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Review Article

Screening for Diabetic Retinopathy – A Long Way to Go

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Abstract

Diabetic retinopathy (DR) is a leading cause of vision loss, yet screening efforts continue to fall short due to delayed referrals, poor patient adherence, and limited access to ophthalmic care, particularly in rural settings. Despite advancements such as AI-based screening, a critical gap remains in the collaboration between general physicians, endocrinologists, and ophthalmologists. This article highlights the current screening strategies, classification, and management of DR while advocating for a more inclusive approach—training MBBS students in basic fundus examination and leveraging AI to expand screening efforts. Strengthening interdisciplinary coordination and early detection initiatives can significantly improve patient outcomes and reduce the burden of vision loss from DR.

Keywords: Diabetic Retinopathy (DR); Optical Coherence Tomography (OCT); International Council of Ophthalmology (ICO)

Introduction

Diabetic retinopathy (DR) remains one of the leading causes of vision loss globally, particularly among working-age adults. It is a progressive microvascular complication of diabetes mellitus, leading to retinal damage and potential blindness if untreated [1]. Despite the advancement in screening including the introduction of Artificial Intelligence based screening programs [2], late diagnosis and poor adherence to follow up continue to be major hurdles.

A lacuna in communication between the general physician, endocrinologist and ophthalmologist persists leading to late referrals.

One possible approach to fill this lacuna would be to enable our MBBS students to do a basic dilated fundus examination to detect Diabetic Retinopathy. AI based programs for screening for Diabetic Retinopathy can also be used to help them in screening the masses especially during their posting in the rural setup.

Early detection of DR is essential for preventing vision loss. Various screening modalities include fundus photography, optical coherence tomography (OCT), and fluorescein angiography [3]. The International Council of Ophthalmology (ICO) recommends regular retinal screening for diabetic patients based on disease severity and duration [4].

Screening guidelines for diabetic retinopathy

Risk Factor: Screening Recommendation

- **Type 1:** Diabetes First screening within 5 years of diagnosis and annually thereafter
- **Type 2:** Diabetes Screening at the time of diagnosis and annually thereafter
- **Pregnancy in Diabetics:** Every trimester of pregnancy and postpartum

Classification of diabetic retinopathy

Diabetic retinopathy is classified based on the presence and severity of retinal microvascular changes.

Non-Proliferative Diabetic Retinopathy (NPDR)

- Characterized by microaneurysms, intraretinal hemorrhages, hard exudates, and venous beading [5].
- Can progress from mild to severe stages, increasing the risk of diabetic macular edema (DME).

Proliferative Diabetic Retinopathy (PDR)

- Defined by neovascularization, which can lead to vitreous hemorrhage and tractional retinal detachment [6].
- Associated with a significantly higher risk of severe vision loss.

Diabetic Macular Edema (DME)

- The primary cause of vision loss in DR, caused by breakdown of the blood-retinal barrier, leading to fluid accumulation in the macula [7].

Pathophysiology of diabetic retinopathy

The pathogenesis of DR involves hyperglycemia-induced microvascular damage, leading to retinal ischemia and increased vascular permeability [8]. The key mechanisms include:

- Chronic Hyperglycemia → Activation of the polyol pathway → Increased oxidative stress
- VEGF Overexpression → Promotes neovascularization and vascular leakage
- Inflammation and Neurodegeneration → Contribute to retinal capillary dropout and neuronal dysfunction [9].

Treatment modalities

Laser photocoagulation

Panretinal photocoagulation (PRP) remains the standard treatment for PDR. It reduces the risk of severe visual loss by 50% by destroying ischemic retinal tissue and reducing VEGF levels [6].

Intravitreal Anti-VEGF therapy

Anti-VEGF agents such as ranibizumab, aflibercept, and bevacizumab are the first-line treatments for DME and PDR. The VISTA/VIVID trials demonstrated significant improvement in visual outcomes with aflibercept in DME [9].

Intravitreal steroids

Dexamethasone and fluocinolone implants are beneficial for chronic DME cases, particularly in patients unresponsive to anti-VEGF therapy [7].

Vitrectomy

Indicated for non-clearing vitreous hemorrhage and tractional retinal detachment, vitrectomy restores vision by removing hemorrhage and relieving traction on the retina [5].

Conclusion

Diabetic retinopathy remains a major cause of vision loss worldwide, but advances in screening, classification, and treatment have significantly improved patient outcomes. Including more MBBS students, general physician posted at CHC/PHC for screening for Diabetic Retinopathy may help in early detection and better the interdisciplinary approach in management of the disease.

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