



Diabetic Management beyond traditional risk factors and LDL-C control: Can we improve macro and microvascular risks?

Retinopathy

Diabetes has a negative effect on eyes in many ways, increasing the risk of cataracts for example, but the most common and serious ocular complication of diabetes is retinopathy. Diabetic retinopathy is a microangiopathy, that is, a microvascular disease that affects small blood vessels in the eye. This is contributed to by poor metabolic control, which over time, leads to retinal damage, and in the most severe cases to loss of sight.¹ Retinopathy affects 97 million (40%) diabetic patients worldwide, of which, 19.5 million are severe cases.

Diabetes is the leading cause of new cases of blindness among adults, more specifically, diabetic retinopathy causes 11% of blindness in the West, and the Centers for Disease Control and Prevention (CDC) estimate that between 12,000-24,000 new cases of blindness related to diabetic retinopathy occur in the US each year.²

Classification

Diabetic maculopathy, which accounts for 10% of cases of diabetic retinopathy, is the leading cause (80%) of visual impairment in this population.³ Diabetic retinopathy is classified as nonproliferative or proliferative, both of which can be sight-threatening. Pre-proliferative retinopathy is a later stage of nonproliferative disease which results from retinal ischemia and is characterized by multiple cotton wool spots, venous irregularities such as beading, duplication and loops, multiple hemorrhages and intra-retinal abnormalities.^{3, 4} Proliferative retinopathy results from retinal hyperperfusion and is characterized by neovascularization, pre-retinal hemorrhage and fibrous scarring, which leads to retinal detachment and severe vision loss.



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Risk factors

Certain patients are more at risk than others. Firstly, the longer a patient has diabetes, the more likely he or she is to develop retinopathy, after long duration > 90% of type 1 and > 65% of type 2 diabetic patients have diabetic retinopathy.

Serum lipid levels are also an important risk factor: elevated serum cholesterol and LDL-C are associated with retinal hard exudation, while elevated triglycerides are associated with a worsening of retinopathy. Other risk factors are poor glycemic control, hypertension, elevated LDL-C, pregnancy, and anemia.³ See table 2 for more details.

Diagnosis and management

As soon as diabetes is diagnosed a patient should be examined, preferably by an ophthalmologist, to detect early signs of retinopathy and then to be appropriately treated. Although diabetic retinopathy is asymptomatic in the early stages, it can be detected using fundus photography, and does not affect the macula.

Maculopathy, which as mentioned above, results from the leakage of fluid from retinal capillaries around the fovea, is characterized by microaneurysms,—which appear as small red dots, and are the first sign that the retina micro vessels are affected—hemorrhages and exudates due to a leakage of lipoproteins from the capillaries.^{3, 5, 6}

Screening is of paramount importance as it is the only way that early proliferative changes can be identified. Leakage can be detected using fluorescein angiography



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and is able to determine the extent of macula ischemia. Slit-lamp biomicroscopy is the gold standard for detecting retinal edema or signs of retinal damage.

Once retinopathy has been detected, it is important to prevent further progression. Delaying the onset and preventing the progression of retinopathy can be done by ensuring strict glycemic and blood pressure control, by correcting underlying anaemia and by initiating appropriate treatment. Changes in lipoproteins through the use of lipid-lowering drugs may play a role in improving retinopathic outcomes.

For severe or ischemic maculopathy damage to the capillaries is often permanent and cannot be treated with laser, however new approaches use anti-VEGF intravitreal injections are also now being explored. Proliferative retinopathy can be treated with panretinal photocoagulation. The risks associated with laser therapy include accidental foveal burn. Panretinal photocoagulation can affect the visual field and increase glare sensitivity—and can limit the ability to drive safely—cause pre-retinal hemorrhage and may deteriorate pre-existing macula edema in patients with type 2 diabetes.

Practical points

As soon as diabetes is diagnosed the patient should be screened for retinopathy at least every two years annually thereafter.

The risk, development and progression of retinopathy can be reduced with very tight control of blood glucose, blood pressure, and possibly blood lipids.

The presence of retinopathy should alert the physician to the fact that the patient is also at a heightened risk of systemic vascular complications.



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Table 1: Target levels for diabetes patients

Glycemia	HbA1c < 7%
Blood pressure	Systolic: < 140 mmHg
	Diastolic: < 85 mmHg
Total cholesterol	< 200 mg/dL (< 5.2 mmol/L)
LDL cholesterol	< 70 mg/dL (< 1.8 mmol/L)
HDL cholesterol	> 60 mg/dL (>1.5 mmol/L)
Triglycercides	< 150 mg/dL (< 1.7 mmol/L)

Table 2: Risk factors for diabetic retinopathy¹

- Hyperglycemia
- 1% decrease in glycated hemoglobin (HbA1c) roughly equates to a decreased risk of retinopathy by 40%, progression to vision-threatening retinopathy by 25%, need for laser therapy by 25%, and blindness by 15%
- Hypertension
- 10 mm Hg decreased systolic blood pressure approximately equates a decreased risk of retinopathy progression by 35%, need for laser therapy by 35%, and visual loss by 50%
- Dyslipidemia
- Diabetes duration
- Ethnic origin (Hispanic, south Asian)
- Pregnancy
- Puberty
- Cataract surgery



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