METHOD FOR KERATOGRAPHIC RECORDING*

BY

RONALD PLUMMER AND ADRIAN LAMB

Perth Chest Hospital and Royal Perth Hospital, Western Australia

FINCHAM (1953) gives the history of keratography and discusses its value in ophthalmology. Commercially-produced apparatus to fulfil the functions described are marketed under the names Zeiss Corneal Reflectograph (Jeffreys, 1953) and A.I.M. Photo-Keratoscope (Hansell, 1956). Stein (1958) describes an apparatus which he has produced for photo-keratography. It is not our intention to review this excellent work, but to give details of the methods employed in our department.

Procedure

Apparatus.—A target similar to that described by Fincham (Fig. 1) was produced by making a stencil and painting it on to a circular piece of medium opal Perspex 8.75" in diameter. The main body of the apparatus was made from two 9" diameter cake tins, and the light source was a circular cold cathode tube, made by a local company engaged in the manufacture of neon signs.

FIG. 1.—Fincham type target.

The camera used was a 35-mm. Exakta single lens reflex with extension tubes and an adapter to accept the optical component, a 50 mm. f.3.5 Berthiot Steller enlarging lens. A small amount of metal work to fit the components together, was carried out in the hospital workshops. The Perspex target was fitted into the base of one cake tin, which had had a hole 8" in diameter cut in the bottom, and the cold cathode tube was attached to the interior of the other cake tin by spring clips (Fig. 2). A camera extension ring with the Exakta fitment was then attached to the rear of the tin. The lens and the lens hood were connected to the

* Received for publication August 17, 1960.

rear Exakta fitment extension ring by means of extension tubes and an adapter, and protruded through a hole in the centre of the Perspex target, the camera being connected and disconnected in the usual manner. The distance from the front of the camera to the front of the lens was 62 mm. The apparatus (Fig. 3), being of fixed focus, necessitated total movement when focusing.

FIG. 2.—Cold cathode tube and housing.

FIG. 3.—Apparatus assembled.

In practice, the distance from eye to target was 85 mm. and the resultant image covered a reasonable proportion of the cornea (Fig. 4).

FIG. 4.—Normal corneal reflex.

Photography.—Viewing on the ground glass screen of the camera, the target is focused on the cornea and the exposure made in the usual manner. Using F.P.3 film developed in I.D.11 for 12 min. at 68°F., the exposure was 1/25 sec.

Calibration.—Three ball-bearings of known radius were photographed, the image was multiplied by 5 on to glossy paper, and a graph was drawn (Fig. 5), on which the ordinate was the radius of the bearing in millimetres, and the abscissa was the size in millimetres of the third ring of the image on the glossy print.

FIG. 5.—Measurement graph.

The selection of the third ring for calibration purposes and the degree of enlargement used are optional, but once the calibration has been made for a selected ring or enlargement, no deviation can be allowed. For measuring purposes, it would be possible to use a target of only one ring, provided a graph was drawn as described above, but for the visual inspection of the irregularities and abnormalities of the corneal surface, the Fincham type target is desirable.

Discussion

From the ophthalmologist's point of view, the simplicity and cheapness of this device are its greatest assets. In addition, it is portable and can be carried about from one clinic to another or used in the consulting room. In practice it has been found simple to use, and gives an accurate recording of the corneal curvature.

Keratoconus (Fig. 6, opposite) is fairly common in Western Australia, and this apparatus has been found very useful in recording the gradual changes in curvature which occur as the condition progresses, thereby assisting in the assessment of prognosis.

FIG. 6.—Keratoconus with some keratomalacia.

The instrument is also useful in keratoplasty for recording the condition of the cornea before operation (Fig. 7); the photograph and the curvature graph assist the surgeon in deciding what size graft is required. Post-operatively (Fig. 8), the gradual changes which can be observed in the curvature of the graft have supplemented clinical observation.

FIG. 7.—Corneal scarring before lamellar graft.

FIG. 8.—6 weeks after lamellar graft (A.L.).

Summary

An inexpensive and convenient method of photo-keratography, using a 35-mm. single lens reflex camera is described together with a method for measurement.

We wish to thank Mr. K. Locke and Mr. H. Klavins, of the Public Health Department of Medical Photography, for their assistance. This work would not have been possible without the co-operation of Perth Ophthalmic Surgeon, Dr. R. Linton. Our thanks are also due to the Commissioner of Public Health for permission to publish this article.

REFERENCES

- FINCHAM, E. F. (1953). *Med. biol. Ill.*, 3, 87.
 JEFFREYS, N. (1953). *J. photogr. Sci.*, 1, 184.
 HANSELL, P. (1956). *X-Ray Focus*, 1, No. 2, p. 17.
 STEIN, L. (1958). *Amer. J. Ophthal.*, 45, 104.