

Diabetic Retinopathy: Challenges in the Current Scenario

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Introduction

Diabetes mellitus has been associated with a multitude of disorders including but not limited to renal disease, heart disease etc. As far as the human eye is concerned, there are many diseases of the eye that are affected by and/or compounded by presence of diabetes.

Diabetes mellitus is a major clinical and public health problem accounting for 4.6 million deaths annually worldwide. According to the International Diabetes Federation, around 366 million people globally are currently estimated to have diabetes, of which 80% live in low and middle income countries [1].

As far as eyes are concerned, diabetes accelerates the formation and maturation of cataracts. In the retina, diabetes leads to retinopathy which is one of the leading causes of irreversible blindness in around 40 - 50% of diabetics.

Hence, there is a need for creating extensive awareness among the general public regarding the ill effects of diabetes on the eye; which till date, are one of the most neglected and least talked about aspects of general eye care. Here we talk about challenges associated with the one of the most common associations of diabetes with the eye - diabetic retinopathy.

Pathogenesis [2,3]

Diabetes causes progressive dysfunction of the retinal vasculature caused by chronic hyperglycemia. It causes loss of pericytes, damage to capillary endothelial cells and thickening of basement membrane in the retinal capillaries.

Hematologically, there is deformation of erythrocytes leading to rouleaux formation and increases blood viscosity.

These pathologies cause both microvascular occlusion and leakage both

Chronic microvascular leakage from the retinal capillaries due to loss of pericytes and damaged endothelial cells leads to retinal oedema. This oedema, if affecting the centre of retina, known as macula is called clinically significant macular oedema (CSME).

Microvascular occlusion, in turn causes retinal capillary hypoxia. If hypoxia affects central retina, it can lead to macular ischaemia.

Another response to retinal hypoxia is release of vasoformative substances like vasculoendothelial growth factor (VEGF). VEGF release causes formation of new vessels. The characteristic feature of these new vessels is that they lack capillary basement membrane and thus the strength of these vessels is lower than normal, leading to recurrent haemorrhages.

Clinically significant macular oedema, macular ischaemia, vitreous and pre-retinal haemorrhages along with components of advanced diabetic eye disease viz. tractional retinal detachment, combined mechanism retinal detachment, recurrent or protracted vitreous or pre-retinal haemorrhages are the main causes of visual disability in diabetic retinopathy [3].

Challenges

The first and foremost of challenges faced in the detection of diabetic retinopathy (DR) is the diagnosis of diabetes itself within the growing number of diabetics all-round the globe. The risk of developing diabetes has remained higher in the current years as compared to previous years. The Framingham heart study [4], as well as, the ICMR-INDIAB [5] study are a testament to that. The general global trend tends towards around 50% diabetics remaining undiagnosed at new incidence.

Eyes are often called the “window to the body”. Hence screening for subtle changes of diabetic retinopathy coupled with blood sugar assessment may not only lead to swift and prompt diagnosis of DR but of diabetes too.

Another hindrance to the early detection of DR is the absence of visual symptoms in the early stages of the disease. Lack of visual disturbances makes it difficult for the healthcare professionals to convince patients into committing themselves to regular follow ups and the need for strict adherence to metabolic control of diabetes.

Loss of daily pay is a big elephant in the room which still affects many families especially in the lower economic strata and in the developing countries. Longer waiting times combined with large crowds ensures that the patient, in many cases the sole bread winner lose their pay for the day. This is very discouraging as far as motivation and participation of individual is concerned [6].

The phenomenon of new exposure to economic freedom can also contribute to the emerging trends of increase in incidence of diabetic retinopathy. Even blue collar job workers, e.g. truck drivers etc are now contracting diabetes. This can be attributed in part to social stigma that a rich diet signifies one’s uplifted social status [7].

One major problem is the dearth of qualified and trained professionals in the healthcare setups, doctors and ophthalmic assistants both. Not only is the scarcity significant, the unequal distribution of resources among urban and rural populations is also alarming.

The list of challenges would be left incomplete if lack of infrastructure and finance were not mentioned. Transport and accessibility is still difficult in many areas of the world, making it tough for even the aware patient to utilise the existing healthcare services.

Recent advances

The advent of anti-VEGF agents has well and truly revolutionised the treatment of diabetic macular oedema. Earlier, the only modalities available for resolution of CSME were focal lasers and vitreo-retinal surgery [8-11].

Focal lasers could only be used to treat macular oedema not involving centre of macula. They also had an increased risk of causing accidental macular scarring and ischaemia.

Vitreo-retinal surgery, on the other hand was an invasive modality, with higher rate of complications.

Anti-VEGF injections have clearly given an edge to the ophthalmologist community in handling diabetic macular oedema and ensuring that we have a first line of treatment before resorting to surgery.

The advent of micro incision vitreous surgery including smaller gauges of vitrectomy ports, vitrectors with better cutting rates have ensured that vitreo-retinal surgery today is no longer a cumbersome procedure but a safe and effective one [12].

Optical Coherence Tomography (OCT) has rendered the visualisation, quantitative and qualitative evaluation of retinal structures and follow-up for diabetic retinopathy very easy. So much that an OCT is no longer considered to be a luxury but a necessity for ophthalmic clinical practice [13].

Similarly, newer tools at our disposal in the field of investigations have also made life simpler for ophthalmic practitioners. Optical Coherence Tomography- Angiography has rendered fluorescein angiography of fundus nearly obsolete for determination of macular ischaemia. Although much work needs to be done in advancement of current technologies [14].

In the field of community ophthalmology, portable fundus cameras in conjunction with tele-medicine have given us a fresh perspective with regards to screening of diabetic retinopathy. Telemedicine in particular, has been a boon for ophthalmologists in conducting triage and making precise diagnoses in remotely located patients [15].

A refreshing development is the use of artificial intelligence for screening of retinal disorders. Much can be talked about this fledgling yet ambitious project. In the recent future, artificial intelligence may become the key to decrease the load on our already strained human resources [16,17].

This war waged against this epidemic of Diabetes has a long way to go. It needs sincere efforts by health authorities with respect to awareness and availability of concerned treatment facility. An equal role needs to be played by the patients with respect to compliance and follow up.

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