Correspondence

Using a +20D lens for non-contact slit lamp biomicroscopy of ocular fundus

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Noncontact slit lamp examination of the ocular fundus has been classically done using high power convex lenses like +90D, +78D, and +60D. A real and inverted image of the fundus is formed in between the high power convex lens and the slit lamp. The +20D lens is commonly used for binocular indirect ophthalmoscopy. The authors use this +20D lens for slit lamp biomicroscopy examination of the fundus.

An informed consent of the patient for a clinical examination is obtained. Unlike the contact lens biomicroscopic examination, corneal anesthesia and coupling gel is not required. The pupil is dilated maximally. The eye is made stable by using the fixation of the eye being examined or the contralateral eye. Both the examiner and the patient are seated comfortably at the slit lamp. The magnification of the biomicroscope is kept at the minimum. The width of the slit lamp beam is decreased to avoid reflections. The patient shifts chin back (away from the headband) on the chin rest. At this position, the patient's forehead does not touch the headband (*Figure 1A*, red arrow). The +20D lens is held near the headband (*Figure 1A*). With coaxial illumination, the joystick of the slit map is moved away from the headband until a clear image of the fundus is obtained. Most of the times, the joystick needs to be moved fully back to get a proper image (*Figure 1A*, green star).

Magnified stereoscopic view of the fundus is possible with the method (*Figure 1B,C*). Troublesome reflections may be prevented by making the light source slightly off-axis. With practice, examination of fundus up to equator is possible by moving the eye.

Examination of the fundus may be achieved by negating the converging refractive apparatus of the eye (erect, virtual image) or by adding a convex lens to this converging refractive apparatus in an indirect ophthalmoscopic examination (inverted, real image). The rays originating from the retina of an emmetropic eye are parallel after emerging from the cornea. Thus, the image of the retina formed by the condensing lens used for indirect ophthalmoscopy lies at the focal plane of the lens. For a +20D lens with a lens diameter of 25 and 40 cm, the distance from the cornea to the lens is 6 and 5.6 cm respectively (1). The image is formed at the focal plane at 5 cm from the +20D lens on the side of the examiner. Thus, for viewing the inverted real image of the patient's fundus through a slit lamp with a +20D lens of 25 or 40 cm diameter, the patient's cornea should be 11 or 10.6 cm farther than the focal point of the slit lamp microscope. To provide this increased distance, the slit lamp has to be brought maximally to the examiner as well as the patient has to shift his head away from the headband.

Gellrich MM used various plus lenses (+20D, +40D, +55D, +60D, and +90D) for slit lamp biomicroscopy of the fundus (2). He noted that the problems with +20D lens were the need of increased examination distance over 10 cm and increased intensity of light over the fundus. Light-induced maculopathy is a potential concern for slit lamp biomicroscopy of the fovea using any lens and even anterior segment (2,3). Kohnen reported two pseudophakic patients with visual acuity of 20/25 who worsened to hand movements following slit lamp photography of the anterior segment for documentation of posterior capsule

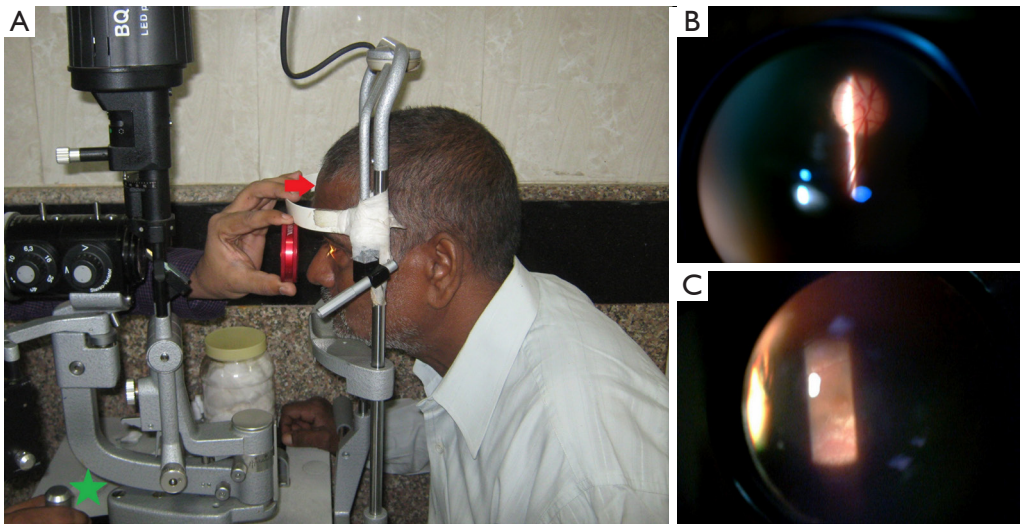

Figure 1 Examination of the fundus on slit-lamp using a +20D lens. (A) The patient's head is positioned away from the headband (red arrow) and the joystick is drawn fully back from the headband toward the examiner (green star). The slit lamp is kept co-axial; (B) stereoscopic examination of the optic disc is shown; (C) the foveal depression along with minute details can be evaluated though annoying reflexes need to be avoided.

using retroillumination (3). The slit lamp used Xenon lamp as the light source, and the exposure may have been more than 10 minutes especially during the adjustments. Both patients noted vision loss immediately after the slit lamp photography. One patient reported pain during the photography, and both patients showed multiple macular scars simulating laser burns (3).

The angle between the observation system and the illumination system should be very small during use of a low-power plus lens (2). Other limitations of this technique include the need for maximal pupillary dilatation and patient cooperation. Also, it is not easy to see the peripheral retina using this technique. Annoying reflexes may obscure the image and positioning the patient may be difficult. Beginners may require 3–5 minutes to get a sharp image of the fundus when using +20D for the first time in slit lamp. The static field of view is smaller and magnification is more compared to the +90D lens. With full pupillary dilation approximately 10°–15° of fundus can be visualized in a single field.

Media haze (corneal opacity, cataract, asteroid hyalosis, synchysis scintillans) and high magnification also may degrade the image quality of the fundus. We have examined more than 100 patients using this method, and we have not noted any specific side effects so far. We believe the stereoscopic appreciation of contour of fovea may be better than +90D when the examiner is accustomed to the technique. Positioning the patient and avoiding the reflexes are the most important skills which a beginner takes time to master. However, in areas with lack of resources, a single +20D lens can be very useful for both indirect ophthalmoscopy and a stereoscopic evaluation of the posterior pole.

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Footnote

Conflicts of Interest: Part of this manuscript was presented as a poster at the Annual Conference of the American Academy of Ophthalmology, held in Las Vegas, USA on 14th–17th November 2015.

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