# Retinal vessel occlusion

A retinal vessel occlusion is a blockage in the blood vessel at the back of your eye that can result in sight loss. There are two types of retinal blood vessels, arteries and veins. Either of these can become blocked and each of them can affect the eye in different ways. The visual loss caused by retinal vein and artery occlusions is painless, and often quite sudden. It is usual for only one eye to be involved at a time, but occasionally both eyes may be affected at the same time.

This factsheet covers both retinal artery occlusion and retinal vein occlusion.

## How your eye works

Your retina is a delicate tissue that lines the back of your eye and is sensitive to light. It converts the light into electrical signals that travel along the optic nerve to your brain. The brain interprets these signals to “see” the world around you.

Most light entering your eye is focused onto a tiny area of your central retina called the macula. The macula is important because it lets you recognise colours and see the fine detail needed to carry out activities such as reading and writing. The rest of your retina, called the peripheral retina, gives you peripheral vision (also known as side vision).

The retina is supplied with blood by a delicate network of blood vessels. The retina receives all the nutrients it needs to continue working via blood in the arteries and removes any waste that is produced through veins. Arteries carry blood from the heart around the body, and veins carry it back to the heart. Blood travels around your whole body keeping every part nourished and working. The arteries and veins in your eye are smaller than in other parts of the body, but they do a similar job.

Unfortunately, arteries and veins can become blocked. These blockages can happen anywhere in the body. When it occurs in the retina it’s called a retinal artery occlusion or a retinal vein occlusion.

## What causes a retinal vessel occlusion?

Retinal vessel occlusions are commonly caused by factors which affect the normal blood flow through blood vessels.

### Causes of artery occlusions

Most commonly, artery occlusions are caused by atherosclerosis or an embolus.

Atherosclerosis is a condition where plaque builds up on the inside walls of arteries. These plaques (known as atheroma) are made up of fat, cholesterol, calcium and other substances found in the blood. Over time, the plaques harden and narrow the arteries, which can make it difficult for the blood to flow through them easily. As these plaques grow, they can cut off some, and potentially all of the blood flowing through the artery. Plaques can also cause blood clots to form which have the potential to also cause an occlusion.

Sometimes, part of an atheroma plaque which forms in a larger artery, commonly in the arteries near the heart and in the neck, may break off. This piece, known as an embolus, will then flow with the blood, potentially blocking a smaller vessel downstream – this is called an embolism. An embolism can block an artery and if this happens in your retina, it’s called a retinal artery occlusion.

Less commonly, retinal artery occlusions may be caused by vasculitis (inflammation of the artery wall), trauma, sickle cell disease and clotting disorders.

### Causes of vein occlusions

Retinal vein occlusion is commonly caused by a blood clot (thrombosis) forming in the vein, which causes the vein to become blocked. It’s not always known exactly why the blood clot has formed but there are certain risk factors which affect the normal blood flow, and these can increase the risk of a blood clot forming.

Atherosclerosis can also play a role in retinal vein occlusions. Veins and arteries run very closely together at the back of the eye and cross over each other. If someone has narrowing of their retinal arteries due to atherosclerosis, this can cause the hardened arteries to press onto the nearby veins, causing the veins to narrow and disturb the blood flow in them. This narrowing can potentially cause an occlusion, or the disturbed blood flow means that a clot is more likely to form in the vein, leading to retinal vein occlusion.

## What are the risk factors?

The risk factors of developing a retinal vessel occlusion are similar to the risk factors for cardiovascular disease. Cardiovascular diseases are diseases of the heart or blood vessels caused by atheroma and are associated with an increased risk of blood clots.

Factors which increase your risk of retinal vessel occlusion include:

* age – most retinal vessel occlusions happen in people over 60
* hypertension (high blood pressure)
* high cholesterol levels
* blood clotting disorders
* glaucoma or raised intraocular (eye) pressure
* diabetes
* smoking
* obesity

### Managing risk factors

Following a retinal vessel occlusion, it’s important to identify and treat any risk factors which may have led to it happening. However, in a small number of cases, no risk factors can be found, and the cause remains unknown. Treatment of any risk factors can reduce the chances of a further occlusion occurring in either eye and may also help to reduce the chances of other blood vessel blockages such as those that lead to stroke or heart attack.

High blood pressure can damage blood vessels and cause hardening of arteries. High cholesterol levels can cause your blood vessels to narrow and increase your risk of developing a blood clot. Your GP can diagnose circulation problems like hypertension or high cholesterol and prescribe medication to help control them.

High blood sugar levels in diabetes can damage the blood vessels, making them more likely to become narrowed. If you are diabetic, then good diabetic control can help reduce the risk of blood vessel problems.

If a blood clotting disorder is identified, then this will be looked after and treated by a specialist.

Lifestyle changes can also help to reduce your risk of atherosclerosis, which can also go some way to reverse the development of atherosclerotic plaques. These steps are also likely to improve your general health overall, reducing your risk of developing conditions like diabetes, stroke, and cardiovascular disease as well as retinal vessel occlusions.

* **Stopping smoking**. Smoking reduces the amount of oxygen your blood can carry, as well as damaging the lining of blood vessels and making arthrosclerosis more likely. Your GP or pharmacist can give you details of your local stop smoking service for help with giving up.
* **Eating a healthy diet**. An unhealthy diet can lead to high cholesterol and high blood pressure. A healthy balanced diet is rich in fresh fruit, vegetables, fibre and wholegrain foods, and is low in salt, sugar, and saturated fats.
* **Drinking less alcohol**. Excessive alcohol consumption can increase your cholesterol and blood pressure levels and contribute to weight gain. If you drink alcohol, it is important to keep within the recommended guidelines and have several alcohol-free days a week.
* **Keeping active**. If you don't exercise regularly, it's more likely that you'll have high blood pressure, high cholesterol levels and be overweight. It is thought that even a small increase in physical activity reduces your risk of atherosclerosis. You are advised to aim for at least 150 minutes of moderate activity a week, such as cycling or brisk walking.
* **Maintaining a healthy weight**. People who are overweight are at increased risk of developing diabetes, high blood pressure and high cholesterol. You can maintain a healthy weight by eating a healthy balanced diet and exercising regularly.

You can find more information about healthy eating, exercise, losing weight and NHS stop smoking services on the NHS Live Well website: [www.nhs.uk/live-well](http://www.nhs.uk/live-well)

People with a high eye pressure or glaucoma are more likely to have a vessel occlusion. Increased pressure in the eye has the effect of slowing the blood flow through the retinal blood vessels. Your optometrist (optician) can measure your eye pressure as part of an eye examination and refer you to an ophthalmologist if necessary. Glaucoma is where your eye pressure causes damage to the optic nerve at the back of your eye. If you have glaucoma, keeping your eye pressure under control can prevent damage to your optic nerve as well as lowering your risk of a retinal vessel occlusion.

# Retinal artery occlusion (RAO)

A retinal artery occlusion causes a sudden loss of sight (usually over seconds). If you suddenly lose all or part of your vision in one or both eyes, you should attend your local hospital Accident and Emergency (A&E) department straight away.

Some people may experience a warning condition called amaurosis fugax. In this condition, all or part of the vision in one eye is temporarily but suddenly lost for periods of seconds or minutes before it returns. This happens when small blockages are occurring momentarily before the circulation manages to clear them away. It is an urgent warning sign, as it means that a complete and permanent blockage is imminent. If you experience this, you should have your eyes examined as soon as possible by an optometrist or at an A&E department. Not every temporary loss of vision is due to artery occlusion, but these symptoms need investigating immediately, to work out the cause.

Your retinal arteries deliver blood which is rich in oxygen to the cells of your retina. If retinal arteries become blocked, then blood and the essential oxygen cannot reach the retinal cells. Without a constant supply of fresh blood and oxygen, the cells of the retina are quickly damaged, and this means that the cells stop working and sight can be permanently lost. The amount of sight lost depends on where the blockage has occurred.

The main artery supplying your retina enters your eye with your optic nerve; this is called the central retinal artery. At the point it enters the eye, the central artery splits in half, one branch for the upper retina, and another branch for the lower retina. In turn each branch splits again, to a left and a right side. In total, there are four branch arteries supplying blood to all areas of your retina.

If the central artery becomes blocked, then little to no blood will enter your eye, and it will affect all of your vision in that eye. This type of occlusion is a central retinal artery occlusion (CRAO). If the blockage happens in one of the branch arteries, then only a certain area of your sight in that eye will be affected. This type of blockage is a branch retinal artery occlusion (BRAO).

## Is there any treatment for a retinal artery occlusion?

Unfortunately, there is little treatment that can help to bring back sight following a retinal artery occlusion. The cells on the retina are very sensitive to a lack of blood supply, which can result in permanent sight loss. Although the chances of restoring any vision are low, if you are seen at the hospital within a few hours of having a retinal artery occlusion, then your ophthalmologist may try some treatment to dislodge the blockage and get the blood flowing again. If a blockage can be moved further downstream in the artery, less of the retina is affected by the blockage resulting in a smaller area of vision loss. However, even though the blockage may move, the retinal cells may have already been permanently affected from the lack of blood supply, so there is no single guaranteed treatment that can restore vision.

Your ophthalmologist may lower your eye pressure in an attempt to dislodge the blockage. By lowering the pressure inside your eye, the vessel can expand and the blood may flow more easily. The eye pressure is lowered by using medications (tablets and eye drops) or using a small needle (under anaesthetic) to take some fluid out of the eye.

Firmly massaging your eye may also be tried. This causes a repeated raising and lowering of the eye pressure, which may dislodge the blockage and allow the blood to flow again.

If the blockage moves quickly, then an improvement in your vision may be seen. How much improvement you see will depend on how long it has been before the blockage started to move, and how far it moves. Most people however still have permanent changes in their vision, as unfortunately there’s no treatment available to reverse the damage to cells caused by the lack of blood supply.

As a retinal artery occlusion is commonly only in one eye, most people manage with the sight from their other eye; although you will require a period of adjustment to your new level of vision.

After a retinal artery occlusion, it is crucial to have further tests, usually by your GP, to try and find out if there is an underlying risk factor that may have caused this. This means looking for and treating underlying risk factors such as high blood pressure, cholesterol or diabetes. You may have blood tests to check for any blood clotting disorders. You may also have an assessment of the arteries in your neck (carotid arteries) to see whether they contain atheroma plaques which may need to be removed with a surgical procedure. Although these things can’t reverse the sight loss which has already happened, it can prevent the chances of an occlusion happening again in the future, either in the other eye or elsewhere in the body.

# Retinal vein occlusion (RVO)

A retinal vein occlusion causes a dimming or blurring of all or part of your sight in one eye over a period of hours or days. If you experience any change in your vision you should have your eyes examined as soon as possible. Your optometrist is best placed to examine your eyes for milder vision changes, however if you feel your sight has deteriorated a lot or very quickly, you should visit your local A&E department as soon as possible.

The retinal veins drain away used blood from the retinal cells. When one of these veins becomes blocked, then the used blood cannot drain away. This causes the blood to collect in the veins and leak out into the retina, resulting in swelling and haemorrhages (bleeding). These areas of swelling and bleeding damage the cells of the retina, which can affect your sight. How much sight is affected depends on where the blockage takes place.

The veins are spread out all over the retina but join together to form larger veins. Similar to the arteries, there are four branch veins that join together to form the central retinal vein that leaves the eye through the optic nerve at the back of your eye. If the blockage is in the central retinal vein (known as a central retinal vein occlusion or CRVO) it can affect all your vision in that eye. If it is in one of the branch retinal veins (known as a branch retinal vein occlusion or BRVO), then it will usually affect a smaller area of your sight in that eye.

## What is the treatment for a retinal vein occlusion?

A branch retinal vein occlusion (BRVO) may only cause a small amount or area of vision loss. It can often get better without any treatment. A central retinal vein occlusion (CRVO) causes more of your vision to be affected, usually all of the vision in the eye.

Some of the changes to your vision may be caused by the swelling and bleeding the occlusion causes. With time, this swelling can improve, and the blood is reabsorbed. This can mean your sight may get better. Your ophthalmologist may choose to wait for a few months and monitor your eye for signs of improvement, before starting any treatment.

There is no treatment for the vein occlusion itself but there are treatments for the complications which can develop after a vein occlusion. Your ophthalmologist will discuss with you whether you need treatment depending on whether you have developed any complications from the vein occlusion. If treatment is recommended, they will explore which type of treatment you need and the timing of the treatment. Treatment is not always needed when you first have a vein occlusion, but you will still be monitored by the eye clinic. It is likely that you will continue to be monitored for up to two years, whether you have treatment or not.

Your ophthalmologist will also want to do some tests to check for any underlying risk factors which may have led to a retinal vein occlusion. Some of these tests may be done at the eye clinic, such as blood pressure or blood sugar tests. You will normally be advised to see your GP for further investigations into risk factors and management of these. Sometimes the blood tests (and possibly other investigations) do not find anything wrong. If a cause is suspected, then it can be treated or managed to reduce the risk of another occlusion occurring in the other eye.

If you have a retinal vein occlusion, one or more of the following complications may mean you need treatment:

* macula oedema (swelling of your central retina)
* neovascularisation (new blood vessel growth)
* high eye pressure (glaucoma).

### Macular oedema

The most common need for treatment is if you have macular oedema – this is when your central macular area of your retina is swollen with fluid. It is caused by a damaged vein, which leaks fluid and collects at your macula. Macula oedema can cause problems with your central vision, causing blurring and distortion. This can lead to difficulties recognising faces, reading or watching television with that eye.

If you have macular oedema your ophthalmologist may suggest treatment with anti-VEGF injections or steroid injections. If your macula oedema is mild, your ophthalmologist may suggest monitoring this for a while as the fluid can sometimes resolve on its own. If your macula oedema needs treatment, then the earlier treatment is given the better the outcome can be for your sight.

#### Anti-VEGF injections

Anti-VEGF stands for anti-vascular endothelial growth factor. Vascular endothelial growth factor is a protein produced by cells when there is not enough oxygen or blood flow to an area. It promotes leakiness of blood vessels and can stimulate the growth of new blood vessels in that area. Anti-VEGF drugs work by blocking these chemical signals helping to reduce swelling in the macula.

Anti-VEGF medication is given as injections into the eye. Normally, a course of three injections, one a month for three months, is given to start with. After this your eye will be checked at the hospital every four to eight weeks. You may be given further injections if your ophthalmologist thinks they are needed. It’s quite common for people to have more injections after the first three.

Anti-VEGF medicines are injected into the vitreous, which is the clear jelly that fills the inside of your eye. This is called an intravitreal injection. The injection needs to be given in a clean sterile room or an operating theatre to reduce the risk of infection.

Before the injection, you’ll be given anaesthetic eye drops to make your eye numb, antiseptic drops to clean the eye and if necessary, an antibiotic drop to help prevent you from getting an infection. The injection is not usually painful, but your eye may be a little sore after the anaesthetic wears off.

We have more information about anti-VEGF treatment on our website, or by calling our Helpline 0303 123 9999.

#### Steroid injections

Steroids are used to control swelling and this is usually given in the form of an implant about the size of a grain of rice. This implant is injected into your eye in a similar way to an anti-VEGF injection. It slowly releases a steroid for up to six months. A further implant might be required after the previous one has worn off, depending on whether the swelling has fully subsided.

#### Possible complications of anti-VEGF injections and steroid implants

All medicines and treatments can have side effects. It’s not always possible to predict whether you will experience any side effects, but most people do not have any complications. When deciding on a treatment, your doctor will consider your individual circumstances before recommending a specific one. If you are concerned by any possible side effects or complications, it is best to discuss this with your ophthalmologist beforehand.

Intravitreal injections come with the risk of infection (approximately 1 in 1,000). This is minimised with the use of sterile equipment and using a clean room. There is also a risk of a retinal detachment from an injection (approximately 1 in 7,000). The most common side effects reported are: redness and haemorrhage (bleeding) at the site of the injection, eye pain from the injection, and headache.

Steroids can cause side effects in the eye, but the risks of using steroids are considered smaller than the risk to your vision if no treatment was given.

Steroids are known to cause cataracts (clouding of the lens in your eye). They can also increase the pressure within your eye, which can lead to glaucoma. These side effects do not happen to everyone, and they can be managed if they occur.

Cataracts can be treated using surgery to remove the cloudy lens and replacing it with an artificial one. Raised eye pressure and glaucoma can be managed with eye drops to help lower your eye pressure.

### Neovascularisation (new vessel growth)

If a large part of your retina is affected by the retinal vein occlusion, like in a central retinal vein occlusion, areas of the retina become starved of oxygen. This is called ischaemia. The eye responds to ischaemia by attempting to grow new blood vessels, a process called neovascularisation. This is nature’s way of trying to repair the damage by growing a new blood supply to the oxygen-starved area of your retina.

Unfortunately, these new blood vessels have weak walls, and grow in the wrong places. They can grow on the surface of the retina or on the iris at the front of the eye. These blood vessels bleed very easily. New blood vessels on the retina can result in more haemorrhages and damage to the retina, or bleeding into the vitreous of the eye. At the iris, new blood vessels can cause your eye pressure to rise and lead to glaucoma.

Most people do not get neovascularisation after a vein occlusion, though if you do, it can be treated with a laser.

### High eye pressure (glaucoma)

New blood vessel growth at the iris can cause your eye pressure to rise and this can lead to glaucoma.

Your eye produces a fluid called aqueous humour, which is always being drained from your eye. The fluid is drained at the angle between your iris and cornea. If you have growth of new blood vessels in this area, it can cause the drainage angle to become blocked and cause the pressure in your eye to rise. If the pressure in your eye is too high, it can cause damage to your optic nerve – this is called glaucoma.

This is rare, but on average happens around 100 days after the initial vein occlusion, hence is often called 100-day glaucoma. It may also be called new vessel glaucoma (NVG), or rubeotic glaucoma.

If your ophthalmologist sees growth of new vessels in this area, then they will offer you laser treatment. You may also need eye drops and more rarely, surgery, to control your eye pressure.

# Managing your general health after a vessel occlusion

Since the main cause of a vessel occlusion is atherosclerosis, and this is affected by a range of general health issues, your GP will have a key role after you have had a vessel occlusion. It is likely that they will want to monitor risk factors such as your blood pressure, blood sugar and cholesterol levels more closely, and you may be prescribed new or additional medications to help control these. Your GP can also provide advice and help with stopping smoking and with managing your weight, as well as advice on exercise. Taking steps to manage these things can improve your blood circulation generally and reduce your chance of having a similar occlusion in your other eye.

# How will I manage with the change in my sight?

How much a vessel occlusion will affect your sight varies from person to person. Retinal vessel occlusions usually only affect one eye. Some people do not notice much difference unless they cover the unaffected eye, and others are very aware of the change all the time. Because you use both eyes together to see in three dimensions (3D), when one eye is affected you may have difficulty judging distances. You may feel clumsy, misjudge steps, pavements and the position of objects, for example cups. However, after a few months you will probably find that this becomes less of a problem. This is because our brains are able to adjust to a new level of vision and are able to make the eye with good sight the dominant one. Usually people find that with time their good eye ‘takes over’ and that tasks that were previously difficult become easier.

# Can I still drive?

You may be able to continue driving a car or motorcycle if the vision in your other eye is unaffected by other eye conditions, and you can meet the visual requirements for driving. You’re required by law to tell the Driver and Vehicle Licensing Authority (DVLA) if you have any eye conditions which may affect your vision in both eyes. Ask your optometrist or your ophthalmologist for advice about whether your sight meets DVLA standards and whether you can continue driving. Even if you’re told that your sight does meet DVLA standards, you may be advised to wait until you have adapted to having poorer vision in one eye before you resume driving.

# What if both of my eyes are affected by sight loss?

If the affected eye was your good eye and you have a sight problem in your other eye, then you may need to make changes or use aids to make the most of your remaining sight. This may mean making things bigger, using brighter lighting or using colour to make things easier to see. We have a series of leaflets with helpful information on living with sight loss, including how to make the most of your sight. You can find out more about our range of titles by calling our Helpline 0303 123 9999.

You should ask your ophthalmologist, optometrist or GP about low vision aids and getting a low vision assessment. During this assessment with a low vision specialist, you’ll be able to discuss the use of magnifiers and aids to help you to see things more clearly.

You should also ask your ophthalmologist whether you’re eligible to be registered as sight impaired (partially sighted) or severely sight impaired (blind). Registration can act as your passport to expert help and sometimes to financial concessions. Even if you aren’t registered, a lot of this support is still available to you.

Local social services should be able to give you information on staying safe in your home and getting out and about safely. They should also be able to offer you some practical mobility training to give you more confidence when you are out.

If you have questions about anything you’ve read in this leaflet, or just want someone to speak to about your eye condition, please get in touch with us. We’re here to support you at every step.

# Coping

It’s completely natural to be upset when you’ve been diagnosed with a vessel occlusion, and it’s normal to find yourself worrying about the future and how you will manage with a change in your vision.

It can sometimes be helpful to talk over these feelings with someone outside of your circle of friends or family. At RNIB, we can help with our telephone Helpline and Counselling and Wellbeing team. Your GP or social worker may also find a counsellor for you if you feel this might help.

Your eye clinic may also have a sight loss adviser (also known as an Eye Clinic Liaison Officer or ECLO), who can be on hand to provide you with further practical and emotional support about your eye condition.

# Further help and support

If you have questions about anything you’ve read in this leaflet, please get in touch with us.

Our Helpline is your direct line to the support, advice and services you need. Whether you want to know more about your eye condition, buy a product from our shop, join our library, find out about possible benefit entitlements, or be put in touch with a trained counsellor, we’re only a call away.

Give us a call today to find out how we can help you.

**RNIB Helpline**

**0303 123 9999**

**helpline@rnib.org.uk**

We’re ready to answer your call Monday to Friday 8am to 8pm and Saturday 9.30am to 1pm.

You can also get in touch by post or by visiting our website:

**RNIB**

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**rnib.org.uk**

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Send your comments to us by emailing us at [eyehealth@rnib.org.uk](mailto:eyehealth@rnib.org.uk) or by writing to the Eye Health Information Service, RNIB, 105 Judd Street, London, WC1H 9NE.

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