New neurosurgical operating glasses and fiberoptic headlight

Technical note

CHARLES BURTON, M.D.
Department of Neurological Surgery, Temple University Health Sciences Center, Philadelphia, Pennsylvania

A new type of neurosurgical operating glasses is described, which can be mounted on a regular pair of glasses and give high magnification (×4.4). Good illumination is provided by means of a newly designed fiberoptic headlight.

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NEW neurosurgical operating glasses have been designed which incorporate high magnification and good illumination without the cumbersome bulk of the operating microscope or the limited depth of field focus and magnification of loupes. These neurosurgical operating glasses* (Fig. 1 left) have an optical system based on the principle of the Galilean telescope in which an additional lens compensates for working distance. A telemicroscopic unit, composed of four lenses, is mounted on a lens containing the surgeon's individual prescription. The finished operating telescopes also incorporate the surgeon's functional interpupillary distance, convergence, and inclination angles of the line of


Fig. 1. Left: The neurosurgical operating glasses mounted on the neurosurgeon's eyeglasses. Right: The fiberoptic headlight and headband.
Operating glasses and fiberoptic headlight

vision with the optical axes of the glasses. This unique optical system was originally developed by Dr. William Fienbloom as an aid for visually handicapped persons.

As modified for neurosurgical use, hooded telescopes are mounted on the inferior portion of the lenses by means of a strong and lightweight frame with Silastic nose pieces. The focal point is set at 18 inches, a distance that is most useful for craniotomy or laminectomy; the magnification is \( \times 4.4 \). Use of the Galilean telescopic principle allows greater magnification and resolution while maintaining a wide field of vision (30 mm) and sufficient depth-of-field-in-focus (2 inches) to keep the operative field in focus even when the operator's head returns to the field after looking away.

Illumination is furnished by a fiberoptic headlight† (Fig. 1 right). It is lightweight (4 ounces) and transmits light with maximal efficiency. Several features contribute to comfort during long procedures. There are no projections, such as rivets, from the headband; the headband does not heat up and can be expanded without removing the harness from the head. The focusing device is maintained in a universal movement friction-lock ball joint which is immediately adjustable. The light beam is directed from the bridge of the nose, thus avoiding shadow in deep operative fields. The fiberoptic cable is readily removed from the harness.

The operating telescopes and fiberoptic headlight are used like "bifocal glasses." The operator can maintain a full field of vision with room lights on, or tilt his head and immediately achieve a practical \( \times 4.4 \) magnification with good illumination. The instruments have been tested and improved over the past 3 years.

† Will be made available commercially; for information contact the author.

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Address for reprint requests: Charles Burton, M.D., Department of Neurosurgery, Temple University, Health Sciences Center, Philadelphia, Pennsylvania 19140.