

ACTAS TERTIUM FORUM OPHTHALMOLOGICUM
A MODIFIED ARTIFICIAL ANTERIOR CHAMBER FOR
USE IN REFRACTIVE KERATOPLASTY

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The artificial anterior chamber¹ was originally developed to allow anterior trephination of corneas preserved in MK medium. We modified the instrument so that it could be used to produce lamellar corneal sections with the Barraquer microkeratome.

The microkeratome² is capable of performing high quality lamellar corneal sections. The instrument is used mainly in refractive keratoplasty but can be an extremely effective tool in performing lamellar corneal transplants. With the Barraquer system, microkeratome keratectomies can be carried out only in vivo, or on whole donor eyes. The widespread use of MK medium for corneal preservation³ provided impetus to design an instrument which could allow making lamellar corneal sections with the microkeratome on these readily available donor corneas.

DESCRIPTION OF DEVICE

The instrument (Fig. 1) is manufactured of teflon and stainless steel*. The main working components are a black teflon dome, which incorporates

* The artificial anterior chamber can be obtained from Ophthalmic Specialties, P. O. Box 27, San Gabriel, California 91778.

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a hydraulic system consisting of a modified Yale BD needle hub and a bored passageway within the dome. A fixation ring fits into the angular landing near the top of the dome. A pair of stainless steel springs holds the ring in place and supplies even tension around its circumference. When the donor cornea is in position, an even pressure is applied to the scleral rim by the securing ring. This creates a seal by forcing the sclera into close contact with the teflon dome. A positive pressure within the artificial anterior chamber is formed using MK medium injected through the syringe fitting.

The modifications of the system for use with the Barraquer microkeratome are the following:

- 1) Use of a combination of MK medium and air within the hydraulic system to produce a high pressure compressible system. It provides reliable pressures of 60 mm Hg or more necessary to obtain reproducible lamellar sections.
- 2) Fabrication of an adjustable fixation rotating ring assembly to accommodate the microkeratome, so various size lamellar donor sections could be cut. The device is a precisely machined two piece assembly. The upper portion or rotating ring threads onto the lower portion or fixation ring, which seals the donor cornea in position.

The rotating ring contains tracks to accommodate the microkeratome similar to those found on the Barraquer suction rings. The height of this rotating ring can be varied by rotating it on the fixation ring threads. This exposes varying amounts of corneal tissue to the microkeratome blade, thereby modifying the diameter of the lamellar section. The system allows the use of the presurgical tonometer and the set of special applanation lenses which are part of the Barraquer microkeratome system.

METHOD OF USING THE MODIFIED ARTIFICIAL ANTERIOR CHAMBER

To use the instrument, the surgeon fills one syringe with air and a second with MK medium. Disposable 5 cc syringes are used. The syringes are connected to the needle hub at the base of the teflon dome via the two way stopcock. The central passageway is filled with MK medium until a fluid meniscus forms on the dome's flattened top. The cornea is then carefully placed on top of the dome without disrupting the fluid meniscus. The fixation ring is then placed over the cornea and its springs secured to the base of the instrument. The chamber is filled with MK medium and is brought up to a pressure of 60 mm Hg as measured by the presurgical tonometer.

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Two-tenths of a ml of MK medium is withdrawn and is replaced with air until the pressure in the anterior chamber is brought to 60 mm Hg again.

Finally, the rotating ring is threaded onto the fixation ring. The diameter of the lamellar section is measured with the Barraquer applanation lens. The rotating ring is turned until the diameter of the applanated cornea matches the ring engraved in the applanation lens. The thickness of the lamellar section is determined by inserting the appropriate stainless steel plate in the head of the microkeratome.

The intraocular pressure is checked again and more air is introduced if necessary, to bring the pressure to 60 mm Hg. The microkeratome head is slid onto the track of the rotating ring and the lamellar section is carried out (Fig. 2).

SUMMARY

A modified artificial anterior chamber, which enables Barraquer microkeratome keratectomies on corneas preserved in MK medium has been devised. It consists of a hydraulic system which creates a positive pressure of 60 mm Hg and over. An added rotating ring serves as a base to the microkeratome's tracks and allows one to obtain varying diameters of lamellar sections. Its mode of operation is described in detail. This device allows the surgeon to use readily available corneas with scleral rims preserved in MK medium rather than whole eyes to obtain precise lamellar sections.

REFERENCES

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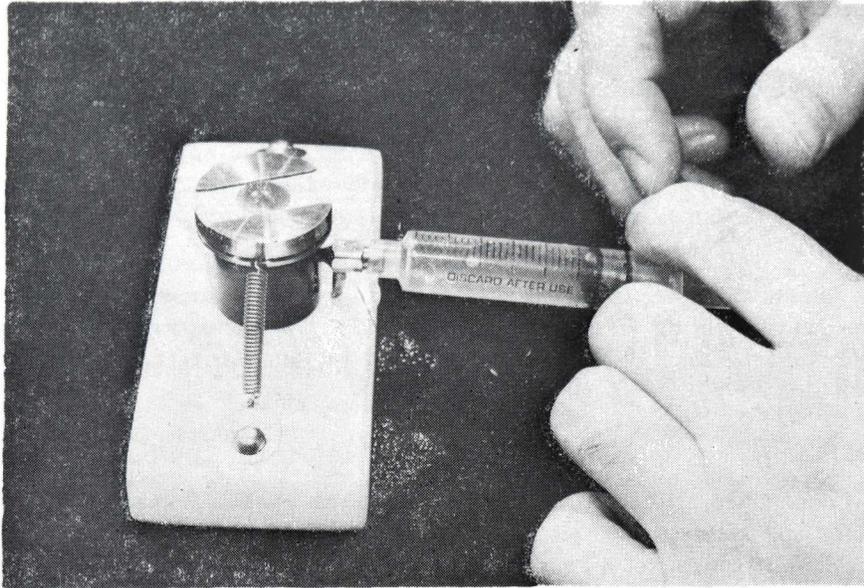


FIGURE 1

(Maguen et al) A human cornea is mounted on the modified artificial anterior chamber using the adjustable two piece fixation rotating ring device. Positive pressure of 60 mm Hg is created by injecting known amounts of air and MK medium. The rotating ring containing the microkeratome tracks is threaded in place.

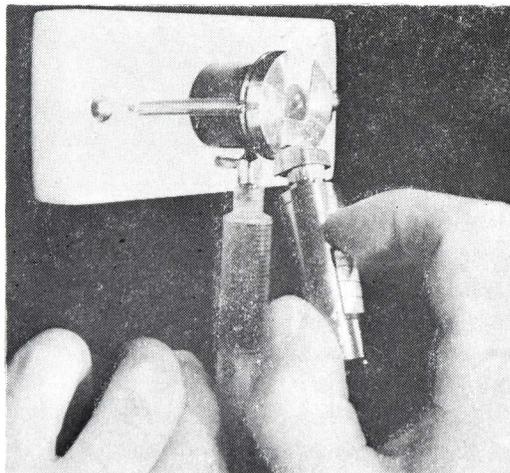


FIGURE 2

The microkeratome head is inserted onto the tracks of the rotating ring and the microkeratome section is carried out.