Diagnostic Value of Objective Campimetry

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Summary. The results obtained in ten normal subjects with a new method of pupillocampimetry are described and compared with those obtained with routine campimetry.

Once the relationship between the two methods was established, ten subjects suffering from pregeniculate or postgeniculate lesions of the optic pathways were examined by pupillocampimetry.

This study shows the value of this new method, particularly for the differential diagnosis of pre- or postgeniculate lesions.

Key words: Campimetry - Optic pathways - Pre- and postgeniculate lesion - Pupillocampimeter

Introduction

The campimetric test remains a subjective method, even though there have been improvements in recent years, in line with technological progress.

Most automatic and modern campimeters which eliminate possible operator errors still rely, in part, on the cooperation of the subject to indicate the exact moment of perception.

Theoretically, the problem of objective campimetry can be solved with various techniques [1, 2, 3, 5, 8, 9]. The best technique among those possible in clinical practice is the study of the photomotor reflex established by the localised stimulus of the campimeter [4, 6].

The first experimental attempt in this direction was reported by Sugita et al. [7]. Later Trimarchi [8, 9] described an instrument for the clinical application of objective campimetry.

We intend to prove with the use of this instrument that: (1) there are some differences between objective and subjective tracings obtained under identical conditions.

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conditions of adaptation and stimulation; (2) the responses obtained with objective campimetry in normal subjects shows evidence of stability and reliability; and (3) what responses can be obtained in subjects with lesions of the optical pathways.

**Materials and Methods**

The pupiloadaptocampimeter is essentially composed of two parts: one for measuring the diameter of the pupil in static and dynamic conditions; the other for stimulating the retina and maintaining a certain adaptation status.

The part for measuring the diameter of the pupil consists of a silicone diode sensitive to infrared radiation up to nm, connected in closed circuit to a 12" monitor.

The silicone diode frames the iris through a telescopic optical system so that the iris is seen under a 5° angle; this value at a distance of 30 cm corresponds to a 3 cm diameter surface. The light is supplied by an optical system provided with a 30 W lamp with a slightly divergent beam covering a circular field of 40 mm diameter at a distance of 30 cm.

The light optical system and the telescopic lens placed before the silicone diode are both provided with a Shott AG 1000 filter with a band from 900 to 1000 nm.

In parallel to the monitor, a digital minicomputer counts and memorizes the number of the central points of the lines scanned without emission.

As the number of the horizontal lines is constant, the sum of the dark points corresponds to the diameter of the pupil. This measurement is repeated for every scan over three neighbouring points and the average of the three measurements is memorized until the new information arrives, that is, every 20s.

The values are transmitted to a potentiometric recorder as dc voltage and indicate the variations of the pupillary diameter as a function of time.

The part regarding the adaptation of the retina and its stimulation consists of an Etienne campimeter modified appropriately.

The background luminance of the dome is maintained at 8.5 UL psb.

The stimulator of the Etienne campimeter is adapted so as to obtain the localized stimulus; the light source has been replaced by a 15 W filament lamp.

A Compour photographic shutter is placed between this lamp and the filters providing stimuli of different length from 1 s to 4 ms with a wave form very close to the square wave.

The first of the three drums of the shutter determines the variation of the diameter of the spot from Goldman value 0 to 5; the other two drums have Wratten Kodak ND filters with absorption 0, 1, 2, 3, 4 UL, and 0.2, 0.4, 0.6, 0.8 UL, respectively.

The combination of the filters allows luminance variations of the spot from 9.5 UL psb to 4.7 UL psb with 2 UL steps.

First, a dynamic subjective field of vision is determined, under conditions of photopic adaptation, using a 1-4 Goldman view finder.

Unlike the routine method, the stimulus is not present continuously but only for the duration of 150 ms, at 5° intervals, from periphery to center, along the meridians 45°, 30°, 15°, 0°, 345°, 315°, 225°, 210°, 195°, 180°, 165°, 150°, and 135°.

Because of the technical reasons due to the presence of a camera and an infrared light lamp, the meridians 75°, 60°, 300°, 285°, 270°, 255°, 240°, 120°, 105°, and 90° are not explored.

The point of the meridian corresponding to the subjective light perception of the stimulus is first plotted on the graph. Then the test is repeated under the same conditions, and the point of the meridian which corresponds to a pupillary contraction of 0.2 nm in amplitude, is added.

Before this second campimetry, stimuli are sent to the macula cæca in order to ascertain the lack of the pupillary response to the stimulus in this site, thus excluding stray-light phenomena.

The test described was first carried out on ten normal volunteers, males and females, aged 18 to 40 years with irises of various colour.

The tracings obtained were analysed statistically.

The ±-average of the statistic error (SE) was calculated for the angular values of each