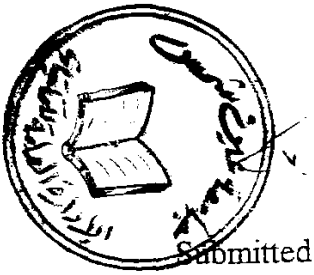
# *MODERN TRENDS IN THE MANAGEMENT OF PROLIFERATIVE DIABETIC RETINOPATHY*



**Essay Presented By**
Bassem Samir Iskander
( M.B.B.ch )
Submitted for partial fulfillment of master degree
in ophthalomlogy



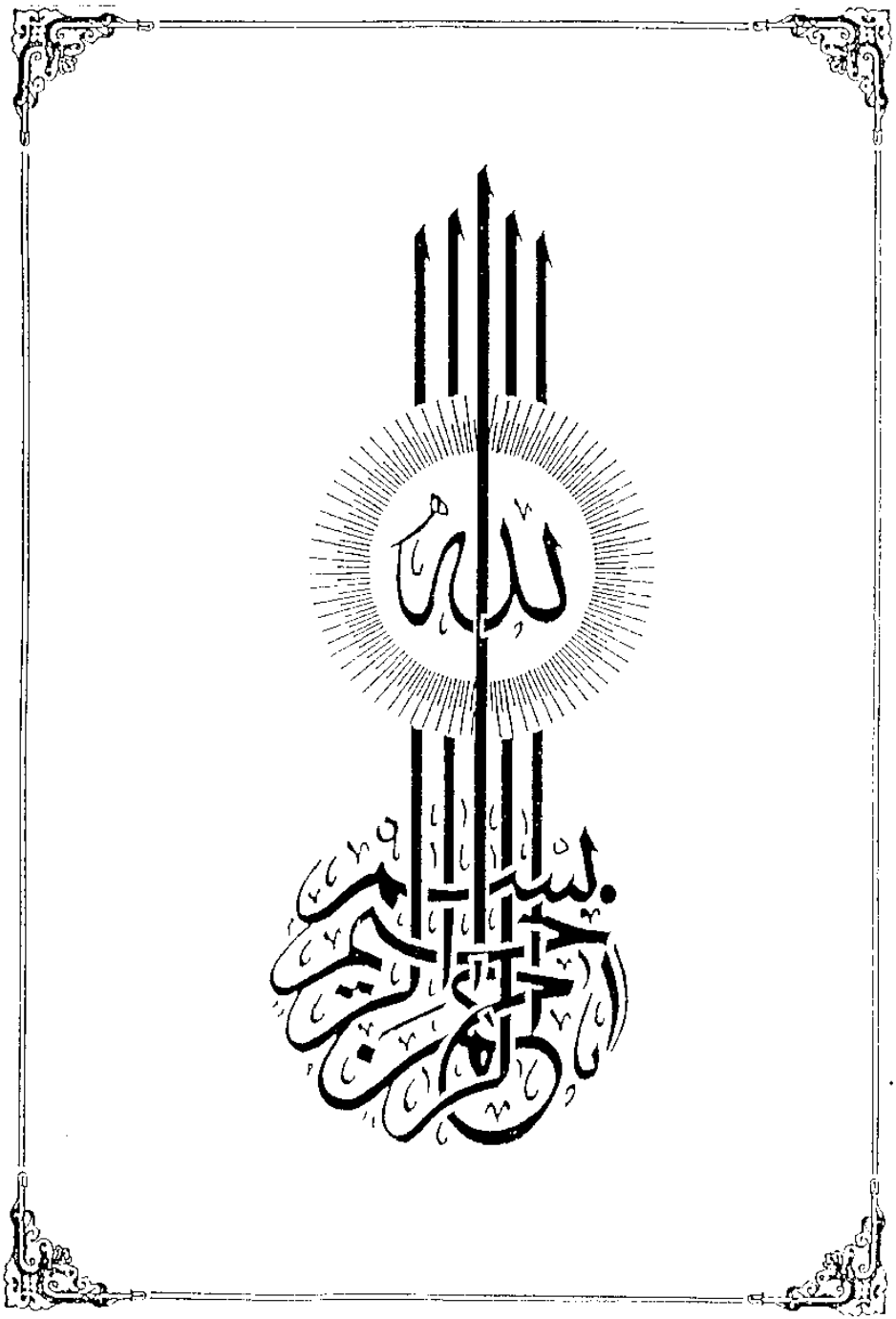
**Supervised By**

***Prof. Dr.* Nigm El-Din Helal Abdella**
Professor of Ophthalmology
Ain-Shams University

***Dr.* Tarek Mohamed Mahmoud Abdella**
Assistant Professor of Ophthalmology
Ain-Shams University

***Dr.* Hassan Wafeek Hefny**
Lecturer of Ophthalmology
Ain-Shams University

**CAIRO**
1995



# INTRODUCTION

Proliferative diabetic retinopathy (PDR) requires the presence of newly formed blood vessels and/or fibrous tissue arising from the retina or optic disc and extending along their inner surfaces, or into the vitreous cavity. It is a major cause of blindness due to its known complications as persistent vitreous hemorrhage, tractional retinal detachment, opaque membrane formation on the posterior surface of the hyaloid and neovascular glaucoma.

Proliferative diabetic retinopathy should be properly managed due to its threatening effect on vision. Management of PDR is to prevent proliferation of new vessels and to prevent or relieve the effect of contraction of the posterior vitreous surface and fibrovascular proliferation through laser photocoagulation and vitrectomy with improving the visual outcome.

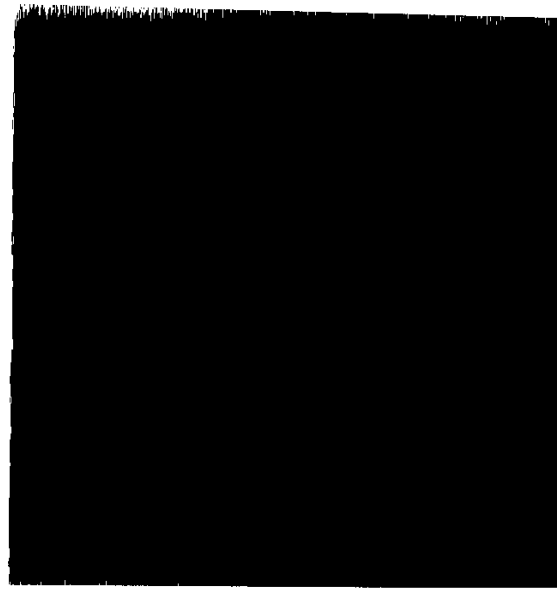


Figure 1: Mild-to-moderate non-proliferative diabetic retinopathy. (Quoted from Kanski, 1994).

# CLASSIFICATION OF DIABETIC RETINOPATHY

There are many classificationsof diabetic retinopathy (DR), but here we have used the clinical classification of DR established by the ETDRS. This clinically useful scale separates non-proliferative from proliferative retinopathy. Further subdivision separates mild-to-moderate non-proliferative from moderate-to-severe nonproliferative retinopathy based on both clinical findings and the propensity for developing proliferative disease. Proliferative disease is divided into early and high-risk retinopathy. The new classification of mild-to-moderate non-proliferative retinopathy incorporates what traditionally has been called background retinopathy. The classifications of moderate-to-severe and very severe non-proliferative retinopathy incorporate what has traditionally been referred to as preproliferative retinopathy. Their pathyophysiologic correlates and significance remain unchanged, but the newer grading scale allows the identification of eyes that have a higher rate of development of proliferative disease and, consequently, severe visual loss, if left untreated.

In the ETDRS, diabetic retinopathy is clalssified as follows:

## I. Non-proliferative diabetic retinopathy

**a) Mild-to-moderate non-proliferative DR:** (Figure 1).

- Microaneurysms.
- Intraretinal hemorrhages: mild to moderate in fewer than 4 quadrants.
- Hard exudates.

- Macular edema.
- Foveal avascular zone abnormalities.

**b) Moderate-to-severe non-proliferative DR:** (Figure 2).

- Cotton-wool spots.
- Intraretinal hemorrhages: mild to moderate in 4 quadrants.
- Venous beading.
- Intra retinal microvasculalr abnormalities (IRMA).

**c) "Severe" non-proliferative DR:**

Any **one** of the following:

- Severe intra retinal hemorrhages in 4 quadrantys.
- Venous beading in 2 quadrants.
- Moderately severe IRMA in one quadrant.

**d) "Very severe" non-proliferative D.R.:**

Any **Two** of the following:

- Severe intra retinal hemorrhages in 4 quaerants.
- Venous beading in 2 quadrants.
- Moderately severe IRMA in one quadrant.

## II. Proliferative diabetic retinopthy (PDR) (Figure 3)

It is further classified into early PDR and high-risk retinopathy.

**a) Early P.D.R.: i.e. P.R. without high-risk characters**

The clinical features are:

- Neovascularization of the disc. (NVD).

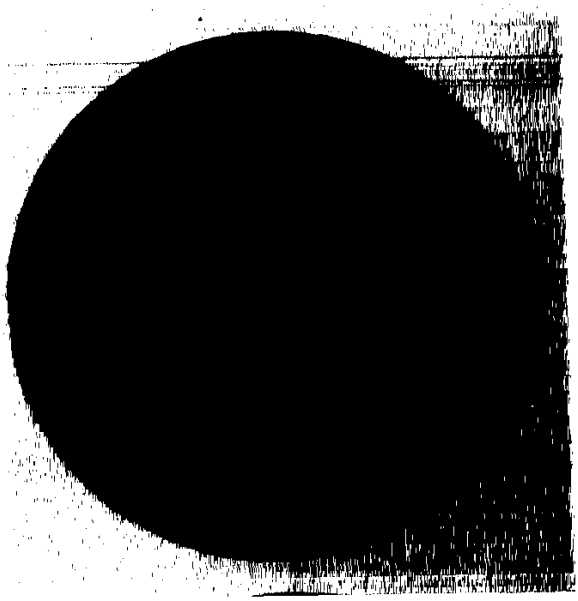


Figure 2: Moderate-to-severe non-proliferative diabetic reintopathy. (Quoted from Orth, 1984).

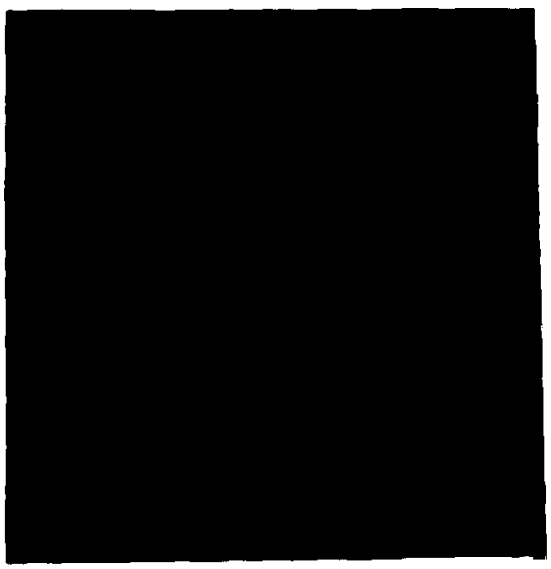


Figure 3: Proliferative diabetic retinopathy (Quoted from Kanski, 1994).

- Neovascularization of the retina elsewhere (NVE).
- Preretinal or vitreous hemorrhage.
- Tractional retinal detachment.
- Neovascularization of the iris or angle or both.

b) **High-risk retinopathy:**

The following are the clinical features of eyes with high-risk characteristics:

1. NVD or neovascularlation within one disc diameter of the optic disc more than one-quarter disc in area.
2. Less extensive NVD associated with vitreous or preretinal hemorrhage.
3. NVE more than one-half disc in area in association with vitreous or preretinal hemorrhage *(ETDRS, 1991)*.

# CLINICAL EVALUATION OF CASES OF PDR

PDR affects about 5-10% of the diabetic patients. Cases having PDR are characterized with neovascularization, preretinal or vitreous hemorrhage, tractional retinal detachment and neovascularization of the iris or the angle or both.

## Neovascularization:

It is the hallmark of PDR and probably it arises in response to ischaemia. Retinal ischaemia is due to retinal arteriolar and capillary closure which may occur due to thickening of the capillary basement membrane, capillary endothelial cell damage and proliferation, changes in red blood cells leading to defective oxygen transport and increased stickiness and aggregation of platelets. Retinal ischaemia induces retinal hypoxia which may lead to elaboration of an angiogenic factor that stimulates neovascularization. Generally, the new vessels arise most frequently from retinal venules rather than from retinal capillaries. ***(Muraoka, 1984)***.

More recent evidence suggests that the eye contains many factors of both vascular and extravascular retinal origin that affect new vessel formation. Most of these factors stimulate neovascularization and are called mitogens. A small group of factors appear to inhibit neovascularization. ***(Sebag, 1986)***.

Another hypothesis is that ischemia causes retinal vessels to dilate (chronic venous dilatation) in an attempt to provide additional oxygen. The resultant chronically increased endothelial wall tension is considered to be, by itself, a

sufficient stimulus for neovascularization. ***(Stefansson et al., 1983)***.

Neovascularization is most commonly associated with midperipheral capillary non-perfusion and is most commonly located posteriorly within 45° of the optic disc and especially, on the disc itself. ***(Niki et al., 1984)***.

In the DRS, NVD is defined as new vessels located on, or within one disc diameter of the optic disc. Any other neovascularization is called neovascularization elsewhere or NVE. ***(DRS, 1981)***.

Neovascularization of the disc (NVD) appears as fine strands of blood vessels, sometimes looping across other disc vessels (Figure 4). It can be appreicated with slit lamp fundus biomicroscopy. Direct ophthalmoscopy using the red-free filter can also be used. ***(Shimizu et al., 1981)***.

If any doubt exists, despite careful clinical examination and stereo color fundus photography, fluorescein angiography can show the neovascularization as these new vessels leak dye profusely. ***(Moss et al., 1985)***.

Neovascularizartion elsewhere (Figure 5) is seen as a wheel-like network of fine vessels, usually arising from the retinal veins, venules or capillaries and crossing between the arterial and venous sides. They can be appreciated with direct and indirect ophthalmoscopy. Because subtle NVE may be difficult to see clinically, stereo fundus photographs and fluorescein angiography can be used. ***(ETDRS, 1991)***.