

DIABETIC RETINOPATHY

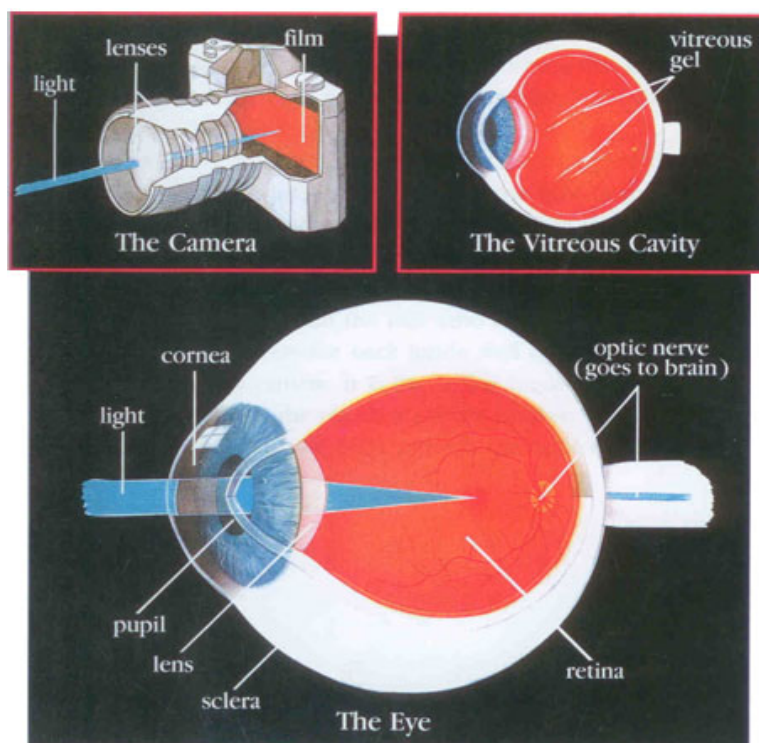
INTRODUCTION

Diabetic Retinopathy is a condition that can cause permanent loss of eyesight and even blindness. It is a major cause of loss of vision. But if a person with Diabetes receives proper eye care regularly, and treatment when necessary, diabetic retinopathy will rarely cause total blindness.

How the Eye Works

The eye is like a camera. When you take a picture, the lens in the front of the camera allows light through and focuses that light on the film that covers the back inside wall of the camera. When the light hits the film, a picture is taken.

The eye works in much the same way. The front parts of the eye (the cornea, pupil, and lens) are clear and allow light to pass through. The light also passes through the large space in the center of the eye called the vitreous cavity. The vitreous cavity is filled with a clear, jelly-like substance called the vitreous or vitreous gel. The light is focused by the cornea and the lens onto a thin layer of tissue called the retina, which covers the back inside wall of the eye. The retina is like the film in a camera. It is the seeing tissue of the eye. When the focused light hits the retina, a picture is taken. Messages about this picture are sent to the brain through the optic nerve. This is how we see.



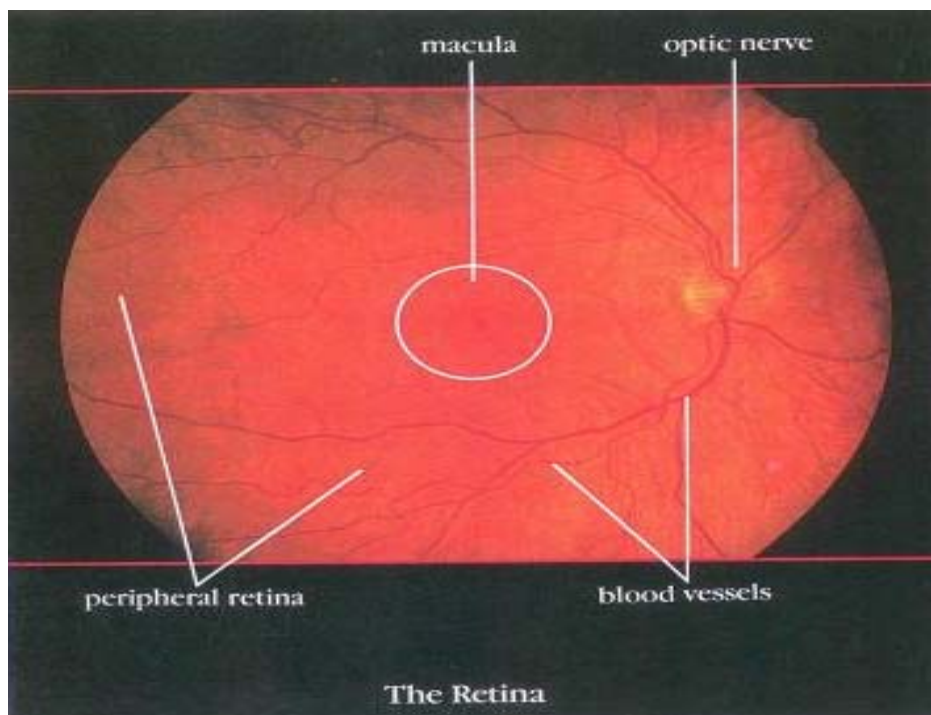
The Retina

The retina has two parts: the peripheral retina and the macula. If you imagine the retina as a circle with a bull's-eye at the center, the macula is like the bull's-eye, it is very small.

The peripheral retina gives us vision to the side, called “peripheral” vision. It is this part of the retina that is at work when we see something out of the corner of the eye.

In order to see fine detail, you must look straight ahead, using the macula, the “bull's-eye” center of the retina. Even though the macula makes up only a small part of the retina, it is one hundred times more sensitive to detail than the peripheral retina.

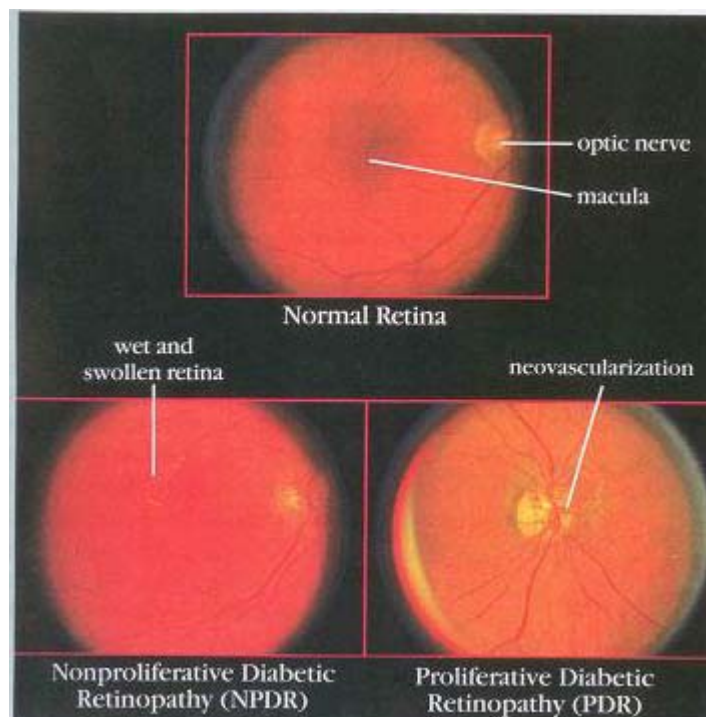
If you look at the drawing of the eye and the photograph of the retina you will note that there are dark and curving lines in the retina. These are the blood vessels of the retina. The blood vessels bring oxygen and nutrition to the retina. In order for the peripheral retina and macula to work properly, the blood vessels must be normal. Diabetic Retinopathy occurs when the retinal blood vessels become abnormal.



Two Kinds of Diabetic Retinopathy

In diabetic retinopathy the blood vessels of the retina become abnormal and cause the problems that people with diabetes have with their eyesight. Normally, the blood vessels in the retina do not leak. But with diabetes, the retinal blood vessels can develop tiny leaks. These leaks cause fluid or blood to seep into the retina. The retina then becomes wet and swollen and cannot work properly. The form of diabetic retinopathy caused by leakage of the retinal blood vessels is called Nonproliferative (or background) diabetic retinopathy. We will use the term NPDR for Nonproliferative Diabetic Retinopathy

Another problem with the retinal blood vessels in Diabetes is that they can close. The retinal tissue, which depends on those vessels for nutrition, will no longer work properly. The areas of the retina in which the blood vessels have closed then foster the growth of abnormal new blood vessels, called neovascularization, that can be very bad for the eye because neovascularization can cause bleeding and scar tissue that can result in blindness (total loss of vision). The form of diabetic retinopathy caused by closure of the blood vessels and in which neovascularization develops (proliferates) is called proliferative diabetic retinopathy. We will use the term PDR for Proliferative Diabetic Retinopathy

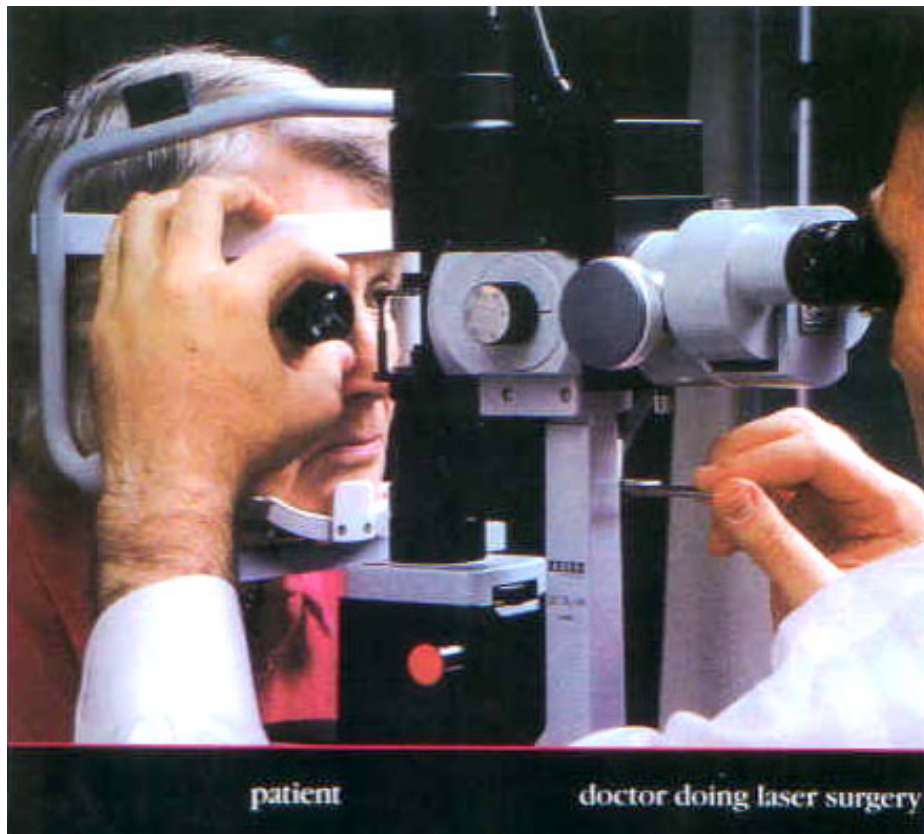


Laser Surgery

Laser surgery can be very helpful for the treatment of diabetic retinopathy. The laser beam is a high energy light that turns to heat when it is focused on the parts of the retina to be treated. In Nonproliferative diabetic retinopathy (NPDR), the laser heat either seals the leaking blood vessels of the macula or reduces their leakage and allows the macula to dry. In proliferative diabetic retinopathy (PDR), the laser destroys the diseased portions of the retina to stop the growth of neovascularization (abnormal new blood vessels).

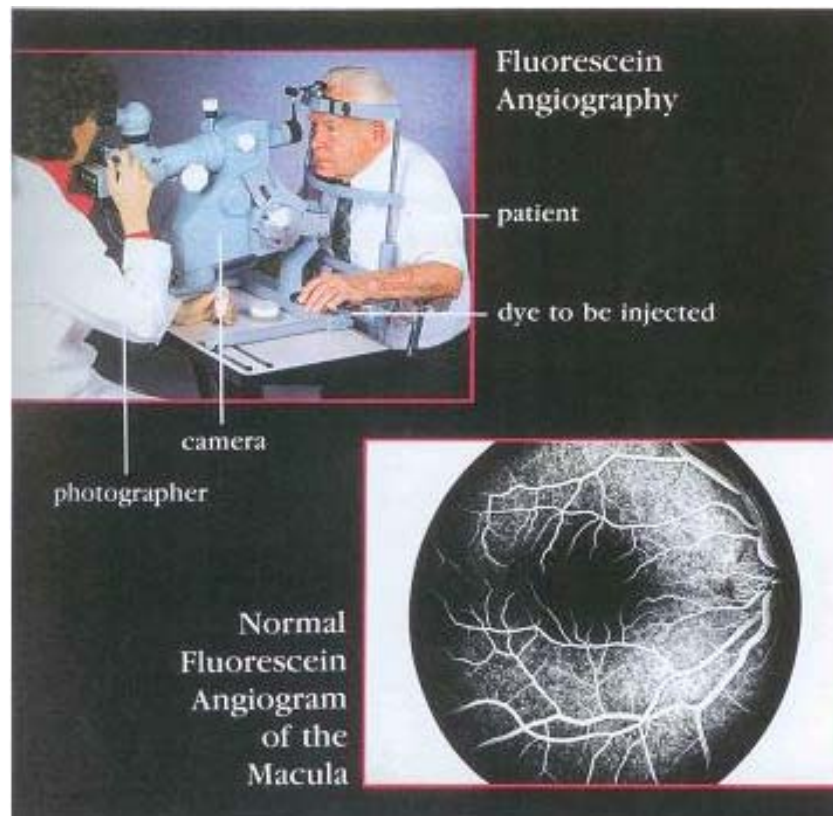
Essentially, the major purpose of laser surgery is to prevent further visual loss.

Because diabetes is a condition for which there is currently no cure, the diabetes may continue to damage the retina. Even with laser surgery patients may continue to lose vision. But when laser is the right treatment, the chances are that it can prevent further visual loss.



Fluorescein Angiography

If your doctor diagnoses diabetic retinopathy and feels that laser surgery might be helpful, a special test called fluorescein angiography may be done. To do the test, dye is injected into a vein in the patient's arm. The dye travels throughout the body, including the eyes. With a special camera and a flash, not an X-ray machine, a series of photographs of the retina is taken as the dye passes through it. The photographs will show what kinds of changes have occurred in the retina. The photographs will provide a kind of map, which the doctor will use as a guide to the exact location and amount of laser surgery necessary.

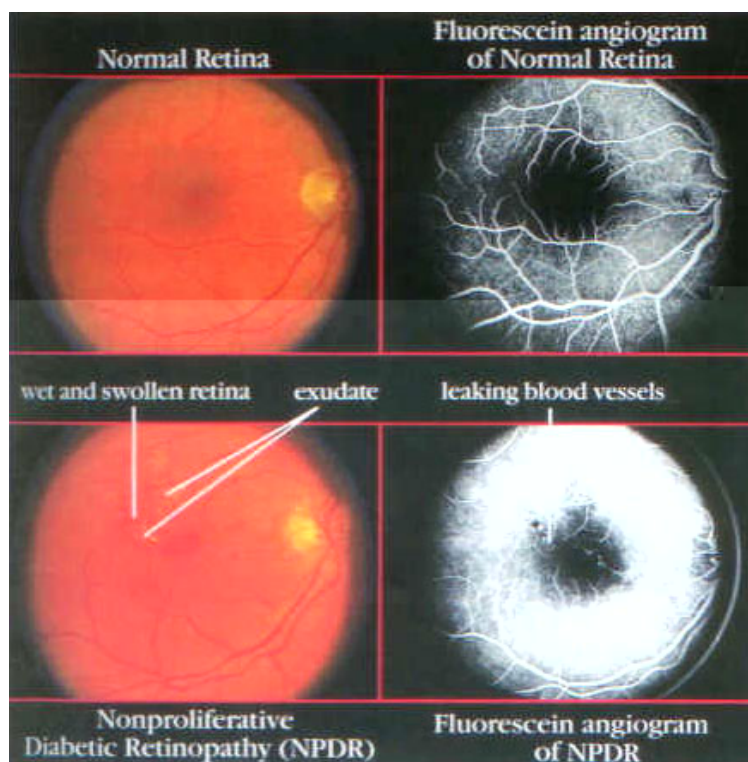


DIABETIC RETINOPATHY

Nonproliferative (Background) Diabetic Retinopathy (NPDR)

In diabetes, the retinal blood vessels can develop tiny leaks. Blood and fluid seep from the retinal blood vessels, and fatty material (called exudates) deposits in the retina. This causes swelling of the retina, and it is called Nonproliferative diabetic retinopathy (NPDR). When this occurs in the central part of the retina (the macula), vision will be reduced or blurred. Leakage elsewhere in the retina will usually have no effect on vision.

A patient with a wet, swollen macula, or with exudates in the macula, will experience some loss of vision, including blurring, distortion, or darkening. If one eye is affected, the other eye is frequently affected also, though the problem may not be equally severe in both eyes. If the diabetic retinopathy has affected each macula severely, central vision may be lost from each eye. But even if the ability to see detail has been lost from each eye, the person with severe NPDR will usually be able to get along fairly well by learning to use the areas just outside of the macula to see some detail. This ability to look slightly off centre usually improves with time, though the eyesight will never be as good as it was before the macula was damaged by the leakage of blood vessels. So patients who have NPDR will usually be able to see well enough to take care of themselves and continue those activities that do not require detail vision.



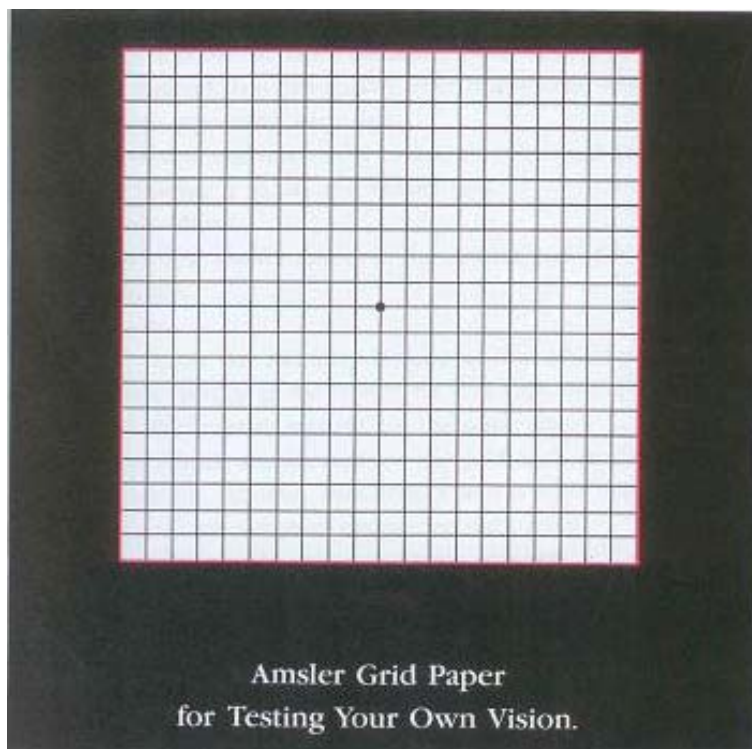
Early Diagnosis of Nonproliferative Diabetic Retinopathy (NPDR)

It is important that patients be aware of what they are seeing with each eye. If a patient can detect a problem with vision very early, the chance of saving eyesight with laser surgery is much greater. Once the macula has been damaged, laser surgery is generally not as helpful. For this reason, everyone should test the vision in each eye, separately, each day.

One way to test vision in order to detect even small changes when they first appear is to use the Amsler grid. Follows these instructions:

1. Wear your reading glasses and hold the Amsler grid at a normal reading distance.
2. Cover on eye.
3. Look at the centre dot and keep looking at it all times.
4. While looking directly at the centre, be sure that all the lines are straight and all the small squares are the same size.

If you should notice any changes on the grid such as distortion, blur, discoloration, or other abnormality, and it stays that way for a few days, call and see your eye doctor right away.

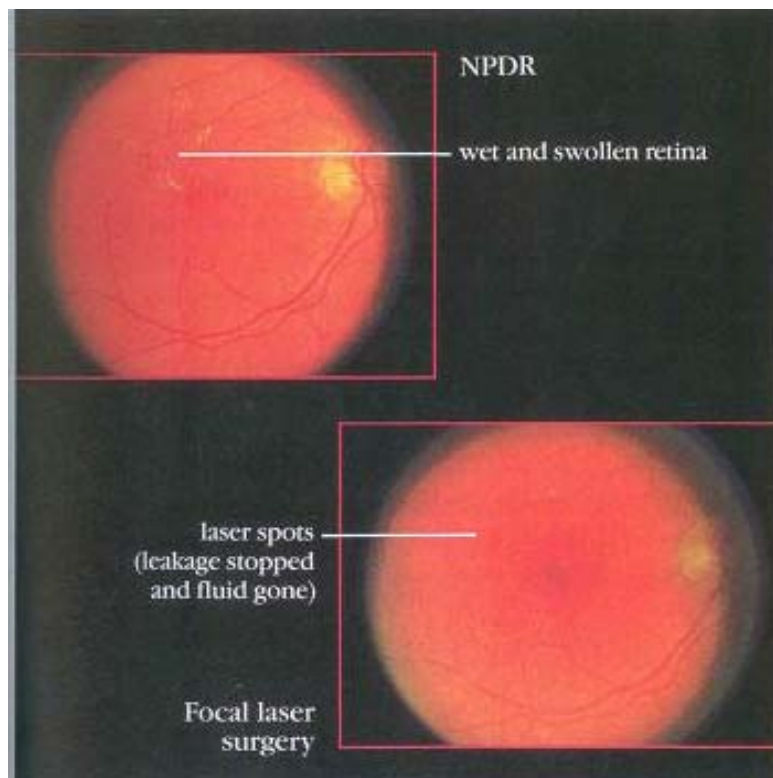


Laser surgery for Nonproliferative Diabetic Retinopathy (NPDR)

The laser is used to stop abnormal retinal blood vessels from leaking fluid into the retina. Vision does not usually improve with laser, but laser can frequently stop further loss of vision. When the swelling of the retina or amount of exudates in the macula has reached a critical stage, laser should be done so that vision does not deteriorate further. Your own doctor can help you evaluate your chances with laser and discuss the options with you.

Two types of Laser Surgery for NPDR

There are two types of laser surgery for NPDR: focal (or specific) surgery; and grid surgery. With focal laser surgery, the specific leaking spots in the retina are found by a fluorescein angiogram, which is then used as a guide for the laser in an attempt to stop the leakage. In some patients, all of the leaking spots may be properly treated, but they may continue to leak, or new ones may develop. In such cases, further leakage causes more swelling and worsening of vision. Additional laser surgery frequently needs to be done in order to stop new leakage, but again, the vision is not likely to improve. In other situations, further laser surgery is not helpful and should not be done.

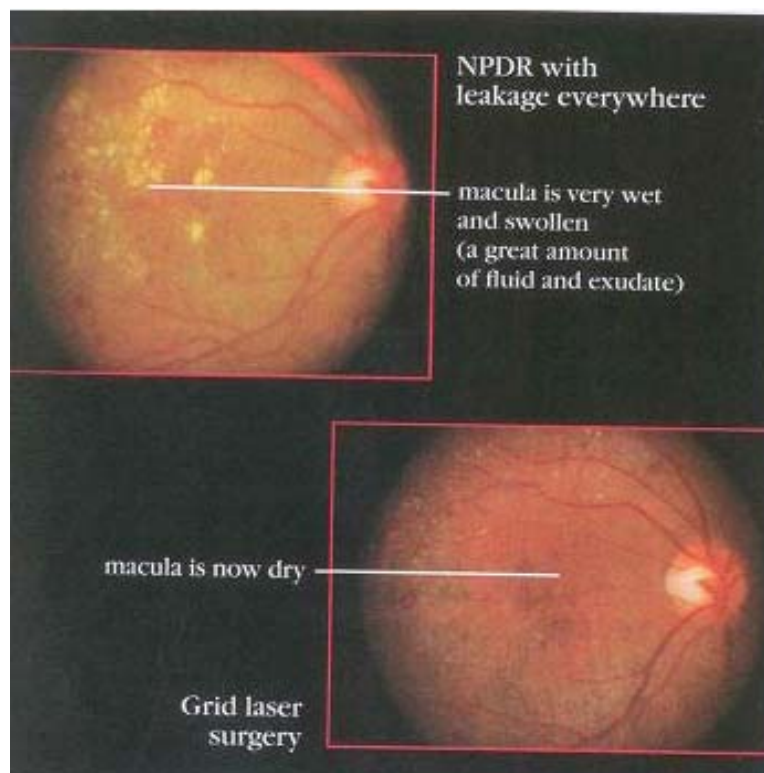


Laser surgery for Nonproliferative Diabetic Retinopathy (NPDR)

In some cases of NPDR, blood vessels appear to be leaking everywhere in the macula a not just in a few specific areas. In such cases, a scatter of laser in a grid pattern is placed across the entire swollen macular area. Grid laser surgery has a fair chance of drying the macula and holding vision stable. Grid surgery, however, infrequently improves vision.

After the laser surgery, the patient will often see the many small spots caused by the laser burns. With time, the spots tend to shrink and fade, and the patient will be less and less bothered by them, though they will always be there.

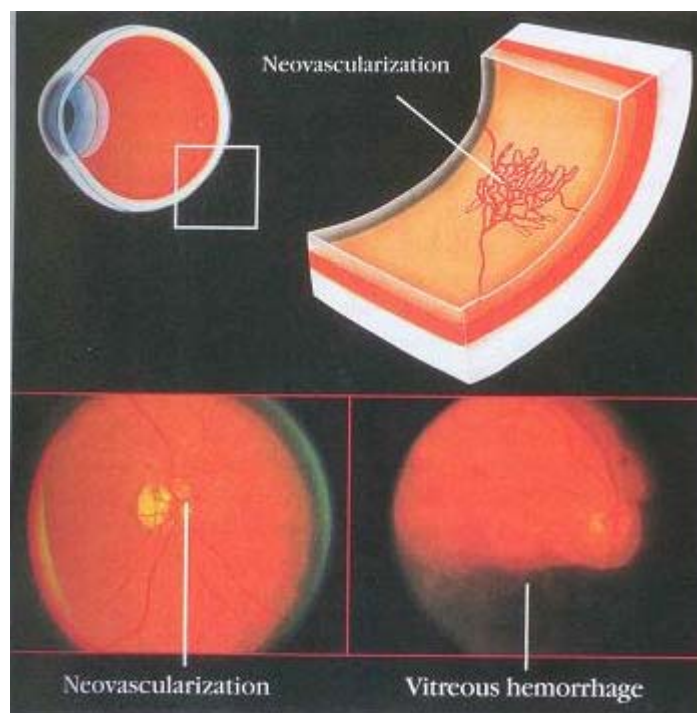
Even when laser surgery has successfully sealed the leaking vessels, new areas of leakage frequently appear later, causing more swelling and more loss of vision. The patient who is treated with laser should continue to check the vision in each eye daily and tell the doctor immediately if there are new changes, such as a return of distortion or blurriness. Vision does not usually improve with laser, but if NPDR is discovered early enough, laser surgery may stop further loss.



Proliferative Diabetic Retinopathy (PDR)

In PDR, retinal blood vessels close off and large areas of retina lose their source of nutrition. When this happens, peripheral or side vision is usually reduced, and the patient's ability to see at night and to adjust from light to dark is often diminished.

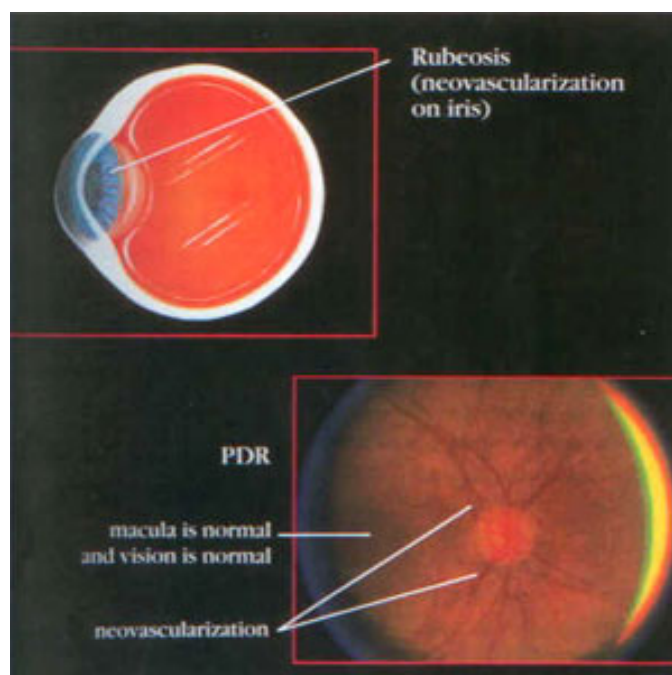
As a result of this loss of nourishing blood flow, the retina responds by developing new blood vessels that are abnormal and are called neovascularization. The development of neovascularization is the retina's method of coping with the closing of its own blood vessels and the loss of nourishment. But the problem is that when neovascularization develops, it is never any good. It is, in fact, dangerous to the eye. Neovascularization does not nourish the retina properly, and it may cause other problems. One problem is bleeding into the vitreous cavity (called vitreous hemorrhage). A second problem that occurs when neovascularization develops is the growth of scar tissue on the retina; the scar tissue can pull the retina off the back wall of the eye (called a traction retinal detachment). Either of these serious problems, vitreous hemorrhage or traction retinal detachment, can lead to severe loss of vision or even total blindness.



Proliferative Diabetic Retinopathy (PDR)

A third problem that can occur is when neovascularization grows on the iris, the colored part of the eye, rather than just on the retina. When neovascularization grows on the iris (called rubeosis), it may close off the normal flow of fluid out of the eye and cause the pressure in the eye to rise to dangerously high levels. The high pressure (called neovascular glaucoma) can cause permanent changes, resulting in visual loss, pain, and even loss of the eye.

It is very important to understand that the closing the retinal blood vessels and the development and growth of neovascularization may occur without any noticeable change of vision. So, it may be impossible for the person with diabetes and early PDR to know that such changes are occurring. For this reason, it is essential that every person with diabetes be examined regularly by a specialist who is familiar with diagnosing diabetic retinopathy. Such examinations should occur regularly – probably every six to twelve months, or more or less frequently, depending on the degree of diabetic retinopathy – for the lifetime of the person with diabetes. The earlier neovascularization is discovered, the better the chance that laser surgery will save vision. The later neovascularization is discovered, the greater the chance for blindness.

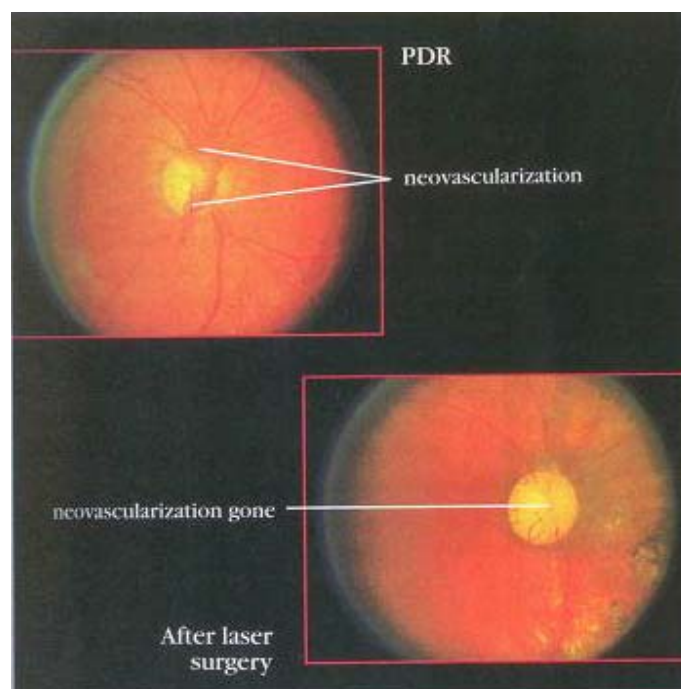


Laser Surgery for Proliferative Diabetic Retinopathy (PDR)

All people with diabetes should be examined regularly to be sure that neovascularization is not developing. When neovascularization does develop, if the amount is not severe, laser surgery is not necessary as long as the patient is examined regularly.

If the amount of neovascularization is great, laser surgery can often prevent loss of vision. The type of laser surgery that is done when there is a lot neovascularization is called panretinal laser photocoagulation. This type of laser surgery is usually done in two or more separate sessions. The idea is to use the laser to destroy all of the dead areas of retina where the blood vessels have been closed. When these areas are treated with the laser, the retina stops manufacturing new blood vessels, and those that are already present tend to decrease or disappear.

There are side effects of panretinal laser photocoagulation and, for this reason, this surgery is not done when only a small amount of neovascularization is present. It is important to remember, however, that when the amount is great enough to warrant laser surgery, the longer the eye remains untreated the more likely vision will be lost and blindness will occur. The earlier severe neovascularization is discovered and the eye is treated with laser the more likely blindness can be prevented. If you have developed neovascularization, your doctor will advise you

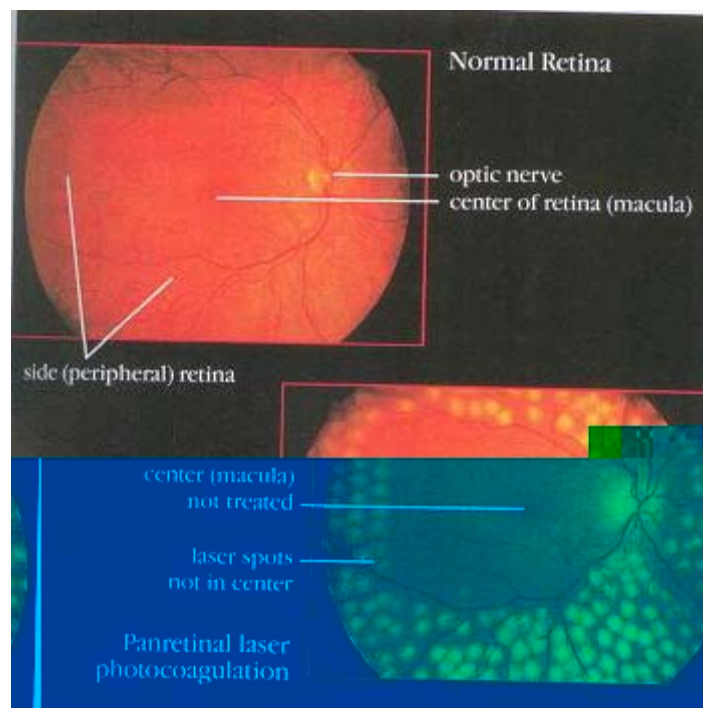


Laser Surgery for Proliferative Diabetic Retinopathy (PDR)

Panretinal laser photocoagulation does not improve vision: it is the best possible means of holding vision stable to prevent further loss. After laser surgery, patients may still have reduced vision or may continue to lose more vision. But if panretinal laser photocoagulation is indicated, the chances are that it will prevent severe loss of vision.

Panretinal laser photocoagulation is placed on the side (periphery) of the retina, not the center, and side (peripheral) vision will definitely be diminished to some extent. These side areas are sacrificed in order to save as much of the central vision as possible and to save the eye itself. Night vision will also be diminished. After laser, blurred vision is very common. Usually, this blur goes away, but in a small number of patients, some blur will continue forever.

Because diabetic retinopathy can occur at any time, the patient who is treated with laser for either NPDR or PDR should have regular retinal examinations by an eye specialist, should continue to check the vision in each eye daily, and should let the doctor know immediately if there are any new changes.



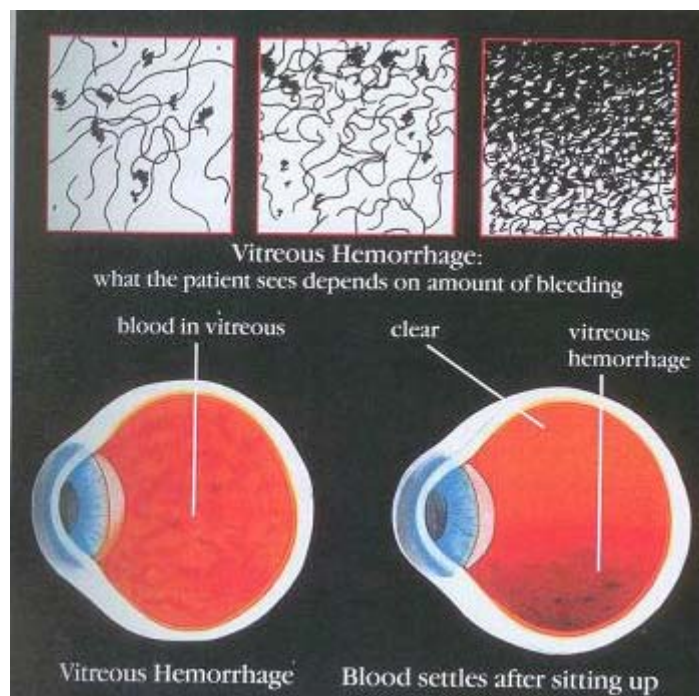
Vitreous Hemorrhage

Symptoms

Because vitreous hemorrhage is not necessarily associated with any specific activity (although it can be associated with strenuous physical activity), people with diabetes are encouraged to lead a normal life and not restrict their physical activities for the sake of their eyes. There may be exceptions to this general rule, and your doctor will help advise you. When a person does notice the sudden appearance of floaters, spiderwebs, spots in front of the eyes, or blurred vision, they should immediately call their eye doctor.

Treatment

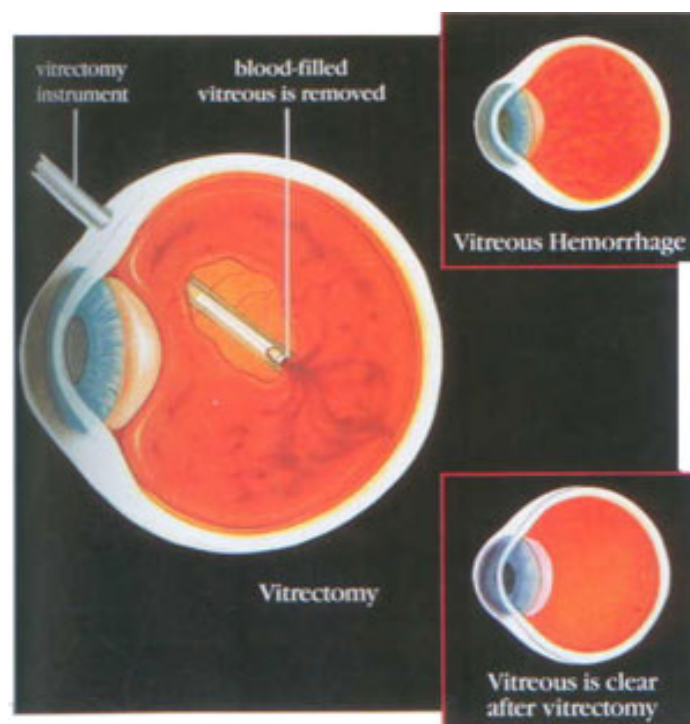
It is often helpful for someone with diabetes who develops a vitreous hemorrhage to remain in a sitting position so that gravity can help settle the blood to the lower parts of the vitreous cavity. Once the blood settles, panretinal laser photocoagulation can be done. Laser surgery cannot make the blood disappear, but it can cause the neovascularization that bled to shrink and thereby prevent more bleeding into the vitreous. The vitreous hemorrhage that is present usually disappears with time but can take many months to clear.



Vitreous Hemorrhage

If there is so much vitreous hemorrhage that laser surgery is not possible, or if the blood does not disappear on its own, it can be removed with an operation called a Vitrectomy.

Vitrectomy surgery is done in the hospital, under general or local anesthesia. The blood-filled vitreous gel is removed. It is replaced during the operation with a gas bubble or a clear fluid that is compatible with the eye. Over time, the gas bubble or fluid is absorbed by the eye and is replaced by the eye's own fluid, although the eye does not replace the gel itself. The lack of vitreous gel does not affect the function of the eye. If the blood in the vitreous does not go away on its own, your doctor will advise you as to how long you should wait before Vitrectomy surgery is considered.

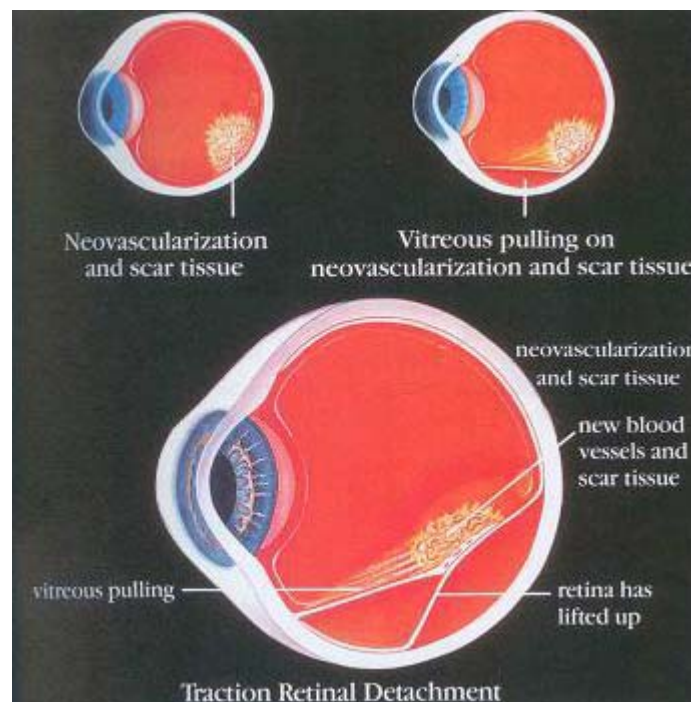


Traction Retinal Detachment

In PDR, the neovascularization may cause scar tissue to develop. The neovascularization and the scar tissue grow along the surface of the retina and attach firmly to the back surface of the vitreous gel. The vitreous gel pulls on the blood vessels and scar tissue are attached to the retina; the retina is also lifted up. When the retina separates from the back surface of the eye, it is called a retinal detachment. Because the retina is pulled off, it is called a traction retinal detachment. The scar tissue can also tear the retina and cause a retinal detachment.

Symptoms

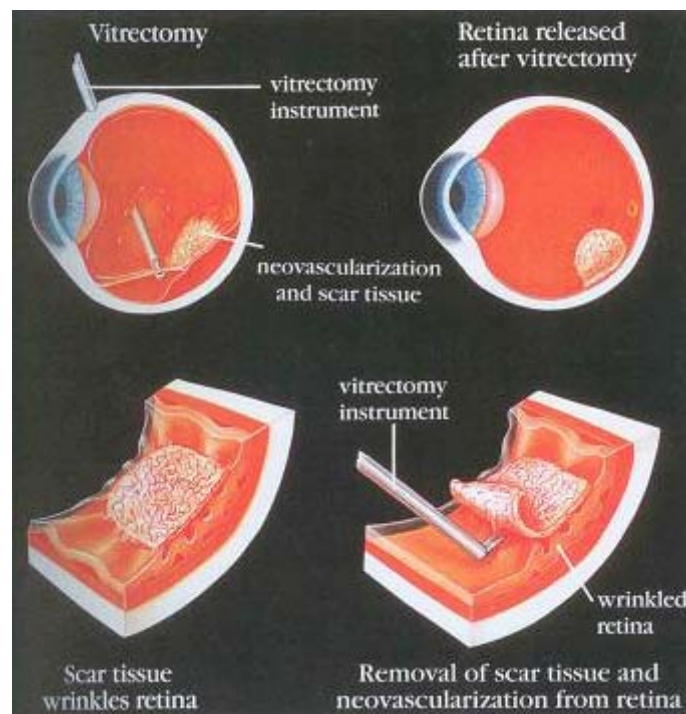
When a retinal detachment occurs, the patient may notice a shadow or very large dark area in the vision. When the retinal detachment extends to the macula, the dark shadow will be straight ahead and vision will be very poor. The neovascularization and scar tissue also can cause visual loss because they can wrinkle the retina.



Traction Retinal Detachment

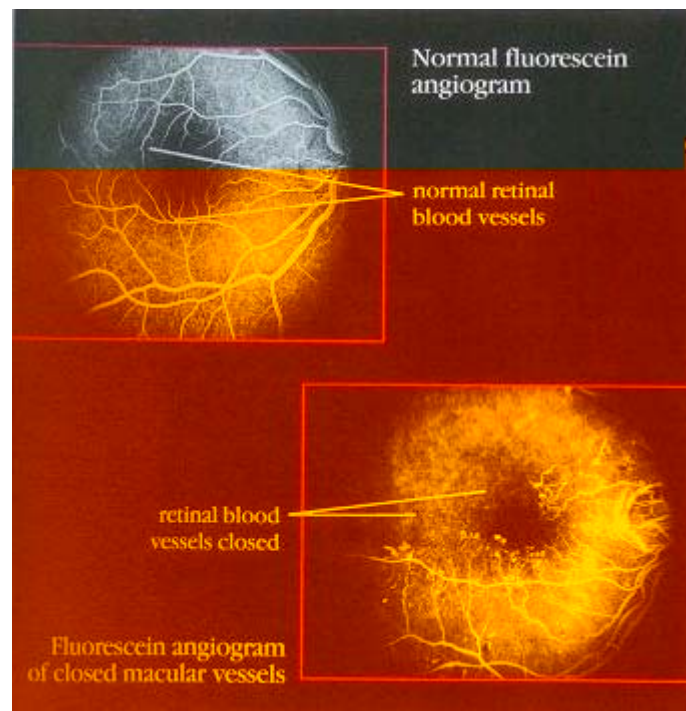
Treatment

The only way the patient can regain any vision is for the retina to be reattached and the neovascularization and scar tissue to be removed from the surface of the retina. This is accomplished by Vitrectomy surgery. The surgeon removes the vitreous gel from the eye so that it stops pulling on the retina; the traction is released. The surgeon may remove the scar tissue from the surface of the retina so that there is not wrinkling of the retina. The detached and wrinkled retina should flatten and smooth out. The surgeon may also perform panretinal laser photocoagulation to prevent later development of neovascularization and rubeosis. The surgeon also uses laser inside the eye to seal any tears of the retina. If there are tears in the retina, the surgeon may place a large gas bubble in the eye to press the retina completely against the back wall of the eye while the laser surgery takes hold. In order to accomplish this, you may be asked to position your head facing down for up to a week following the surgery. In time, the gas bubble will disappear and be replaced by the eye's own fluid



Closure of Macular Vessels

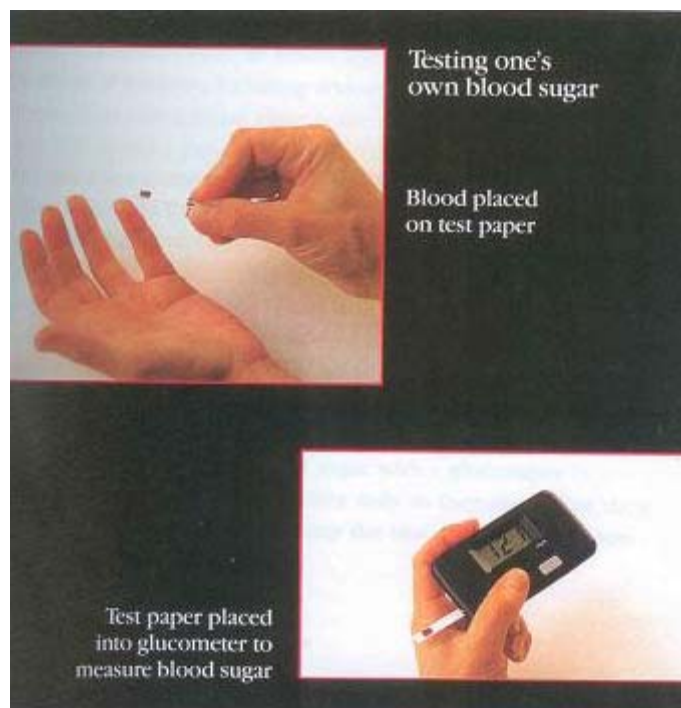
If the retinal blood vessels in the macula close, the macula stops working. This causes loss of central or detail vision. Although there is no medical, surgical, or laser surgery for this form of diabetic retinopathy, eyesight may be helped somewhat with the use of special low vision aids: magnifying lenses for close-up and telescopic lenses for distance. And, with counseling, patients who have lost macular vision can learn to use some of their peripheral or side vision to help them see more clearly and to cope more effectively with the practical tasks of everyday life. Finally, people with diabetes who have lost their central vision must continue to have regular retinal examinations because PDR can develop and damage the remaining peripheral vision.



Preventing Diabetic Retinopathy

In diabetes, there is too much sugar in the blood. When the blood sugar is constantly or frequently high, many complications occur: eyesight can suffer, heart attacks and other blood vessel problems can occur, and one's lifespan can be shortened. When the blood sugar is maintained at a normal level, or below 150, at all times, the complications of diabetes can do to prevent the complications of diabetes and diabetic retinopathy.

Type I diabetes usually beings at a young age. People with Type I diabetes must take insulin to survive and to control blood sugar. Most people with Type I diabetes take an intermediate-acting type of insulin (such as human NPH or Lente) or a long-acting type of insulin (such as human Ultralente) to provide a small, constant level of insulin before meals to control the rise in blood sugar with a glucometer (a glucose-monitoring device) several times daily so they can adjust their diet, exercise, and insulin doses to keep the blood sugar level below 150 and above 60 at all times. They should follow a diet controlled in carbohydrates and low in fact and cholesterol. Regular exercise is also very important as it helps reduce blood sugar.



Preventing Diabetic Retinopathy

Type II diabetes usually starts in adult life and is often not dependent on insulin for control of blood sugar. Maintaining normal weight and a diet low in calories, fat, and cholesterol is very important. Blood sugar can be controlled either with diet alone or in combination with pills to lower blood sugar. In some cases, insulin treatment is also necessary.

All people with diabetes should see a general physician, internist, or endocrinologist, who has knowledge of the important ways to help people with diabetes strictly control their blood sugar. The doctor will probably measure the patient's glycohemoglobin (which reflects the average blood sugar level for the past two months) several times yearly.

In addition to the importance of diet and exercise, there are other factors that can affect diabetes. High blood pressure is very bad for people with diabetes because it increases the likelihood of complications, including loss of vision. Blood pressure should be strictly controlled and kept normal if at all possible. Smoking is known to be particularly bad for people with diabetes because it promotes the closure of blood vessels.

Finally, the severity of diabetic retinopathy is often related to the length of time the person has had diabetes. It is unusual for someone with Type I diabetes to have significant diabetic retinopathy during the first 10 years of the disease. After 10 years, and especially after 20 years, most people with Type I diabetes have some retinopathy, although it may not be severe, especially if the blood sugar level has been well controlled. In people with Type II diabetes, the diabetic retinopathy may be discovered shortly after, or sometimes even before, the diabetes is diagnosed.

All people with diabetes, especially those who have had diabetes a long time, should have regular eye examinations (particularly examinations of the retina, through a dilated pupil) to be sure that diabetic retinopathy is not developing.

Emotional Factors in Diabetes

Having diabetes is emotionally difficult. Just knowing that one has diabetes and having to learn to deal with the many everyday reminders of the disease is stressful and frequently causes anxiety and psychological turmoil. Furthermore, emotional stress can cause great swings in blood sugar levels in diabetes. It is not uncommon for a person with diabetes, even one who generally maintains very careful blood sugar control, to experience high blood sugar levels during periods of tension, depression, or other psychological upset. It can be quite frustrating and frightening to know that no matter how careful a person with diabetes may be about controlling blood sugar, the control may still be elusive. These fluctuations in blood sugar can be distressing that they can even lead to greater swings in the level of blood sugar.

We have found that psychological counseling or therapy can be very useful in assisting people to cope more effectively with anxiety and stress, thereby helping to control blood sugar levels and thus increasing the patient's sense of well-being, both emotionally and physically. Talking with an experienced therapist can be very beneficial, helping the person with diabetes to discover ways to deal better with the tension and anxiety that can build up, especially when it is difficult to talk about those feelings with family and friends.

Questions and Answers About Laser Surgery

Q. What is the purpose of laser surgery?

A. In Nonproliferative diabetic retinopathy (NPDR), leaking blood vessels can cause the retina to become wet and swollen, resulting in loss of vision. The goal of laser surgery in NPDR is to stop the leakage from these vessels and to prevent further visual loss.

In proliferative diabetic retinopathy (PDR), neovascularization can cause severe visual loss by bleeding into the eye (called vitreous hemorrhage) and by developing scar tissue that can pull on the retina and cause traction retinal detachment. The goal of laser surgery in PDR is to stop the growth of these vessels and to prevent vitreous hemorrhage, traction retinal detachment, and severe visual loss.

Q. Will I have to go to the hospital?

A. Laser surgery is usually done in the doctor's office or in the hospital as outpatient surgery. You may eat before the laser surgery. After the surgery, you will be able to go home and resume your normal activities without special restrictions.

Q. Is the laser surgery safe?

A. In most cases, no complications occur but, as with all surgery, there are some risks. There is a remote chance that the laser beam might not be aimed properly and that healthy retina might be destroyed and vision lost. Laser may also cause bleeding or an unusually large scar. Fortunately, these complications are rare.

Questions and Answers About Laser Surgery

Q. In NPDR, will the leaking blood vessels be permanently closed by laser, and in PDR, will the abnormal new retinal blood vessels be permanently destroyed by panretinal laser photocoagulation?

A. In most cases of NPDR that have been treated with laser, the leaking blood vessels remain closed. But because the diabetes continues, it is common for the leakage to begin in new areas. If laser surgery is indicated, however, the chances are better that the treated blood vessels will stop leaking than if no laser surgery is done.

In most cases of PDR, the growth of neovascularization is stopped permanently after laser surgery, and most of the neovascularization that was present shrinks away. Nevertheless, it is quite possible that the neovascularization will not disappear totally. It may even grow back to some extent after surgery, though this is not common. When only a small amount of neovascularization remains after panretinal laser photocoagulation, it is generally not a problem, and further laser is frequently not necessary. If the amount of neovascularization remaining is great enough, however, more laser may be necessary. In some patients who have had panretinal laser photocoagulation, small vitreous hemorrhages will occur from time to time.

Q. Does the laser surgery cause any pain?

A. For NPDR, laser surgery is almost always painless, though a few patients do experience some discomfort. In rare instances, the eye must be anesthetized to keep it steady for the laser surgery. An anesthetic is injected behind the eye so that it cannot move and will not feel anything. After the laser surgery, the eye is patched for the rest of the day.

Q. How long does laser surgery take?

A. Depending on the extent of the problem, laser surgery for NPDR may take anywhere from a few minutes to one-half hour.

Questions and Answers About Laser Surgery

Q. Are all forms of laser the same?

A. The various types of laser differ according to their wavelength (or color). The lasers used in treating diabetic retinopathy are 532 green argon blue-green, argon green-only, krypton-red, and also tunable dye lasers.

Q. Are there any aftereffects?

Because of the intense brightness of the laser beam, there is a light-dazzle, or “flashbulb,” effect afterwards. This is not harmful to the eye. The eye takes a few hours to recover from this glare.

Q. What will my vision be like immediately after laser?

A. Following laser surgery for NPDR, vision is often blurred, but it usually improves within a month. Following panretinal laser photocoagulation for PDR, vision is often blurred, but it usually improves within a month or two. Side, or peripheral, vision and night vision are likely to be reduced permanently. In some patients, central vision is blurred permanently, this blurriness is not great.

Q. Do I need to avoid any activities after surgery?

A. After both NPDR and PDR treatments, you may resume normal activities and use of the eyes the same day as laser surgery.

Q. How many treatments will I need?

A. For NPDR, although we are always hopeful that only one laser surgery will be necessary, the blood vessels may become leaky again, or new leaks may develop, and for many patients, additional laser surgery is necessary. The need for more than one laser surgery for NPDR is an actually common.

For PDR, two or three laser surgery sessions are all that are usually needed, initially. But if the neovascularization does not go away, or if more develops, additional laser surgery may be required.

Questions and Answers About Laser Surgery

Q. How does one know if the laser surgery has helped?

A. Several weeks after laser surgery, you will return for a follow-up examination and possibly a fluorescein angiogram. If you had NPDR, the leakage should have stopped by this time. If you had PDR, the neovascularization should have shrunk. If this is the case, the laser surgery will be considered to have been temporarily successful.

Q. What if the laser surgery did not work?

A. In NPDR, if there is still significant leakage, additional laser surgery or grid laser may be helpful. In fact, more than one treatment is usually necessary for NPDR.

In PDR, if there is more growth of neovascularization, or if the neovascularization has not gone away, additional laser surgery may be necessary. If, despite adequate laser surgery, a vitreous hemorrhage develops and does not clear, or if scar tissue forms and wrinkles or detaches the retina, Vitrectomy can be performed.

Q. Can anything help if central vision is lost in each eye?

A. Those patients who have lost central or detail vision in both eyes will be referred to a low vision specialist who helps patients learn to use the remaining lenses for close-up vision specialists can fit magnifying lenses for close-up vision and telescopic lenses for seeing at a distance. There are other visual and mechanical devices including special filters, increased lighting, and special tools for reading that can help patients see better.

Q. Will using my eyes hurt them?

A. It is important to know that you cannot hurt your eyes by using them. There is no way in which using your eyes can do your eyes any harm, whether by reading, watching television, or driving for long periods of time.

Questions and Answers About Laser Surgery

Q. Do I need to wear sunglasses?

There has been some research suggesting that too much exposure to sunlight may cause various eye problems. While the connection between exposure to sunlight and damage to the eye has not been proved, it is probably a good idea to use dark sunglasses in bright sunlight, preferably sunglasses designed to filter out especially blue and ultraviolet light.

Q. Is it normal to have trouble adjusting quickly between bright sunlight and dim light?

A. Many patients who have diabetic retinopathy have difficulty adjusting quickly between bright light and dim light, or shadow. It may be difficult to adjust when driving from bright sunlight into a dark tunnel, or reading the menu in a dark restaurant when one has just come in from bright sunlight. This difficulty can be overcome somewhat by using clip-on sunglasses over regular glasses. These clip-on sunglasses can be slipped off easily when going from light to dark and can then be slipped back on again when going from dark to light.

Questions and Answers About Vitrectomy Surgery for Proliferative Diabetic Retinopathy

Q. How long will I be in the hospital for my Vitrectomy surgery?

A. You will be admitted to the hospital the day before or the morning of surgery. Most patients are able to leave the hospital the same day.

Q. How is the surgery performed?

A. The surgery is performed under general or local anesthesia. Small openings are made in the white part of the eye. Small, thin instruments are placed into the eye through these openings. These Vitrectomy instruments include a fiberoptic light used to light the inside of the eye, and a variety of cutters, scissors, and forceps. The surgery is done using a microscope that focuses through the pupil

Q. What are the possible complications of Vitrectomy surgery?

A. There are risks and complications that can occur with any surgery. Those risks and complications that can occur with Vitrectomy include: infection, retinal detachment, retinal tear, cataract formation, glaucoma, more vitreous hemorrhage after surgery, and the development of scar tissue. Although these complications can often be managed by further treatment, any one of them may cause the vision to get worse or cause a total loss of vision and perhaps eventual loss of the eye.

Q. Will my eye hurt after surgery?

A. Most patients will note some discomfort around the eye that can be relieved with medication if necessary. Severe pain is very unusual. The eye will remain swollen, red, and somewhat tender and uncomfortable for several weeks. Itchiness or a scratchy, foreign-body sensation when opening or closing the eyes is common. This is caused by small stitches. These stitches will gradually become soft, fall out, or become absorbed.

Questions and Answers About Vitrectomy Surgery for Proliferative Diabetic Retinopathy

Q. What if I do experience a great deal of pain?

A. If you experience a great deal of pain, please let your surgeon know immediately. Pain can be an important symptom indicating infection, excessive pressure in the eye, or injury to the front lining of the cornea. You should notify your surgeon immediately if you are experiencing more than mild pain.

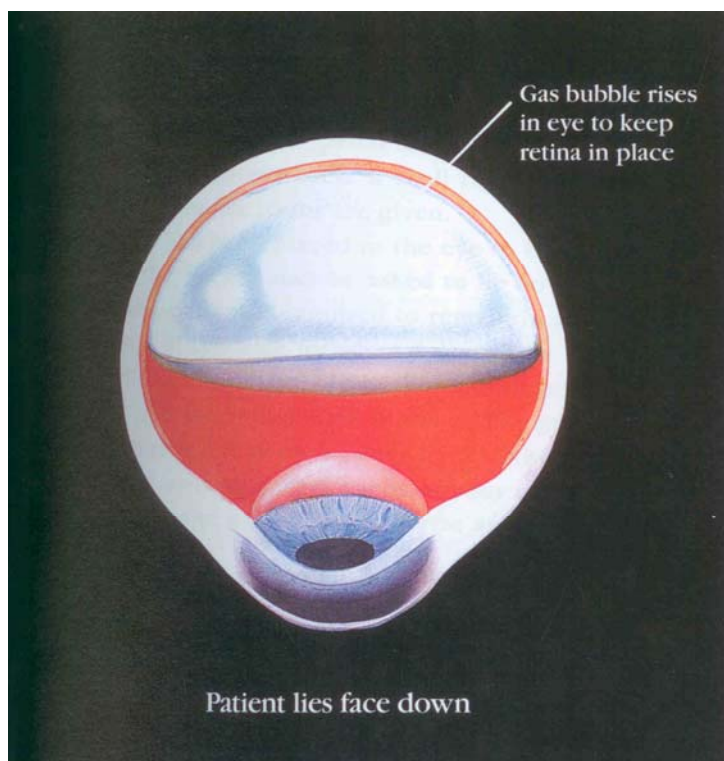
Q. What instructions must I follow when I go home after surgery?

A. We ask that patients not engage in strenuous activity or exercise for about a week after activity or exercise for about a week after surgery. They may return to work, or to driving, when they feel able to do so; this is usually within a week or two. They are encouraged to take walks and engage in normal activity as soon as possible.

If a gas bubble has been placed in the eye to hold the retina in position, the patient may be asked to lie down on one side. Sometimes, the patient is required to remain in a facedown position most of the time for several days. This positioning will place the gas bubble in the correct position within the eye so that the retina stays in place. If a gas bubble is in your eye, you should not sleep on your back.

DIABETIC RETINOPATHY

Questions and Answers About Vitrectomy Surgery for Proliferative Diabetic Retinopathy



Q. What medicines do I use after the surgery?

A. Most surgeons will use a type of dilating drop that eases the discomfort of the inflamed eye. An antibiotic drop may be used to help prevent infection. A steroid (cortisone) drop is often used to reduce inflammation and make the eye more comfortable. These medications may also be given in ointment form.

Q. How long will I need to wear a patch or plastic shield?

A. The patch may be worn for one or two weeks for the patient's comfort. In most instances, it plays no role in the healing of the eye.

The use of a plastic shield may be encouraged for two to three weeks for protection. If a patient normally wears glasses, they may be worn over the patch during the day, with the metal shield worn at night.

Questions and Answers About Vitrectomy Surgery for Proliferative Diabetic Retinopathy

Q. Will I see better right after surgery?

A. The eye and the retina may take many weeks to fully heal. When Vitrectomy is done for a vitreous hemorrhage, there will always be some blood left. This causes some cloudiness of vision that may take several weeks to clear.

There may be oozing of blood from the retina after surgery, which may result in even more vitreous hemorrhage. This hemorrhage usually clears after several days to weeks. If it doesn't clear, it can sometimes be removed on an outpatient basis by removing the fluid in the eye and replacing it with a gas bubble.

If surgery has been performed for a retinal detachment, it will take time for the retina to resume its normal position against the back wall of the eye.

When retinal tears are present, gas may be used to fill the eye at the end of surgery. The gas is used to press the retina flat against the back wall of the eye. There will be no return of vision until the gas bubble disappears.

Improved vision after retinal surgery is not immediate. It may take several months before the vision improves to its best possible level. In most cases, when the diabetes has caused such damage to the retina that vitreous or retinal surgery is necessary, the eye will never again see normally. Sometimes, small amounts of visual improvement occur, and occasionally, a great deal of improvement occurs. Each eye is different, and before your surgery, your doctor will discuss with you your chances for better eyesight.

Questions and Answers About Vitrectomy Surgery for Proliferative Diabetic Retinopathy

Q. Is it possible that I might not see after surgery?

A. Despite our increasing knowledge of diabetic retinopathy, and despite the sophisticated technology that we can bring into the operating room, we may find ourselves unable to improve a patient's vision. The chance for blindness in PDR is very real. When considering surgery, the patient and the doctor together must weigh the risks, including the possibility of total blindness, against the possible benefits of either stabilizing or improving vision. It is important for the patient to know that surgery may fail owing to complications or simply to the progressive nature of diabetes.