012; Verkicharla et al., 2015). The prevalence of myopic maculopathy has been shown to be low in children (Kobayashi et al., 2005; Samarawickrama et al., 2011), but increases (Chang et al., 2013)