67 per cent utilize antibiotic drop application. Comparison of two different methods for donor eye sterilization in this study showed a significantly greater effect using the rinsing-immersion technique (Group B) for both premedia and media cultures. The moderate and heavy growth of S. aureus noted in 60 per cent of globes cultured after Polyspectrin drops (Group A) and the 100 per cent no growth in media up to 48 hours in Polyspectrin (Group B) immersed eyes substantiates the work of Doctor and Hughes3 and the recommendations of McCarey, Slappey, and Kaufman.7 Rinsing plus immersing eyes for three minutes in Polyspectrin appears to be adequate for suppression of S. aureus in this model. We agree with the comments of Doctor and Hughes3 who believe there is a beneficial effect of ridding the eye of bacteria by mechanical rinsing.

Media cultures. Recovery of S. aureus from media in Group A (drop) eyes in this study (Table III) suggests that penicillin-streptomycin doses alone are insufficient to suppress growth of the organism in this animal model. Rinsing plus antibiotic immersion of donor globes plus penicillin-streptomycin as recommended by McCarey, Slappey, and Kaufman7 do appear to be effective in suppressing donor organisms inoculated into the media. We are concerned about and have not yet studied the potential for Gram-negative organisms such as pseudomonas to persist in media.

Corneal button cultures. Direct swabs of corneal-scleral tissue resting in TC-199 media and 48-hour old media buttons placed directly onto blood agar plates yielded 1 to 3 colonies of S. aureus in approximately 20 per cent of eyes. Although attempts were made to bring only endothelium into contact with plates, folding of several buttons during inoculation did occur which exposed epithelium to the plate. We conclude that small numbers of organisms were able to survive on the corneal epithelium even after 48 hours in media. No data is available, regarding the persistence of bacteria on human corneas immediately prior to grafting in moist chamber-stored eyes. For sake of comparison using the same animal model 10 of 10 (100 per cent) moist chamber-stored Polyspectrin drop-treated rabbit eyes inoculated with S. aureus showed recovery of the organism 48 hours after 4°C storage. The clinical significance of these findings is unknown.

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REFERENCES


Stereotaxic device for experimental eye surgery Juan Arentsen and Mario Duran

A stereotaxic device for experimental surgery in enucleated eyes is described. This instrument is made entirely of plastic, is inexpensive to make, and has proved to be an invaluable help in teaching microsurgical procedures to ophthalmic residents.

Most surgical procedures of the anterior segment of the eye are done today under the surgical microscope. Microsurgery, as it is commonly called, has improved results because with the magnification afforded by the microscope the surgeon can better appreciate the various surgical steps of his procedure. Training of eye surgeons demands extensive practice in experimental animals and enucleated eyes, particularly when using the surgical microscope. One of the more frequent
problems when working with enucleated eyes is that of properly stabilizing the eye so a procedure can be carried out comfortably and under relatively high magnification. Mannequins are available and have been used in the past for this purpose. These devices, however, are costly and do not provide a stereotaxic movement which may be useful in some instances.

The instrument we describe here is simple, affords firm stabilization of human or animal eyes, and offers a full range of three dimensional movements.

The instrument consists of a stereotaxic mechanism which permits movements of rotation and translation in addition to tilting (Fig. 1). It can

Fig. 1. Drawing of the plastic stereotaxic device for experimental eye surgery. The device is affixed to the plate A which can rotate over a heavier base. Two posts (B) support the plate securely which can be tilted in any desired position. This plate has a threaded perforation and a rim (C) to which an eye cup can be fitted. The eye holder EF can be screwed to the plate C by rotating its base F.

Fig. 2. It shows an actual model. The experimental eye is placed in the concave recipient A and covered with the cup B.

Fig. 3. (A through F.) The drawing illustrates different types of retaining cups which can be used to practice different types of surgical procedures. For example, cup A is useful for keratoplasty, cup F is useful in glaucoma operations.
be adjusted in any of these positions. The eye holder itself is a small container which consists of two principal pieces—a concave hemisphere or base (Fig. 2, A); this concave base is the end of a cylinder with threaded walls which can be raised or lowered by turning it around the plate d. The eye is placed in this hollow base. The second piece is a cover (Fig. 2, B) which is affixed to the concave base and secures the eye in place.

Different types of covers are illustrated in Fig. 3. They are used to retain the globe during procedures such as corneal transplantation, cataract removal, glaucoma procedures, etc.

**To use the device.** The globe is placed on top of the concave cylinder and covered by one of the selected tops (Fig. 2), adequate intraocular pressure is then produced by screwing the base (Fig. 1, F); this will push the eye against the cover. Un screwing the base will decompress the eye and lower the pressure. With this mechanism, the ocular tension can be raised over 100 mm. At the University of Chile, we use this instrument in the practice of microsurgery, such as placing corneal sutures, repair of lacerations, paracentesis, iridectomy, trabeculectomy, lens extraction, and even vitreous procedures. By varying the covers, different areas of the eye can be exposed and the intraocular pressure can be regulated to reproduce that which we find in clinical cases. This device is useful in teaching anatomy, since it is possible to remove the cornea, iris, and lens without losing vitreous, and make an open-sky microanatomic dissection of the anterior segment. We have used this device, also, to teach medical students and residents how to take ocular pressures with various tonometers.

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**REFERENCE**


Surface ultrastructure of the human lens capsule and zonular attachments. **PATRICIA N. FARNSWORTH,* JOSEPH A. MAURIELLO,** PATRICIA BURKE-GADOMSKI,* TEOFIL KULYK,** AND ALFONSE A. CINOTTE.**

The ultrastructure of the human lens capsule and zonular attachments was studied using scanning electron microscopy. The capsule was found to have two components: an organized mass of undulating, roughly parallel fibrils and a granular component. The undulation of the capsular surface and filament organization was much less evident near the anterior pole. The zonules were also found to be fibrillar and easily distinguishable from the capsular network. The three-dimensional aspects of the association between the zonules and the capsule as seen in these studies appear to meet the requirements of accommodation.

The ultrastructure of the lens capsule and the insertion of the zonules have been studied by transmission (TEM) and scanning (SEM) electron microscopy. However, the details of the three-dimensional architecture of these structures and their interconnections remain unresolved. The capsule has been described as a grossly homogeneous, acellular structure which surrounds the entire lens. In TEM studies, it appears lamellated with faintly fibrillar sheets of basement membrane substance. The zonular fibers insert about the lens equator on the anterior and posterior surfaces. Although it is generally agreed that the depth of fibrillar penetration is for the most part superficial, the exact nature of the attachment remains unclear.

The high resolution scanning electron micrographs presented here establish the three-dimensional construction of the lens capsule and the areas of zonular insertion. The fibrillar organization of the capsule and the zonules are discussed and related to the process of accommodation.

**Method.** Human lenses were obtained from donor eyes for corneal transplant, Eye Bank of New Jersey, and from patients undergoing lens extraction, Jersey City Medical Center. Only those lenses made available for immediate fixation on removal were used for the following study. Seven normal human lenses were prepared and observed, however, the scanning electron micrographs presented here are from a single normal donor and are in concert with the observations on all the lenses.

The lenses were fixed, as previously described by Farnsworth and co-workers in 5 per cent glutaraldehyde in phosphate buffer (pH 7.3) for 24 hours. Following fixation, dissection and sectioning of the lenses were performed with the aid of a dissection microscope. The specimens were dehydrated for critical point drying using acetone, and dried in a Denton Critical Point Drying Apparatus (DCP-1) for 40 minutes. They were then coated with a thin layer of gold-palladium (Au 40 per cent-Pd 60 per cent) in a Denton Vacuum Evaporator (DV 502). Denton’s tilting omni stage with variable speed rotation causes the angle between the source and the specimen to vary continuously, thus ensuring even