

DIABETIC RETINOPATHY

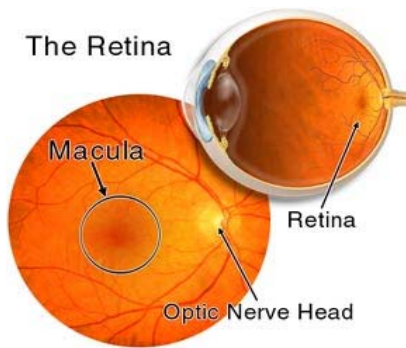


ARAVIND EYE CARE SYSTEM

DEFINITION

Diabetes is derived from the Greek and Latin words “Honey “and” “ to pass through”. It is a disease which affects the blood vessels through out the body, especially in the kidney and eye. When the blood vessels in the inner most layer of the eye are affected this is called Diabetic retinopathy.

The Retina



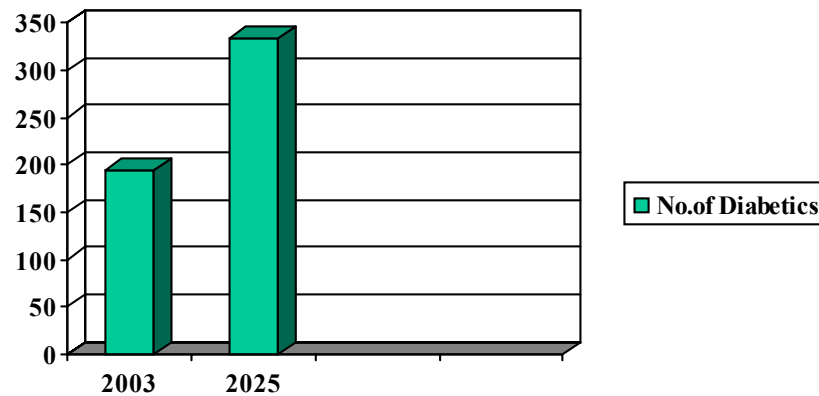
“Retina” is the light sensitive tissue at the back of the eye is necessary for good vision. The function of the retina is to transmit the visual impulses to the optic nerve. Through the optic nerve the images are being transmitted to the brain. An area in the retina called Macula is responsible for central vision. The macula measures 5500 μ . In the center of the macula is an area called Fovea which is responsible for fine vision the retinal layer is full of blood vessels which includes arteries, veins and small capillaries. The visual disability in diabetic retinopathy results from damage to these vessels.

The examination of the eye by an ophthalmoscope, is unique in that the state of the blood vessels can be visualized without any invasive technique. The status of the retinal vessels can serve as an indirect indicator of the diabetic changes elsewhere in the body.

Initially patients with diabetic retinopathy do not have problems with vision. But over a period of time, if the disease is left uncontrolled vision loss may progress and cause blindness in both eyes. The loss of visual acuity may sometimes, be sudden and dramatic and happens without a warning.

Magnitude of the Problem

Diabetic retinopathy is the leading cause of blindness among adults in the developed countries and is emerging as an important cause of blindness in the developing countries next to cataract. The longer the duration of diabetes higher is the incidence of developing diabetic retinopathy.



There are currently more than 194 million people with diabetes world, wide and is likely to increase to 333 million by 2025. 25% of these people are likely to develop Diabetic Retinopathy.

People with either forms of diabetes are 25 times more likely to lose their sight than those without diabetes.

WHAT HAPPENS IN DIABETES?

Normal fundus



Normal fundus showing a healthy retina and macula

The area of the optic nerve and the retina is collectively called as the fundus. A normal fundus reveals a normal disc with normal blood vessels and macula with no evidence of any leakage from the vessels.

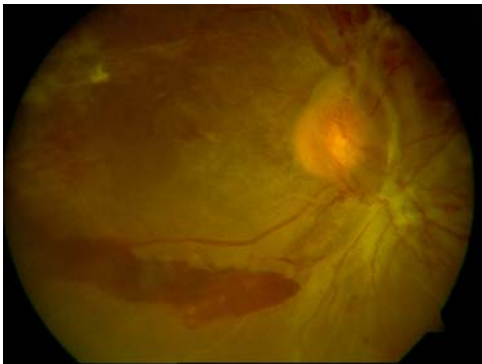
Early diabetic retinopathy



Fundus showing early / background diabetic retinopathy with hemorrhages and exudates.

In the early stages of diabetic retinopathy the vessels leak causing hemorrhages and exudates

Advanced diabetic retinopathy:



Fundus showing advanced diabetic retinopathy with vitreous hemorrhages / traction retinal detachment.

Over a period of time, new immature vessels form which can bleed causing vitreous hemorrhage.

Macula becomes damaged when blood vessels weaken and leak fluid exudates and blood.

Plenty of hemorrhages form in the retina due to the leakage of blood products and may obscure vision mechanically or may cause ischemia. .

Stages of Diabetic Retinopathy

- Non proliferative diabetic retinopathy –(Background diabetic retinopathy) with or without maculopathy
- Proliferative diabetic retinopathy (PDR)

1. Non-proliferative diabetic retinopathy

This early stage is also called as background diabetic retinopathy. In this stage small areas of balloon like swelling occurs in the retina's tiny blood vessels called (microaneurysms). More often than not this stage does not require any active ophthalmic intervention except strict control of Diabetes

As the disease progresses small blood vessels that nourish the retina are blocked and their walls become leaky and hence they are not able to perform their function of proper conduction of blood.

Over time many more blood vessels are blocked depriving several areas of retina with their blood supply. These areas of retina send signals to the body to grow new vessels for nourishment. The presence of new vessels implies that the disease process has become more severe.

2. Proliferative Retinopathy

At this advanced stage, the signals sent by the retina for nourishment trigger the growth of new blood vessels. This condition is called proliferative retinopathy. These new vessels grow along the retina and along the surface of the clear vitreous gel.

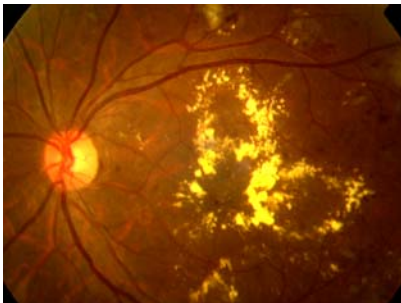
New vessels on the disc (NVD) refers to the vessels that grow on the surface of the disc.

New vessels elsewhere (NVE) refers to the vessels that grow on surface of the retina.

New vessels can rupture leading to vitreous hemorrhage and visual loss.

The new vessels can also damage the retina by forming scar tissue and by pulling the retina away from its proper location. This stage is called proliferative retinopathy and can cause separation of the retina called **traction retinal detachment**.

Diabetic Maculopathy:



Patients with diabetes report loss of central vision due to maculopathy. Fluid leaks in the centre of the macula, causing swelling of the macula. This condition is called macular edema. About half the patients with proliferative retinopathy have macular edema. Timely referral to the ophthalmologist helps in identifying clinically significant macular edema which can be treated by laser.

Detection of diabetic retinopathy

Often there is no early warning symptoms in diabetic retinopathy. Patients are advised not to wait for symptoms and to have a comprehensive dilated eye examination every year. Infact the presence of symptoms may indicate a late stage of the disease . Thus it is extremely important to emphasize the fact that all diabetics should be counseled to have a routine fundus evaluation at prescribed intervals to detect the earliest stage of the disease. If left untreated the patient may report a loss of central vision due to maculopathy or sudden blindness due to vitreous hemorrhage or Retinal detachment.

Diabetic retinopathy is symptom less in the initial part of the disease and hence early detection can only be done by a routine comprehensive eye examination which includes.

1. Visual acuity testing

Visual acuity testing in diabetic patients by using Snellen's visual acuity tests and ETDRS chart, helps to determine the baseline best corrected visual acuity and can serve as an indicates for assessing the progression of the disease.

2. Dilated eye examination using direct and Indirect ophthalmoscope

The eye care professional uses the ophthalmoscope (direct and indirect) to get a magnified view of the fundus. While the direct ophthalmoscope has the advantage of more magnification, the indirect ophthalmoscope helps to get a

much wider field of view. These examination can be complemented by using a 90D lens examination with slit lamp

Fluorescein Angiography



It is the most common investigation performed to assess the integrity of the retinal blood vessels

It involves injection of dye in the veins in the arm and passage of the dye through the blood vessels in the retina is photographically documented . This test allows the ophthalmologist to detect any leaking blood vessel and recommend treatment.

RISK FACTORS FOR DIABETIC RETINOPATHY

WHO IS AT RISK?

All though all patients with is type1 and type2 diabetes are at risk, certain subgroups are at increased risk of developing retinopathy

- | |
|---|
| ◆ All patients with type1 and type 2 diabetes |
| ◆ Long duration of diabetes |
| ◆ Obese patients |

♦ Hypertensive patients
♦ Patients with diabetic kidney diseases.
♦ Smoking and anaemia
♦ Pregnancy

MANAGEMENT OF DIABETIC RETINOPATHY

Control of blood sugar is foremost in management of diabetic retinopathy. Additionally control of high blood pressure and serum cholesterol are also thought to play a major role. This can be done by diet control, insulin injection and oral hypoglycemic agents under strict guidance of a physician. Additional control of high blood pressure and serum cholesterol are also thought to play a major role in preventing the progressing of the disease.

The Diabetic Control and complication Trial (DCCT) has clearly indicated that a strict control of diabetes retards progression of retinopathy.

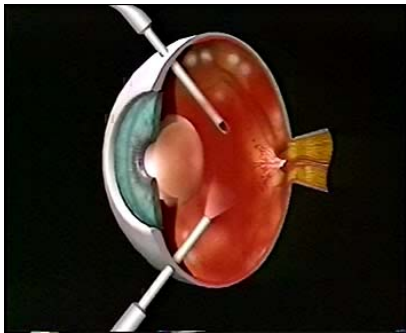
Laser photocoagulation



It is the commonly used ophthalmic intervention in the treatment of diabetic neuropathy. It is used to destroy the new vessels and converts the hypoxic retina to anoxic retina, which by itself, will reduce the signal for the development of new vessels. It has to be understood that laser photocoagulation is essentially a destructive procedure which is aimed at destroying the abnormal tissue. Laser is an intense and high energetic beam of light source focused on the retina. Absorption by the retina will either seal or destroy the abnormal tissue.

Laser treatment is indicated in BDR with Maculopathy and also in the stage of PDR. A general ophthalmologist can be trained in doing laser photocoagulation and such training programmes are freely available.

Vitrectomy



In the late stages of diabetic retinopathy characterized by vitreous haemorrhage or tractional retinal detachment, vitrectomy is indicated. This complex surgery involves removal of the hemorrhage and replacing with appropriate substitute. This is a very specialized procedure, which requires a Vitreo – Retinal surgeon specially trained in this surgery.

Diabetes and Human Body

It is important to understand that diabetes is a multi system problem and hence the following structures can be involved. Often it requires a coordinated effort between the physician and the ophthalmologist

ORGAN	DISEASE
Heart	myocardial infarction.
Kidneys	diabetic nephropathy
Peripheral nerves	Peripheral neuropathy
Brain	Stroke
Skin	Non healing skin ulcers causing delayed wound healing and nail bed infections.

In a nutshell,

♦ Diabetic affects brain, heart, kidneys and eyes.
♦ The risk of blindness is 25 times higher in diabetic patients, as compared to non diabetics.
♦ The onset of diabetic retinopathy is related to duration of diabetes – the longer the diseases the higher chance.
♦ 70-80% of diabetic patients will develop DR in 25 yrs.
♦ Diabetic retinopathy is often symptomless until the late stage of the disease.

<ul style="list-style-type: none"> ◆ Dilated eye examination by eye doctors can detect blood vessels changes in the retina directly. It is an indicator of similar changes occurring in the brain, heart and kidneys.
<ul style="list-style-type: none"> ◆ Early detection and laser treatment for diabetic retinopathy significantly reduces risk of visual loss.
<ul style="list-style-type: none"> ◆ All diabetic patients should have periodic examinations by an eye doctor to prevent loss of vision due to diabetic retinopathy.

Important of Regular eye care

Regular eye care is mandatory in diabetic patients.

Stage	Follow up
None or rare microaneurysms	yearly
Mild NPDR	every 9 months
Moderate NPDR	every 6 months
Severe NPDR	every 4 months
Clinically significant macular edema	every 2-4 months
Proliferative diabetic retinopathy	every 2-3 months