What You Should Know About Peripapillary Subretinal Neovascularization

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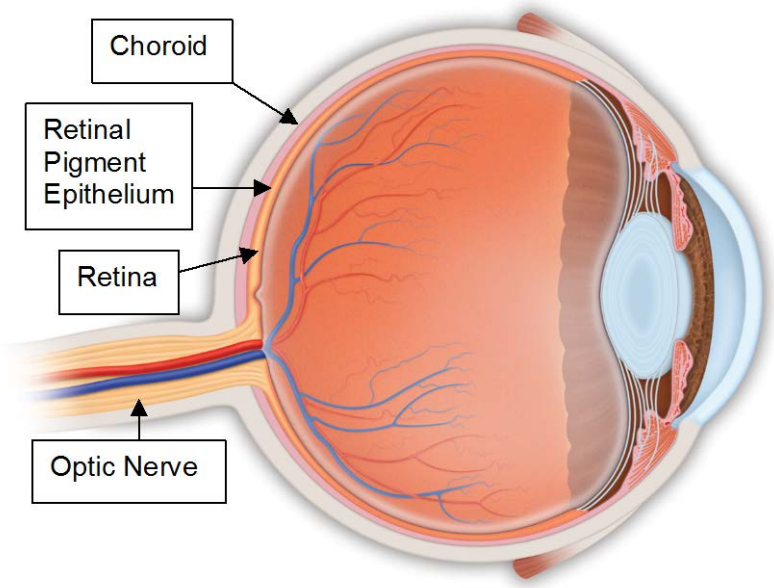
At the back of the eye, the optic nerve enters through a canal approximately 2 mm in diameter. The optic canal carries 1.2 million nerve fibers from the retina, which lines the back of the eye and turns focused light into nerve signals traveling to the brain. Beneath the retina is a layer of cells called the retinal pigment epithelium, which separates the retina from a nutritive layer of blood vessels called the choroid. All of these structures and their relationships are shown in figure 1.

Figure 1. Anatomy of the Human Eye



Legend: Layers of the eye relevant to an understanding of peripapillary subretinal neovascularization.

Peripapillary subretinal neovascularization (PSRNV) is an abnormal sprout of blood vessels, originating from the choroid near the optic nerve or from the small vessels of the optic nerve. These abnormal blood vessels grow behind the retina, but in front of the retinal pigment epithelium. Normally, no blood vessels are present in this location. Their abnormal presence there causes distorted vision and blur spots. The blood vessels

have a tendency to grow toward the center part of the retina, called the macula, and cause a loss of reading vision.

What Causes Peripapillary Subretinal Neovascular Membranes?

Most PSRNV is associated with a disease called age related macular degeneration, in which waste deposits build up under the retina and retinal pigment epithelium. Abnormal blood vessels often grow under the macula in this disease. They need not start near the optic nerve. Ninety percent of subretinal vessels found in macular degeneration start under the macula. Only 10% start near the optic nerve, comprising PSRNV. The PSRNV of macular degeneration is not as vision threatening as subretinal neovascularization that starts under the macula, but without treatment it can eventually grow under the macula and reduce vision.

Many other conditions associated with optic disk abnormalities can lead to PSRNV. Some of these include optic disk drusen, ocular histoplasmosis, angioid streaks, multifocal choroiditis, and congenital optic disk anomalies. Each of these conditions has its own peculiar causes and associations, which you can learn more about by linking to internet databases, such as PubMed on the National Library of Medicine website.

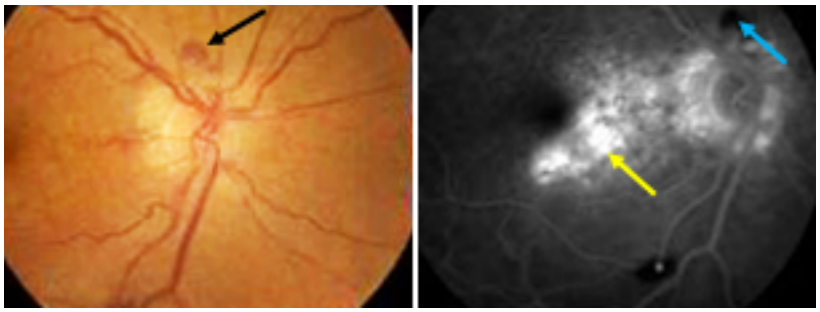
A large number of patients with PSRNV develop them in the absence of any known ocular disease. In these cases, we cannot explain why the condition has occurred. In general, regardless of whether PSRNVM's are associated with another ocular condition or not, they have a similar prognosis and treatment.

Treatment of Peripapillary Subretinal Neovascular Membranes

Some PSRNV do not threaten vision, especially if they start on the side of the optic nerve toward the nose. These cases can be simply observed over time to look for growth. Others may threaten vision by leaking fluid or bleeding. Frequently a photographic study of the eye, called a fluorescein angiogram, is done to define the size and location of the PSRNV. Approximately 2 tablespoons of a food coloring are injected into a vein of the arm and a series of photographs are taken of the eye as the dye traverses the retinal vessels. The dye discolors the urine for a few hours until it is eliminated from the body.

If the vessels threaten the macula, injections of medicine into the eye to cause regression of the vessels or laser treatment may be recommended. Several medications are effective including bevacizumab, ranibizumab, or aflibercept. An example of a patient with PSRNV associated with age-related macular degeneration that has been treated with injections of bevacizumab every 1-2 months for the past seven years is shown in figure 2. If laser treatment is recommended, either a thermal laser or a nonthermal laser can be used depending on the vessel location. Thermal laser is chosen for blood vessels remote from the center of the macula. For vessels beneath the center, a nonthermal form of laser called photodynamic therapy (PDT) is chosen. In the PDT procedure, dye is injected into a vein of the arm and an activating cool laser is used to cause a clot to form in the PSRNV. In rare cases, surgery may be recommended to physically remove the PSRNV.

Figure 2. Peripapillary Subretinal Neovascularization Associated with Age-Related Macular Degeneration

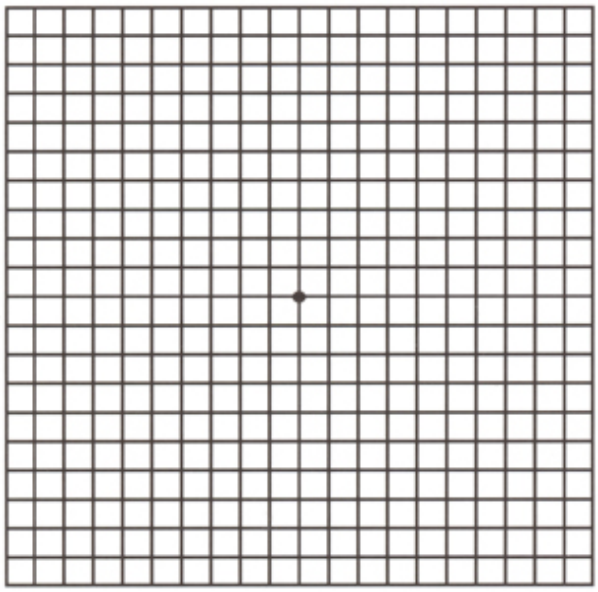


Legend: In the color fundus photograph (left panel), the black arrow shows hemorrhage adjacent to the optic disc, which is a sign of PSRNV. In the frame from the fluorescein angiogram (right panel) the blue arrow shows that the blood blocks fluorescence. The yellow arrow indicates PSRNV extending toward the macula.

What Is The Prognosis?

Over the past 30 years, I have treated approximately 300 patients with PSRNV. Approximately 65% maintain their vision, 30% improve, and 5% worsen despite treatment, or because they declined treatment. The fellow eye should be checked over time as well, since PSRNV can occur in the other eye. A useful home test to check for distorted vision is the Amsler Grid, shown in figure 3.

Figure 3. The Amsler Grid – Used for Home Monitoring of Vision



Legend: Cover one eye and use the open eye to fixate on the center dot. Do not move the eye. Observe if the lines are straight and whether there are blurred areas. If new wavy areas or blurred spots appear, notify your ophthalmologist promptly. Check the other eye similarly.

After reading this brochure, if you have an interest in further study of this topic, many reviews have been published.(1;2) An excellent resource for further references is PubMed, which can be accessed through any search engine, or at the following link: http://www.ncbi.nlm.nih.gov/entrez/query.fcgi.

Reference List

(1) Browning DJ, Fraser CM. Ocular conditions associated with peripapillary subretinal neovascularization, their relative frequencies, and associated outcomes. Ophthalmology 2005; 112:1054-1061.

(2) Bains HS, Patel MR, Singh H, Marcus DM. Surgical treatment of extensive peripapillary choroidal neovascularization in elderly patients. Retina 23, 469-474. 2003.

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