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Review Article

Diabetic Retinopathy: A Concise Review

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Abstract

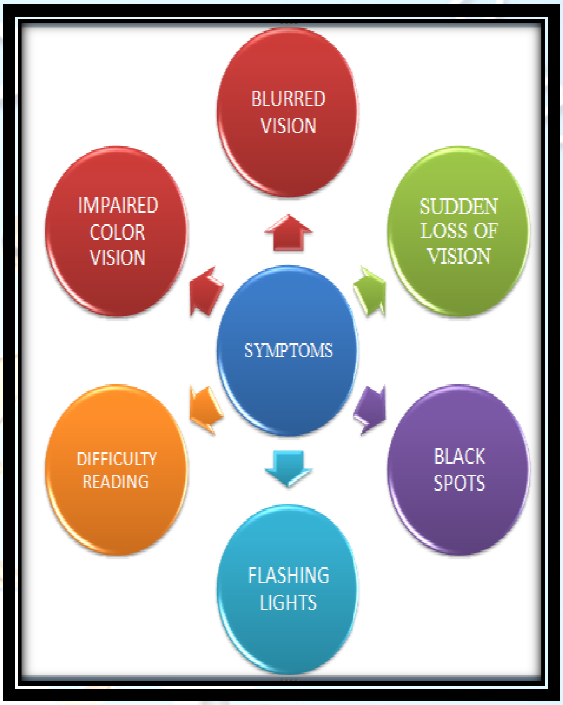
Diabetic retinopathy is most important diabetic complication and remains the primary cause of avoidable blindness in working-aged persons. As the global prevalence of diabetes mellitus continues to increase, diabetic retinopathy remains a principal cause of vision loss in several developed countries. Most favorable control of blood pressure, blood glucose, and possibly blood lipids remains the foundation for decrease of risk of retinopathy development. Novel approaches for DR treatment are intraocular steroid injection and anti-vascular endothelial growth-factor (VEGF) agents, are less damaging to the retina than are older treatments. This article will summarize key detection and management approaches for the complications of diabetes with special prominence on retinopathic complications.

Keywords: Diabetic Retinopathy, Laser Treatment, Vitrectomy

INTRODUCTION

Diabetic retinopathy (DR) is a commonly known multi-factorial disease of the retina with great social impact and complex pathogenesis which includes a variety of different molecules, cells and factors. Diabetic retinopathy results in change in mediators such as neurotrophic factors, growth factors, vasoactive agents, cytokines/chemokine's and adhesion molecules which results in vascular injuries and ultimately cell death.[1-4] In the current past, diabetic retinopathy was commonly considered as vascular disorder of the retina which ultimately leads to vascular damage. It has become evident from last few years that significant retinal neurons damage is also present in early stages of diabetic retinopathy. As the surveys continue and data are produced, it seems that degeneration of neurons also plays a significant role in micro vascular. [5-9]

SYMPTOMS OF DIABETIC RETINOPATHY



TYPES OF DIABETIC RETINOPATHY

1. 'Non-Proliferative' diabetic retinopathy (NPDR)
2. 'proliferative' diabetic retinopathy (PDR)

Non-proliferative diabetic retinopathy. [10]

NPDR is characterized by micro infarcts, hemorrhages, exudate, and micro aneurysm. This further can be classified into mild, moderate and severe depending on the extent of these changes (Table 1). Micro infarcts also known as cotton wool spots or delicate exudates which show up in cutting edge phases of NPDR because of vascular impediment and they show up as white injuries with unclear edges when they heal they may frame a discouraged area because of tissue loss.

Hemorrhages happen because of break of weakened vessels. They can be little spots or bigger blot hemorrhages present inside the thickly pressed more profound layers of retina.

Hard exudates comprise of lipoproteins and different proteins spilling through strange retinal vessels. They show up as yellow lipid stores with a waxy or gleaming appearance and may shape a circinate example around foci of spilling vessels and micro aneurysms.

Micro aneurysms are out pouchings of vessels and are among the primary clinically distinguishable indications of retinopathy. They emerge because of expanding of debilitated narrow dividers or endothelial buds endeavoring to revascularize ischemic retina. They show up as modest red dots, ordinarily fleeting to the macula. Even though micro aneurysms are not settled components and may even disappear. Sudden appearance of various miniaturized scale aneurysms means that compounding retinal ischemia

Proliferative diabetic retinopathy (PDR). [11]

PDR is the highly developed phase of diabetic retinopathy. It is described by new vessel arrangement usually emerging on the optic disk (New vessels on the disk) or emerge on different parts of the retina (new vessel somewhere else or NVE) generated by ischemic changes in the retina and an imbalance amongst angiogenic and antiangiogenic variables. The New vessel on the disk (NVD) conveys the most noticeably bad visualization because of numerous variables including connection of the vitreous to the optic disk. Early phase of PDR begins as neovascularization and pre-retinal hemorrhages (Table 1). This may advance to vitreous hemorrhages and in late stages it might bring about tractional retinal separation and neovascular glaucoma.

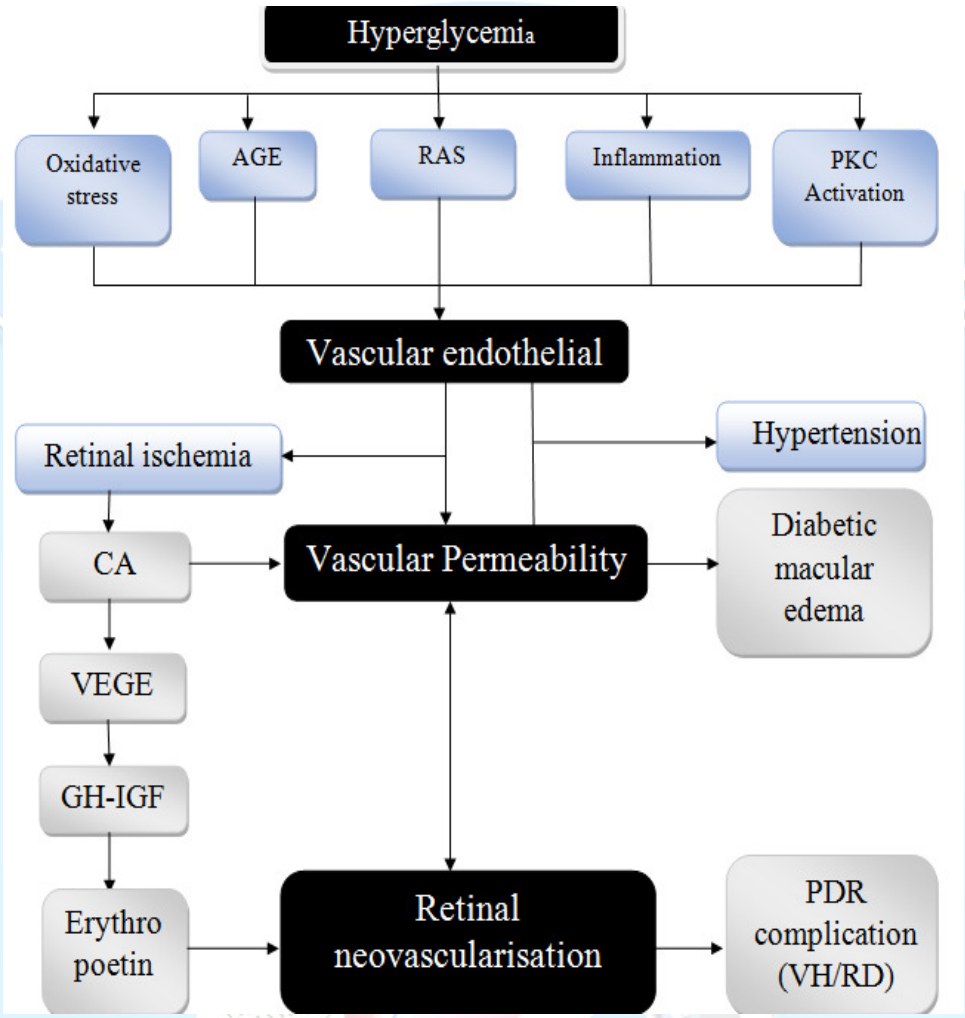
Table 1: The Early Treatment Diabetic Retinopathy Study (ETDRS) grading system. [12]

Types	Sub types	Characteristics
Non-Proliferative Diabetic Retinopathy (NPDR)	Mild to moderate	Hemorrhages, intra-retinal, hard exudates, Macular edema, micro aneurysms,
	Moderate to severe	Extensive intra-retinal hemorrhages and/or micro aneurysms, intra retinal microvascular abnormalities (IRMA), venous beading, Cotton wool spots
	Severe to very severe	IRMA, venous beading, Plus Cotton wool spots. Simplified by 4:2:1 *i.e.* Intraretinal hemorrhages: Venous beading: IRMA.
Proliferative Diabetic Retinopathy (PDR)	Disk neovascularization	Neovascularization somewhere else in the retina
	Early PDR	Pre-retinal hemorrhage
	Proliferative Diabetic Retinopathy with high-risk criteria	High risk:- the occurrence of any of the following: • Vitreous hemorrhage • New vessels on the disk >1/3 DD (most significant prognostic factor for severe visual loss) • New vessels somewhere else >1/2 DD
	Advanced eye diseased PDR	Neo vascularization of the iris, Tractional retinal detachment.

DD=disk diameter, DR =diabetic retinopathy, PDR= proliferative diabetic retinopathy, NPDR=non-proliferative diabetic retinopathy, IRMA=intra-retinal microvascular abnormalities.

Pathophysiology And Current Strategies. [13-15]

Our consideration of the pathophysiological mechanisms essential for the development of diabetic retinopathy is always evolving with new research.



AGE:- Advanced Glycation End-products; **RAS**:- Renin-Angiotensin System; **PKC**:- Protein Kinase C; **CA**:- Carbonic Anhydrase; **VEGE**:- Vascular Endothelial Growth Factor; **GH-IGF**:- Growth Factor–Insulin Growth Factor; **PDR**:- Proliferative Diabetic Retinopathy; **VH**:- Vitreous Haemorrhage; **RD**:- Retinal Detachment

Table 2: Current techniques of treatments in diabetic macular edema [16]

Sr. no.	Current strategies	Treatment For
1	Systemic factor control	Lipids, blood pressure and blood glucose is still the 'gold standard' treatment for diabetic retinopathy.
2	Focal/grid laser	non-centre-involving diabetic macular edema only
3	Anti-vascular endothelial growth factor (VEGF) intravi-treal injections	patients with centre-involving diabetic macular oedema
4	Steroids	For poor responders to anti-VEGF therapies
5	vitrectomy surgery	patients with vitreo-macular traction

Table 3: Role of Current Strategies in Management Of DR

Sr. No.	Management of diabetic retinopathy		Ref.
1	**Laser treatment**	Perform PRP for high risk of PDR. For earlystagesof PDR, start PRP after any maculopathy isStabilized Suppose PRP for severe NPDR, mainly if there is T2DM, impending cataract surgery,poor follow-up compliance, pregnancy, renal disease, and severe disease in the fellow eye or confirmation of retinopathy development.	17
2	**Vitrectomy**	Consider that there is vitrectomy within 3 months for T1DM patients having severe vitreous hemorrhage in eyes which suspected to have very severe PDR. Furthermore, consider the early vitrectomy for eyes having severe PDR, not responding to extensiveandaggressive PRP.	18-22
3	**Management of Cataract**	Carefully evaluate DR in patients with considerable cataract. Before cataract surgery made possible efforts to treat any DME with grid/focal laser. When DR is stable, consider that cataract surgery helps to improve the vision in diabetic patients. If the cataract is moderate to advanced, so consider surgery to sufficiently assess need or to permit laser treatment.	23-26
	Role in managing diabetes retinopathy		
4	**Laser Treatment (Photocoagulation)**	• Multiple RCT, including the ETDRS and DRS, have found that the pan-retinal photocoagulation (PRP) considerably reduces the risk of severe vision loss. At least 50% from PDR and that grid or focal laser photocoagulation decreases the risk of moderate vision loss. • Apply focal laser photocoagulation utilizing 100-micron laser burns to the areas of focal spillage (i.e. spilling microaneurysms) and areas of fine non-perfusion in the perimacular section. • Apply grid laser photocoagulation utilizing 50-100 micron burn up in a grid pattern to areas of diffuse spillage and non-perfusion at the macula.	19
5	**Vitrectomy**	• The Diabetic Retinopathy Vitrectomy Study (DRVS) was a multifocus RCT that assessed signs and timing of standards plana vitrectomy for management of cutting edge DR. • Vitrectomy was found in little RCT to advantage chronic or diffuse DME. OCT is significant to establish and evaluate DME, and to confirm footing and its reaction to surgery.	18

ABBREBIATIONS:-

DCCT =Diabetes Control & Complications Trial; DM =Diabetes mellitus; DME= Diabetic macular edema; DR= Diabetic retinopathy; DRS= Diabetic Retinopathy Study; DRVS =Diabetic Retinopathy Vitrectomy Study; ETDRS= Early Treatment Diabetic Retinopathy Study; NPDR =Non-proliferative diabetic retinopathy; NVD= New vessels on the (optic) disc; NVD= neovascularization on the disk, NVE =New vessels elsewhere; NVE= neovascularization elsewhere in the retina, SVL=severe visual loss. OCT= Optical coherence tomography PDR= Proliferative diabetic retinopathy; PRP= Panretinal photocoagulation; PRP=Pan-Retinal Photocoagulation; PSC =Posterior subcapsular cataract; RCT= Randomised controlled trial(s); STR =Sight threatening retinopathy; T1DM =Type 1 diabetes mellitus; T2DM =Type 2 diabetes mellitus

CONCLUSION

Regardless of good control of systemic risk factors, a huge number of patients will in any case advance to create vision-undermining diabetic retinopathy (either macular oedema or proliferative retinopathy). The present standard for the management of DR are laser treatment, vitrectomy, and not all around powerful in inversion of visual loss. Along these lines, new methodologies have likewise developed, for example, utilization of intraocular organization of hostile to VEGF specialists and corticosteroids in selected eyes. However, ophthalmologists and physicians should be awake not only of the noticeable benefits but also of the possible risks associated with these novel therapies.

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