

HOW TO EXAMINE THE NERVOUS SYSTEM

Techniques and Methods

By

R. T. ROSS, M.D. (Manitoba)
M.R.C.P. (London), F.R.C.P. (Canada)

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PREFACE

IN THE EXAMINATION of sick people, two kinds of skill are required: a *technique* that effectively elicits physical signs, and the ability to *interpret* the signs correctly.

Interpreting physical signs to discover the location of the lesion is one of the interesting parts of neurology. Unfortunately, it may be neglected when too much of the allotted teaching time is spent learning technique. There are more students to be taught every year. There are more subjects in the curriculum, and the technical knowledge explosion continues. We can afford only a small amount of time on the technique of any physical examination.

There are many books that are helpful in the interpretation of abnormal signs; this is *not* one of them. This is a "HOW TO" manual. It is hoped that after reading this book and practicing the methods described in it, plus watching a demonstration or two, the second-year student will be more adept at the bedside examination of the patient with disease of the nervous system.

"Teach and be taught" is a ground rule that most of us will try to observe all of our professional lives. Every doctor and medical student owes a massive debt to *patients* who are an essential part of the teaching situa-

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tion. They allow us to teach "on" them and around them and tolerate several history takings and physical examinations, usually for the benefit of someone else.

Therefore, at all times let us treat the patients with respect and kindness. When you enter the room, identify yourself and tell the patient why you are there. Do not persist with the history or examination past the point where the patient is tired or uncooperative. We have found that patients are most cooperative with students and doctors who are clean, neat, and polite.

When you enter a hospital room to examine a patient, stand on the right side of the bed (on the left side if you are left-handed). After you have identified yourself, level the bed, i.e. if the head or knee break is cranked up, flatten it. Then raise the bed as high as it will go. You can work better with the bed 30 inches up from the floor than with the bed only 18 inches from the floor.

Spend 60 to 75 percent of the time devoted to any one patient on history taking and the remainder on the physical examination. You must have a system of examination and learn to follow it the same way each time. Your system or routine can be your own, but stick to it.

Do not be upset by the transient nature of some physical signs. You may admit a patient in the evening with an enlarged left pupil and explosively hyperactive tendon reflexes in the right arm and leg and a right extensor plantar response. The next day, the pupils and tendon reflexes are equal right and left, and both toes are unequivocally down. No physical sign of nervous

Preface

system disease is fixed, except for papilledema. If papilledema was present yesterday, it will be there today, tomorrow, and the day after; almost all other signs can change and come and go on an hour-to-hour and day-to-day basis.

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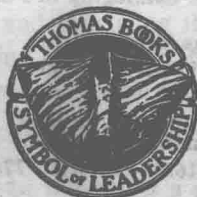
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Chapter 1

THE FUNDUS OCULI, THE OPHTHALMOSCOPE, CENTRAL AND PERIPHERAL VISION

THE EXAMINATION of the eye consists of five parts. This chapter deals with the fundus oculi and with central and peripheral vision. The remaining three parts of the examination are described in later chapters.

THE FUNDUS OCULI

There is a wealth of information in the fundus of the eye for any physician with an ophthalmoscope. Practice looking at the fundus of young persons, e.g. your classmates. Young people have bigger pupils than old people, more patience, and less opaque material in the lens and vitreous. Never start to learn this procedure with the patient or subject lying down. Always have him/her sit or stand. When you get to be an expert, you can examine supine patients, but do not do it until you have to.

If the patient is a female, ask her at the start not to hold her breath. If you do not ask, she will do it. This has practical application on the size and pulsations of her retinal veins.

Then, with the patient sitting on the edge of the bed with his/her back to the window, pull the blinds down and remove the patient's glasses. You do not need a blacked-out room, but remove any incidental light you

can. Why bother to pull the blinds and turn the patient's back to the window if you are about to shine a light in his eye?

There are two things working against you when you are using the ophthalmoscope. Firstly, the eye adds all the light to which it is exposed. The sum of the light from the windows, etc., plus the ophthalmoscope light determines how small the pupils will become. Secondly, trying to look through a *reflecting* surface is difficult. On a bright, sunny day, you cannot look into a lake to any depth because of the reflection off the surface. If, however, you hold a hat close to the water and look into the lake in the shadow of the hat, you can see. Similarly, side light or ceiling light reflected on the patient's cornea or either surface of his glasses will hinder you.

Some doctors keep their glasses on when using the ophthalmoscope; most remove them. With your glasses off, the head of the ophthalmoscope can be closer to your eye, and you will see a larger area of the patient's retina. Try it both ways beginning with your glasses off. The pinhole effect of looking through (A) (Fig. 1) may take care of your refraction unless you wear glasses with a correction for astigmatism. If you are astigmatic your glasses contain a cylinder; hold your glasses at arms length, look through one lens with one eye, and slowly rotate your glasses to the right and then the left. If the thing you are looking at tilts and elongates at one point in the rotation, then you are wearing a cylinder, you are astigmatic, and you may have to wear your glasses when using the ophthalmoscope.

THE OPHTHALMOSCOPE

There are five mechanical things you need to know about the head of the ophthalmoscope. The following remarks apply to the Welch-Allyn® ophthalmoscope (Fig. 1).

Turn it on, push the on/off button in, and turn the disc that contains it. It only turns one way. Hold the handle at arm's length so that you can read the numbers in the magnification window (D). These numbers change as you rotate the big wheel (B). Shine the light on the palm of your other hand and turn the small wheel (C). You will find that the light may be a green circle, a big white circle, a grid, a small white circle, or a slit. Turn it back to the small white circle and leave it there. (If the white circles are really orange, get new batteries and a new bulb.)

Turning the big wheel (B) changes the amount of magnification between your eye and the patient's retina

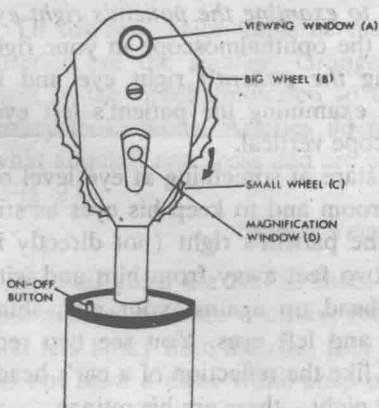


Figure 1. Details of ophthalmoscope head.

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when you are looking through the viewing window (A). If the big wheel is turned clockwise in the direction of the heavy arrow, increasingly stronger *positive* lenses continue to appear in the viewing window (A) and increasingly higher *black* numbers continue to appear in the magnification window at (D).

(This chapter includes a discussion on how to use the lenses and why, and what to do with patients who wear glasses. For now, have zero showing at (D) and the small circle of white light selected from (C). Start by examining a classmate or patient who does not wear glasses.)

Hold the ophthalmoscope in your right hand, turn it on with zero showing at (D), and look through (A). You must wear the head of the ophthalmoscope like a monocle. Get the hole at (A) as close to your eye as possible. If you have it halfway down your nose, you are, in effect, looking through a tube with your pupil at one end and (A) at the other.

Use your right eye to examine the patient's right eye and vice versa. Hold the ophthalmoscope in your right hand when examining *the patient's* right eye and in your left hand when examining the patient's left eye. Keep the ophthalmoscope vertical.

Ask the patient to stare at something at eye level on the other side of the room and to keep his eyes as still as he can. Stand to the patient's right (not directly in front of him) about two feet away from him and with the ophthalmoscope head up against your eye; shine the light in his right and left eyes. You see two red-orange circles—much like the reflection of a car's headlights in a cat's eyes at night—these are his retinae.

Fundus Oculi, and the Ophthalmoscope

Follow down on to the right retina by stepping closer to the patient. Adjust the big wheel (B) if necessary. *This will bring any fine arteriole at the edge of the disc into clear, sharp focus.* Starting at 0, turn the big wheel one or two "clicks" in either direction. If the definition of what you see is worse, turn the wheel in the opposite direction, all the time keeping the ophthalmoscope up to your eye.

You need to identify the following and know normal from abnormal:

- a. Arteries
- b. Veins
- c. Optic nerve head or disc
- d. Physiological cup
- e. Macula.

(The following comments are helpful when examining each other. Before examining patients, read Chapter 2.)

Retinal Arteries

Of the two major kinds of vessels in the retina, the arteries are the smaller. Orange-red, they reflect the light of the ophthalmoscope so that the center of the artery looks white. Arteries do not pulsate, are somewhat angular, and cross and are crossed by retinal veins (Fig. 2).

Retinal Veins

Retinal veins are two to three times larger than retinal arteries and are a dusky, red color. More sinuous and less kinky than arteries, they pulsate. Retinal veins do not have a clear white strip of reflected light down the center. To see the pulsations, you should look

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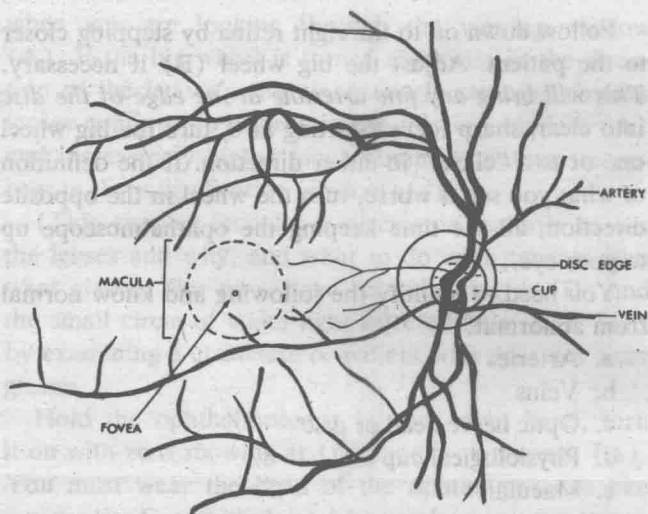


Figure 2. Right retinal details. Veins are larger, darker, and less reflective than arteries. The disc is to the nasal side and has an eccentric depressed area, the cup. Many small vessels surround and point to the macula. It is darker than the surrounding retina and ophthalmoscopically has a central bright highlight, the fovea. Its circumference is *not* anatomically distinct, and the circle of broken lines is only its approximate size.

for a bend or change in direction of the vein. The pulsation is not only an *expansion* of the caliber of the vein, but a *shunting* of the column of blood up and down within the length of the vessel (Fig. 3). Veins change direction at the disc or physiological cup. One can often see a filling and emptying of the vessel at the bend.

Fundus Oculi, and the Ophthalmoscope

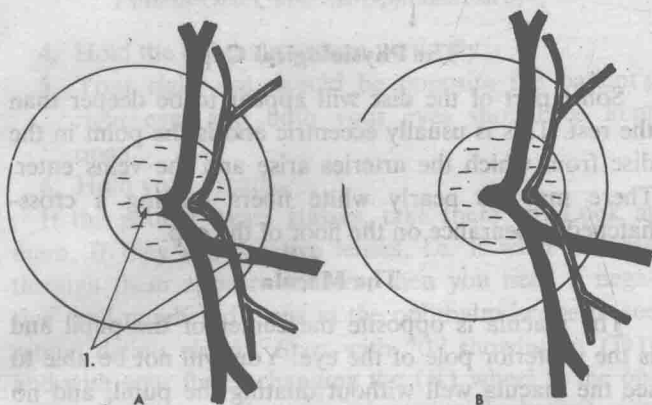


Figure 3a. Detail of retinal vein showing an "empty" segment where the vein disappears into the cup and where it is crossed by an artery.

Figure 3b. Same with veins "filled." The pulsating, filling, and emptying occurs at the same rate as the heart beat.

The Head of the Optic Nerve or Disc

The disc is located at the nasal side of the center of the retina. The disc is pink-white in color in contrast to the orange-red retina. It is round or slightly oval, and the veins disappear into it while the arteries arise from it. The disc usually has a distinct edge around it, but this edge may vanish and the disc will blend into the retina without distinction for a portion of the periphery. This blending into the retina is more evident on the nasal side. A crescent of black pigment around the edge of the disc is common in myopic (short-sighted) persons.

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The Physiological Cup

Some part of the disc will appear to be deeper than the rest. This is usually eccentric and is the point in the disc from which the arteries arise and the veins enter. There may be pearly white fibers making a cross-hatched appearance on the floor of the cup.

The Macula

The macula is opposite the center of the pupil and is the posterior pole of the eye. You will not be able to see the macula well without dilating the pupil, and no one will ask for your opinion on its appearance without allowing you to dilate the pupil. You can see the macula by asking the patient to look into the light, or as follows: Looking at the retina you will see several small groups of arterioles coming off the temporal side of the disc which rapidly curve towards each other in a vertical direction. They end by surrounding the macula (Fig. 2).

The macula is a round, intensely colored area of the retina. It is darker in color than the rest of the retina and has a sharply defined orange-red center with a white spot of reflected light. The center of the macula is called the fovea.

In general, with the ophthalmoscope, the following should be kept in mind:

1. Examine the retinae with the patient sitting.
2. Keep the patient's back to the window, the overhead lights out.
3. Ask the patient not to hold her breath.