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Diabetes and Maturing Eyes: Part I

by Louis J. Catania, O.D., F.A.A.O. and Ernst Nicolitz, M.D., F.A.C.S.

Summary: Everyone has heard of diabetes, but it is important for adults, especially seniors to have a good understanding of this disease. It has been designated as one of the principle debilitating diseases of the coming era, especially in people over age 40. More than 16 million Americans already suffer from it. Although the disease is not well understood, its effects on the eye (and body) are recognizable and even preventable in certain cases. All adults should be familiar with this information.

The Department of Health and Human Services (HHS) has designated diabetes as one of the principle debilitating diseases under its "Healthy People 2010" initiative. Some 16 million Americans already have the disease, an increase of 49% in the past 10 years. And with America's "increasing waistline" (a major risk factor for diabetes), the disease is projected to increase another 165% by the year 2050. Most of this increase will occur in the aging population.

With these increases in diabetes we are seeing a significant increase in diabetic eye problems as well. According to the Center for Disease Control (CDC), it is already the leading cause of new-onset blindness in this country. In fact, up to 80% of people with Type II (sometimes called adult-onset) diabetes develop some degree of eye problems during aging. The important point to make in this discussion is that many of these problems are preventable.

Type I (juvenile-onset) diabetes, the far less common form, is the type of diabetes that produces eye problems that generally are difficult to prevent and manage. Type II, the type most common in people over age 40, is a form of diabetes that can be controlled, if not prevented through good health habits and health maintenance. Thus, the first and foremost method of preventing diabetic related eye problems (and adult-onset diabetes itself) during aging is to do the important things to maintain good health like proper diet, weight control, no smoking, stress reduction, exercise, etc., etc..

Diabetes is a disease of variable and poorly understood causes producing inadequate insulin and resulting in too much sugar in the blood (hyperglycemia). This alters the way the body uses food for nutrition and energy. It weakens foundational layers of tissue, especially blood vessels. This weakening leads to a breakdown of tissue and, in the case of blood vessels, it causes leakage of fluids (serum) and blood. This leads to an inability of the vessels to adequately nourish the tissue they are supposed to supply. In the case of the eye, these effects are most prominent in the delicate blood vessels and tissues of the retinal layer and its macula, the focal point on the retina for central and color vision. The macula is the most critical point on the retina for vision (see illustration from Nov. 11th column). Diabetic retinopathy is the specific name of given to the effects diabetes produces on the retina and macula.

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The effects of diabetic retinopathy are multiple and are generally classified into 2 categories, background diabetic retinopathy and proliferative diabetic retinopathy. Background diabetic retinopathy is the earlier stage of problems where the small vessels begin to leak clear fluid (serum) into the retina and macula producing swelling (macula edema) and deposits (exudates). When this swelling and deposits occur in the peripheral areas of the retina, vision is not affected. But if it occurs in the macula area, it will produce decreased central and color vision.

Vision is not usually seriously affected with background diabetic retinopathy. However, it should be considered a warning sign which can progress to more serious stages, especially if the patient's blood sugars are not carefully controlled.

In proliferative diabetic retinopathy, weak, abnormal blood vessels begin to grow on the surface of the retina. They can leak blood directly into the back chamber of the eye (vitreous chamber) and produce a cloudiness which can block light. These changes may result in vision loss or even blindness. Even more threatening at this stage of disease, fibrous tissue may begin to grow along the abnormal retinal vessels pulling the retina off its underlying structures. This complication is called retinal detachment and is devastating to vision.

Anyone with diabetes is likely to get some degree of diabetic retinopathy. It cannot be prevented. The longer someone has adult-onset (Type II) diabetes, the more likely that he or she will get diabetic retinopathy. Nearly half of all people with diabetes will develop some degree of retinopathy during their lifetime. Thus, conscientious health habits and early diagnosis, treatment and management of diabetic eye disease are of utmost importance.

Our next column will discuss how we detect diabetic eye problems, how we treat and manage them and what new research and procedures are on the horizon.

Diabetes and the Aging Eye: Part II

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Summary: Early detection is the greatest hope of controlling diabetic eye disease. Yearly eye examinations are essential. Numerous forms of treatment, usually with lasers, can help control complications of the disease. Ongoing research will eventually help prevent serious diabetic eye problems. But currently, the vision of diabetic patients is always at risk.

Often there are no signs of eye problems in the early stages of diabetic disease. The vision may not change until the disease becomes severe. There is no pain, red eyes or discharge associated with diabetic eye disease. Even in the advanced form, proliferative diabetic retinopathy, the disease may progress a long way without vision symptoms. That is why regular eye examinations for people with diabetes are so important.

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If you have diabetes, you should have your eyes examined at least once a year. Your eyes should be dilated during the examination. That means eye drops are used to enlarge your pupils. This allows the eye doctor to see more of the inside of your eyes to check for signs of the disease.

If your eye doctor diagnoses diabetic retinopathy, all that may be necessary is careful monitoring. If advancing or proliferative diabetic retinopathy is diagnosed which may be threatening vision, a special diagnostic test may be performed. This valuable test is called fluorescein angiography. It is done in-office and involves injecting a dye, usually into the arm and then taking a series of photographs of the retinal blood vessels as the dye travels through them. This will identify the critical points of leakage and weaknesses.

Depending on the results of fluorescein angiography, the patient may be referred to a retinal specialist for certain forms of laser surgery. These office procedures involve the use of a strong beam of light (a laser) aimed onto the retina to shrink the abnormal blood vessels. Laser surgery has been proven to reduce the risk of severe vision loss from proliferative diabetic retinopathy by 60 percent.

If the patient has macular edema with reduced vision, another form of laser surgery may also be used. In this case, the laser beam is used to seal the blood vessels leaking into the macula. However, this form of laser surgery generally cannot restore vision that has already been lost. Again, this is why finding diabetic retinopathy early is the best way to prevent vision loss.

For people with diabetes, retinopathy cannot be prevented, but the risk of getting it can be greatly reduced. The Diabetes Control and Complications Trial (DCCT) of the National Eye institute has shown that better control of blood sugar level slows the onset and progression of retinopathy and lessens the need for laser surgery in severe forms of the disease.

The study found that the group that tried to keep their blood sugar levels as close to normal as possible had much less eye, kidney, and nerve disease. This level of blood sugar control may not be best for everyone, including some elderly patients, children under 13, or people with heart disease. So the eye doctor, working with the physician(s) managing the diabetes must determine what is best for the patient.

Beyond retinopathy, diabetes also creates the risk of other eye problems. Studies show that diabetics are twice as likely to get a cataract as a person who does not have the disease. Also, cataracts develop at an earlier age in people with diabetes. Fortunately, these cataracts can be treated with standard forms of cataract surgery.

Glaucoma may also become a problem. A person with diabetes is nearly twice as likely to get glaucoma as other adults. As with diabetic retinopathy, the longer the patient has had diabetes, the greater their risk of getting glaucoma. Again, glaucoma in diabetes can usually be effectively managed with standard glaucoma medications, lasers or surgeries.

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Much research is being done to learn more about diabetic eye disease. For instance, the National Eye Institute is supporting a number of research studies in the laboratory and with patients to learn what causes diabetic retinopathy and how it can be better treated. This research should provide better ways to detect and treat diabetic eye disease and prevent blindness in more people with diabetes.

Finding and treating diabetes and diabetic eye disease early, before it causes vision loss or blindness, is the best way to control this difficult disease. If you have diabetes, make sure you get a dilated eye examination at least once a year. If you don't have diabetes, do everything you can, especially avoiding risk factors, controlling your weight, proper diet, exercise, etc. to keep your body healthy as you age. This is the best way to prevent diabetes and to protect your eyes and vision against the problems of diabetic eye disease.

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