OPHTHALMOSCOPY

There are a number of ways to visualize the retina, including direct ophthalmoscopy, binocular indirect ophthalmoscopy, and slit-lamp biomicroscopy. Most nonophthalmologists prefer direct ophthalmoscopy, performed with a hand-held ophthalmoscope, because the technique is simple to master and the device is very portable. Ophthalmologists often use slit-lamp biomicroscopy and indirect ophthalmoscopy to obtain a more extensive view of the fundus.

DIRECT OPHTHALMOSCOPE

Direct ophthalmoscopes are simple hand-held devices that include a small light source for illumination, a viewing aperture through which the examiner looks at the retina, and a lens dial used for correction of the examiner's and the patient's refractive errors. A more recent design, the PanOptic ophthalmoscope, provides a wider field of view.

How to Use a Direct Ophthalmoscope Good alignment is the key. The goal is to align the examiner's eye with the viewing aperture of the ophthalmoscope, the patient's pupil, and the area of interest on the retina. Both the patient and the examiner should be in a comfortable position (sitting or lying for the patient, sitting or standing for the examiner). Dilating the pupil and dimming the room lights make the examination easier. Steps for performing direct ophthalmoscopy are summarized in Table 40e-1.

PANOPTIC OPHTHALMOSCOPE

The PanOptic ophthalmoscope is a type of direct ophthalmoscope that is designed to provide a wider view of the fundus and has slightly more magnification than the standard direct ophthalmoscope. Steps for using the PanOptic Ophthalmoscope are summarized in Table 40e-2.

TABLE 40e-1 GUIDELINES FOR PERFORMING DIRECT OPHTHALMOSCOPY

- Instruct the patient to remove glasses, keep the head straight, and to look steadily at a distant target straight in front. You may keep or remove your own glasses. Position your head at the same level as the patient's head.
- Use your right eye and right hand to examine the patient's right eye, and use your left eye and left hand to examine the patient's left eye.
- Using the ophthalmoscope light as a pen light, briefly examine the external features of the eye, including lashes, lid margins, conjunctiva, sclera, iris, and pupil shape, size, and reactivity.
- Shine the ophthalmoscope light into the patient's pupil at arm's length and observe the red reflex. Note abnormalities of the red reflex such as an opacity of the media.
- Dialing up a +10 D lens in the lens wheel, while examining the eye from 10 cm, allows magnified viewing of the anterior segment of the eye.
- Reduce the power of the lens in the wheel to zero, and move closer to the patient. Identify the optic disc by pointing the ophthalmoscope about 15° nasally or by following a blood vessel toward the apex of any branching. If the retina is out of focus, turn the lens dial either way, without moving your head. If the disc becomes clearer, keep turning until best focus is achieved; if it becomes more blurred, turn the dial the other way.
- Once you visualize the optic nerve, note its shape, size, color, margins, and the cup. Also note the presence of any venous pulsation or surrounding pigment, such as a choroidal or scleral crescent.
- Next, examine the macula. The macula is the area between the superior and inferior temporal vascular arcades, and its center is the fovea. You can examine the macula by pointing your ophthalmoscope about 15° temporal to the optic disc. Alternatively, ask the patient to look into the center of the light. Note the foveal reflex and the presence of any hemorrhage, exudate, abnormal blood vessels, scars, deposits, or other abnormalities.
- Examine the retinal blood vessels by re-identifying the optic disc and following each of the four main branches away from the disc. The veins are dark red and relatively large. The arteries are narrower and bright red.
- Ask the patient to look in the eight cardinal directions to allow you to view the peripheral fundus. In a patient with a well-dilated pupil, it is possible to visualize as far as the equator.

TABLE 40e-2 HOW TO USE A PANOPTIC OPHTHALMOSCOPE

- Focus the ophthalmoscope: Look through the scope at an object that is at least 10 to 15 feet away. Sharpen the image of the object by using the focusing wheel. Set the aperture dial to "small" or home position.
- Turn the scope on, and adjust the light intensity to "Maximum."
- Instruct the patient to look straight ahead. Move the ophthalmoscope close to the patient until the eyecup touches the patient's brow. The eyecup should be compressed about half its length to optimize the view.
- Visualize the optic disc.
- Examine the fundus as described in Table 40e-1.

RETINAL SIGNS ASSOCIATED WITH SYSTEMIC DISEASES

AGE-RELATED CHANGES

Common age-related changes include diminished foveal light reflex, drusen (small yellow subretinal deposits), mild RPE atrophy, and pigment clumping.

RETINAL HEMORRHAGES

Retinal hemorrhages may take various shapes and sizes depending on their location within the retina (Figs. 40e-3 and 40e-4). Flame-shaped hemorrhages are located at the level of the superficial nerve fiber layer and represent bleeding from the inner capillary network of the retina. A white-centered hemorrhage is a superficial flame-shaped hemorrhage with an area of central whitening, often representing edema, focal necrosis, or cellular infiltration. Causes of white-centered hemorrhage include bacterial endocarditis and septicemia (Roth spots), lymphoproliferative disorders, diabetes mellitus, hypertension, anemia, and collagen vascular disorders. Dot hemorrhages are small, round, superficial hemorrhages that also originate from the superficial capillary network of the retina. They resemble microaneurysms. Blot hemorrhages are slightly larger in size, dark, and intraretinal. They represent bleeding from the deep capillary network of the retina. Subhyaloid hemorrhages are variable in shape and size and tend to be larger than other types of hemorrhages. They often have a fluid level ("boat-shaped" hemorrhage) and are located within the space between the vitreous and the retina. Subretinal hemorrhages are located deep (external) to the retina. The retinal vessels can be seen crossing over (internal to) such hemorrhages. Subretinal hemorrhages are variable in size and most commonly are caused by choroidal neovascularization (e.g., wet macular degeneration).

FIGURE 40e-3 Superficial flame-shaped hemorrhages, dot hemorrhages, and microaneurysms in a patient with nonproliferative diabetic retinopathy.