Editorial

Diabetes, retinopathy and blindness

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Diabetes mellitus (DM) has become a universal health problem which is driven by increased caloric consumption resulting in obesity and other complications developing over the years.[1] The World Health Organization (WHO) estimates that >422 million people worldwide are suffering from diabetes.[2] Microvascular complications of DM like, nephropathy, retinopathy and neuropathy are responsible for increasing morbidity and mortality, and affected patients add greatly to healthcare costs.[2]

The overall prevalence of diabetic retinopathy (DR) is 35% among people with diabetes worldwide ranking fifth common cause of blindness or severe vision impairment.[3] Of this, diabetic macular edema (DME), the leading cause of central vision loss, accounts for 75% of DR-related vision loss. Recent meta-analysis documented that prevalence of diabetic retinopathy-related blindness will rise due to population surge, increasing average age and reduction in death rates.[4]

The pathogenesis of DR is multifactorial, with primary contributor likely to be chronic capillary non-perfusion and retinal ischemia. Studies have demonstrated hypoxia to be the initiating factor for production of various growth factors including insulin-like growth factor-1, platelet-derived growth factor, angiopoietin, and most importantly vascular endothelial growth factor (VEGF).[5] These factors play a role in the subsequent development of micro-angiopathy and retinal neovascularization. When these fragile vessels bleed, the vitreous hemorrhage occurs resulting in sudden loss of vision. Over time, the new vessels fibrose and can contract, resulting in tractional retinal detachments, which can cause significant vision loss.

Beside intensive control of blood glucose levels for the global diabetic epidemic, other important aspects are management of systemic parameters like good blood pressure, tight lipid control and management of nephropathy. All these controls help in slowing down or halt the progression of diabetic retinopathy. Furthermore, development of appropriate community-based screening program, comprising early detection and referral to ophthalmologists for baseline ocular examination, relevant treatment and follow up can prevent visual impairment and blindness.

Prominent professional organizations including the American Academy of Pediatrics, the American Academy of Ophthalmology, the American Diabetes Association, and the Canadian Ophthalmological Society published screening guidelines for diabetic retinopathy. These patients need yearly dilated retinal examination commencing from time of diagnosis for patients with type 2 DM and after an interval of 3-5 years for patients with type 1 DM. Twenty years after diagnosis the prevalence of diabetic retinopathy is >90% of patients with type 1 diabetes and >60% of those with type 2 diabetes.[6]

Imaging modalities, the optical coherence tomography (OCT), fluorescein angiography (FA) and optical coherence tomography angiography (OCTA) play a substantial role in the diagnosis and management of DR. Researchers in collaboration with Google have created a deep learning artificial neural network designed to detect retinopathy based on retinal images. It achieved sensitivity of 97.5–96.1% and specificity of 93.4–93.9% in detecting referable disease. In a hypothetical population with a prevalence of 8%, this translates to positive and negative predictive values of 99.8% and 99.6%, respectively. Such automated systems hold the potential of offsetting the surge in demand for screening.[7]

Treatment options have revolutionized the management of DR. Anti-VEGF, laser and steroids alone or in combination are used to halt progression of DR. Intra-vitreal injection of VEGF inhibitors is the first-line agent to treat center-involving DME, and these agents have a growing use in control of proliferative disease as well. Trials of anti-VEGF agents predict that early and regular anti-VEGF treatment can halt and sometimes reverse DR. Laser, focal or pan-retinal photocoagulation (PRP) remain as mainstay treatment for proliferative (neovascular) disease. Use of focal laser, especially in the form of non-damaging, or sub-threshold laser therapy is helpful in DME. Intravitreal corticosteroid dexamethasone or fluocinolone acetonide implant take place as second-line therapy for patients unresponsive to anti-VEGF agents or focal laser or both. A combination of all these is available for refractory cases of diabetic macular edema. Vitreoretinal surgery, in form of pars plana

vitrectomy is treatment of choice for non-clearing vitreous hemorrhage, tractional retinal detachment (TRD) threatening the macula. Thus, earlier surgery may be helpful in immediately restoring vision.

Despite the remarkable success made in the treatment of DR, the primary strategy should be ardent prevention of diabetes and a tight glycemic control whenever possible. Control of other systemic factors such as lipid levels and blood pressure also play important role. New diagnostic approaches and imaging modalities aid in early capturing of referable retinopathy. Once retinopathy develops, early and regular treatment is crucial to prevent permanent vision loss. Along with the continued vigilance of clinicians, the expanding armamentarium of diagnostic and therapeutic options for DR is valuable tool in the fight to reduce the impact of this devastating blinding disease. However, barriers to recommended eye examinations and treatment are numerous, including insufficient referrals, socioeconomic factors, and poor geographical access to health care facilities.

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