

DIABETIC ANGIORETINOPATHY AND TREATMENT METHODS

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Abstract : Diabetic retinopathy is an eye condition that can cause vision loss and blindness in people who have diabetes. It affects blood vessels in the retina (the light-sensitive layer of tissue in the back of your eye). The early stages of diabetic retinopathy usually don't have any symptoms. Some people notice changes in their vision, like trouble reading or seeing faraway objects. These changes may come and go. If you have diabetes, it's important to get a comprehensive dilated eye exam at least once a year. Diabetic retinopathy may not have any symptoms at first — but finding it early can help you take steps to protect your vision.

Keywords: Diabetic retinopathy, background retinopathy, pre-proliferative retinopathy, proliferative retinopathy, Diabetic macular edema (DME), Neovascular glaucoma, Retinal detachment, laser treatment, eye injections, eye surgery, cholesterol, blood sugar.

INTRODUCTION

Diabetic retinopathy is a complication of diabetes, caused by high blood sugar levels damaging the back of the eye (retina). It can cause blindness if left undiagnosed and untreated. However, it usually takes several years for diabetic retinopathy to reach a stage where it could threaten your sight. To minimise the risk of this happening, people with diabetes should: ensure they control their blood sugar levels, blood pressure and cholesterol attend diabetic eye screening appointments – screening is offered to all people with diabetes aged 12 and over to pick up and treat any problems early on.

The retina is the light-sensitive layer of cells at the back of the eye that converts light into electrical signals. The signals are sent to the brain which turns them into the images you see. The retina needs a constant supply of blood, which it receives through a network of tiny blood vessels. Over time, a persistently high blood sugar level can damage these blood vessels in 3 main stages:

Background retinopathy – tiny bulges develop in the blood vessels, which may bleed slightly but do not usually affect your vision.



Pre-proliferative retinopathy – more severe and widespread changes affect the blood vessels, including more significant bleeding into the eye.

Proliferative retinopathy – scar tissue and new blood vessels, which are weak and bleed easily, develop on the retina; this can result in some loss of vision.

However, if a problem with your eyes is picked up early, lifestyle changes and treatment can stop it getting worse. Anyone with type 1 diabetes or type 2 diabetes is potentially at risk of developing diabetic retinopathy:

- have had diabetes for a long time
- have a persistently high blood sugar (blood glucose) level
- have high blood pressure
- have high cholesterol

By keeping your blood sugar, blood pressure and cholesterol levels under control, you can reduce your chances of developing diabetic retinopathy.

Symptoms of diabetic retinopathy: you will not usually notice diabetic retinopathy in the early stages, as it does not tend to have any obvious symptoms until it's more advanced. However, early signs of the condition can be picked up by taking photographs of the eyes during diabetic eye screening.

Contact your GP or diabetes care team immediately if you experience:

- gradually worsening vision
- sudden vision loss
- shapes floating in your field of vision (floaters)
- blurred or patchy vision
- eye pain or redness
- difficulty seeing in the dark

These symptoms do not necessarily mean you have diabetic retinopathy, but it's important to get them checked out. Do not wait until your next screening appointment.

Diabetic eye screening: everyone with diabetes who is 12 years old or over is invited for eye screening. How often you're invited depends on your last 2 screening results. If diabetic retinopathy was not found at your last 2 tests, you'll be invited every 2 years. Screening is offered because:

Diabetic retinopathy does not tend to cause any symptoms in the early stages. The condition can cause permanent blindness if not diagnosed and treated promptly screening can detect problems in your eyes before they start to affect your vision. If problems are caught early, treatment can help prevent or reduce vision loss. The screening test involves examining the back of the eyes and taking photographs. Risk of developing diabetic retinopathy, or help prevent it getting worse by:

- controlling your blood sugar, blood pressure and cholesterol levels;
- taking your diabetes medicine as prescribed;
- attending all your screening appointments;
- getting medical advice quickly if you notice any changes to your vision;
- maintaining a healthy weight, eating a healthy, balanced diet, exercising regularly and stopping smoking.

Diabetic retinopathy can lead to other serious eye conditions:

Diabetic macular edema (DME). Over time, about 1 in 15 people with diabetes will develop DME. DME happens when blood vessels in the retina leak fluid into the macula (a part of the retina needed for sharp, central vision). This causes blurry vision.



Neovascular glaucoma. Diabetic retinopathy can cause abnormal blood vessels to grow out of the retina and block fluid from draining out of the eye. This causes a type of glaucoma (a group of eye diseases that can cause vision loss and blindness).

Retinal detachment. Diabetic retinopathy can cause scars to form in the back of your eye. When the scars pull your retina away from the back of your eye, it's called tractional retinal detachment.

Treatments for diabetic retinopathy

Treatment for diabetic retinopathy is only necessary if screening detects significant problems that mean your vision is at risk. If the condition has not reached this stage, the above advice on managing your diabetes is recommended. The main treatments for more advanced diabetic retinopathy are:

- laser treatment;
- injections of medication into your eyes;
- an operation to remove blood or scar tissue from your eyes.

Diabetic retinopathy develops in stages over time. If you're diagnosed with diabetic retinopathy after diabetic eye screening, lifestyle changes and treatment can reduce the chances of the problem progressing. The main stages of diabetic retinopathy are described below. You will not necessarily experience all of these.

Stage 1: background retinopathy

This means that tiny bulges (microaneurysms) have appeared in the blood vessels in the back of your eyes (retina), which may leak small amounts of blood. This is very common in people with diabetes. At this stage:

your sight is not affected, although you're at a higher risk of developing vision problems in the future;

you do not need treatment, but you'll need to take care to prevent the problem getting worse – read more about preventing diabetic retinopathy;

the chances of your sight getting worse are higher if both of your eyes are affected.

Stage 2: pre-proliferative retinopathy

This means that more severe and widespread changes are seen in the retina, including bleeding into the retina. At this stage:

there's a high risk that your vision could eventually be affected;

you'll usually be advised to have more frequent screening appointments every 3, 6, 9 or 12 months to monitor your eyes;

Stage 3: proliferative retinopathy

This means that new blood vessels and scar tissue have formed on your retina, which can cause significant bleeding and lead to retinal detachment, where the retina pulls away from the back of the eye. At this stage:

there's a very high risk you could lose your vision;

treatment will be offered to stabilise your vision as much as possible, although it will not be possible to restore any vision you've lost. Diabetic retinopathy usually only requires specific treatment when it reaches an advanced stage and there's a risk to your vision. It's typically offered if diabetic eye screening detects stage 3 (proliferative) retinopathy, or if you have symptoms caused by diabetic maculopathy. At all stages, managing your diabetes is crucial.

The most important part of your treatment is to keep your diabetes under control. In the early stages of diabetic retinopathy, controlling your diabetes can help prevent vision problems



developing. In the more advanced stages, when your vision is affected or at risk, keeping your diabetes under control can help stop the condition getting worse.

Treatments for advanced diabetic retinopathy, for diabetic retinopathy that is threatening or affecting your sight, the main treatments are:

- laser treatment – to treat the growth of new blood vessels at the back of the eye (retina) in cases of proliferative diabetic retinopathy, and to stabilise some cases of maculopathy;

- eye injections – to treat severe maculopathy that's threatening your sight;

- steroid eye implants – to treat severe maculopathy if eye injections are not suitable or have not worked for you;

- eye surgery – to remove blood or scar tissue from the eye if laser treatment is not possible because retinopathy is too advanced.

Laser treatment is used to treat new blood vessels at the back of the eyes in the advanced stages of diabetic retinopathy. This is done because the new blood vessels tend to be very weak and often cause bleeding into the eye. Treatment can help stabilise the changes in your eyes caused by your diabetes and stop your vision getting any worse, although it will not usually improve your sight. Laser treatment involves shining a laser into your eyes – you'll be given local anaesthetic drops to numb your eyes; eye drops are used to widen your pupils and special contact lenses are used to hold your eyelids open and focus the laser onto your retina normally takes around 20 to 40 minutes, is usually carried out on an outpatient basis, which means you will not need to stay in hospital overnight. After treatment, you may have some side effects for a few hours. These can include:

- blurred vision – you will not be able to drive until this passes, so you'll need to arrange for a friend or relative to drive you home, or take public transport;

- increased sensitivity to light – it might help to wear sunglasses until your eyes have adjusted;

- aching or discomfort – over-the-counter painkillers, such as paracetamol, should help.

Eye injections: in some cases of diabetic maculopathy, injections of a medicine called anti-VEGF may be given directly into your eyes to prevent new blood vessels forming at the back of the eyes. The main medicines used are called ranibizumab (Lucentis) and aflibercept (Eylea). These can help stop the problems in your eyes getting worse, and may also lead to an improvement in your vision. During treatment:

- the skin around your eyes will be cleaned and covered with a sheet;

- small clips will be used to keep your eyes open;

- you'll be given local anaesthetic drops to numb your eyes

- a very fine needle is carefully guided into your eyeball and the injection is given.

The injections are usually given once a month to begin with. Once your vision starts to stabilise, they'll be stopped or given less frequently. Injections of steroid medication may sometimes be given instead of anti-VEGF injections, or if the anti-VEGF injections do not help.

Steroid implants: if you cannot have anti-VEGF injections or they have not worked for you, you may be offered an eye implant called an intravitreal implant (brand name Ozurdex) containing a steroid medicine called dexamethasone. This is a tiny implant that's injected into your eye using a special applicator. You'll be given a local anaesthetic first to numb your eye. The implant slowly releases dexamethasone over a few months. This reduces swelling in your eye, and can help to improve your eyesight. The implant eventually dissolves so it does not need to be removed.



Eye surgery: surgery may be carried out to remove some of the vitreous humour from the eye. This is the transparent, jelly-like substance that fills the space behind the lens of the eye. The operation, known as vitreoretinal surgery, may be needed if:

- a large amount of blood has collected in your eye;
- there's extensive scar tissue that's likely to cause, or has already caused, retinal detachment.

During the procedure, the surgeon will make a small incision in your eye before removing some of the vitreous humour, removing any scar tissue and using a laser to prevent a further deterioration in your vision. Vitreoretinal surgery is usually carried out under local anaesthetic and sedation. This means you will not experience any pain or have any awareness of the surgery being performed.

After the procedure you should be able to go home on the same day or the day after your surgery. For the first few days, you may need to wear a patch over your eye. This is because activities such as reading and watching television can quickly tire your eye to begin with. You will probably have blurred vision after the operation. This should improve gradually, although it may take several months for your vision to fully return to normal. Your surgeon will advise you about any activities you should avoid during your recovery. Possible risks of vitreoretinal surgery include:

- developing a cataract;
- further bleeding into the eye;
- retinal detachment;
- fluid build-up in the cornea (outer layer at the front of the eye);
- infection in the eye.

There's also a small chance that you will need further retinal surgery afterwards. Your surgeon will explain the risks to you. You can reduce your risk of developing diabetic retinopathy, or help stop it getting worse, by keeping your blood sugar levels, blood pressure and cholesterol levels under control. This can often be done by making healthy lifestyle choices, although some people will also need to take medication.

Healthy lifestyle

Adopting a few lifestyle changes can improve your general health and reduce your risk of developing retinopathy. These include:

- eating a healthy, balanced diet – in particular, try to cut down on salt, fat and sugar;
- losing weight if you're overweight – you should aim for a BMI of 18.5-24.9; use the BMI calculator to work out your BMI;
- exercising regularly – aim to do at least 150 minutes of moderate-intensity activity, such as walking or cycling, a week; doing 10,000 steps a day can be a good way to reach this target;
- stopping smoking if you smoke;
- not exceeding the recommended alcohol limits – men and women are advised not to regularly drink more than 14 alcohol units a week.

You may also be prescribed medication to help control your blood sugar level (such as insulin or metformin), blood pressure (such as ACE inhibitors) and cholesterol level (such as statins). Know your blood sugar, blood pressure and cholesterol levels. It can be easier to keep your blood sugar levels, blood pressure and cholesterol levels under control if you monitor them regularly and know what level they are? The lower you can keep them, the lower your chances of developing retinopathy are? Your diabetes care team can let you know what your target levels should be.

Blood sugar

If you check your blood sugar level at home, it should be 4 to 7mmol/l. The level can vary throughout the day, so try to check it at different times. The check done at your GP surgery is a



measure of your average blood sugar level over the past few weeks. You should know this number, as it is the most important measure of your diabetes control. It's called HbA1c, and for most people with diabetes it should be around 48mmol/mol or 6.5%.

Blood pressure

You can ask for a blood pressure test at your GP surgery, or you can buy a blood pressure monitor to use at home. Blood pressure is measured in millimetres of mercury (mmHg) and is given as 2 figures. If you have diabetes, you'll normally be advised to aim for a blood pressure reading of no more than 140/80mmHg, or less than 130/80mmHg if you have diabetes complications, such as eye damage.

Cholesterol

Your cholesterol level can be measured with a simple blood test carried out at your GP surgery. The result is given in millimoles per litre of blood (mmol/l). A healthy total cholesterol level is below 4mmol/l. Even if you think your diabetes is well controlled, it's still important to attend your diabetic eye screening appointments when invited, as this can detect signs of a problem before you notice anything is wrong.

Conclusion: early detection of retinopathy increases the chances of treatment being effective and stopping it getting worse. You should also contact your GP or diabetes care team immediately if you develop any problems with your eyes or vision, such as: gradually worsening vision, sudden vision loss, shapes floating in your field of vision (floaters), blurred vision, eye pain or redness, difficulty seeing in the dark. These symptoms do not necessarily mean you have diabetic retinopathy, but it's important to get them checked out straight away.

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