

## ACRYLIC GONIO-SUBCONJUNCTIVAL PLATES IN GLAUCOMA SURGERY\*

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OF the numerous surgical procedures designed to the dictates of the pleomorphic demands of glaucoma no one method can be regarded as invariably satisfactory. The very fact that so many operations have been designed for the relief of ocular hypertension suggests that a surgical procedure has yet to be evolved which would adequately restore and maintain normal pressure and save the eye from disaster. The surgeon is consequently forced to select one operation in a given case of simple glaucoma from a long list of possible methods. Sometimes he opens the filtration angle in the hope of establishing an adequate drainage channel, or where this is already obliterated or has been damaged by the pathological process he looks for the seepage of aqueous fluid into the subconjunctival tissue or the suprachoroidal space, through sclerectomies with or without cyclodialysis.

Various operations are fashionable in different countries: in the U.S.A., U.K., Pakistan, and India the corneo-scleral trephine is used; on the continent of Europe cyclodialysis and Langrange's sclerectomy are used, and in Norway and Sweden iris inclusion operations are preferred.

The concept of the gonio-subconjunctival acrylic plate which forms the subject of this paper is based partly on the successful insertion of acrylic lenses in the surgery of cataract (Ridley, 1952) and partly on Seton operations practised by Mayou (1912, 1913), Zorab (1912, 1913), Gradle (1924), Clay (1928), and Wolfe and Blaess (1936) for the establishment of drainage channels from the anterior chamber to the supra-choroidal space by means of threads (Weekers, 1922), gold drains (Stefansson, 1925), and horse-hair (Row, 1939).

**Material.**—A plastic substance was used instead of glass because its specific gravity is half that of glass, its edges can be rounded off, the drainage channels can be very easily engraved. It can be shaped into very fine plates and retained in the eye without deformation and without jeopardizing the safety of the eye by accidental injury. It is also perfectly transparent, and is inert in tissue fluids (Ridley, 1952). It has been known to be very well tolerated after traumatic injuries and to be retained within the eye indefinitely without adversely affecting it. Finally, the surgeon can make the plate for himself with a sharp knife from a 1-mm. thick plastic sheet.

Many other materials have been used in Seton operations, but they carry the disadvantage of sooner or later exciting foreign-body reaction and making the eye vulnerable to the menace of sympathetic ophthalmia. The weight of a gold drain contraindicates its use in the ciliary body of the eye and the sphere of usefulness of Seton operations is confined to cases of absolute glaucoma or to cases of simple glaucoma not amenable to other surgical procedures in establishing adequate drainage channels.

Ridley's work has shown the value of plastic material. Polymethyl methacrylate

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(Transpex 1: I.C.I.) was used to make the plates. These were sterilized in 1 per cent. Cetrinide solution (or Lysol) for one hour and were rinsed in normal saline before insertion.

**The Plate.**—This is composed of a lamina 1 mm. thick (Fig. 1*a*). It is divided for descriptive purposes into head, neck, and body (Fig. 1*b*). The body (B) is rectangular in shape, 6 × 4 mm. in size, with the head (A) attached to one short side, the other side being the base (F). The corners of the base are rounded off to avoid damage by its sharp edges to the adjoining tissues. The side on which the head is attached, the shoulders (E) forms a shallow curve with its concavity away from the body.

The head which is 2 mm. long with its free edges rounded off is attached to the body by the neck (D) 1.5 mm. broad. The neck slopes off into the head describing a shallow curve, forming shallow channels (C) on both surfaces of the plate so that the head which is 1 mm. thick near the neck is thinned out to 0.5 mm. near its apex. The head is perforated by a small central hole (G), from which three small drains run on to the body on each side of the plate. The central channel runs right to the centre of the base and the two lateral ones to the two edges. The plate is shown in section in Fig. 1 (c).

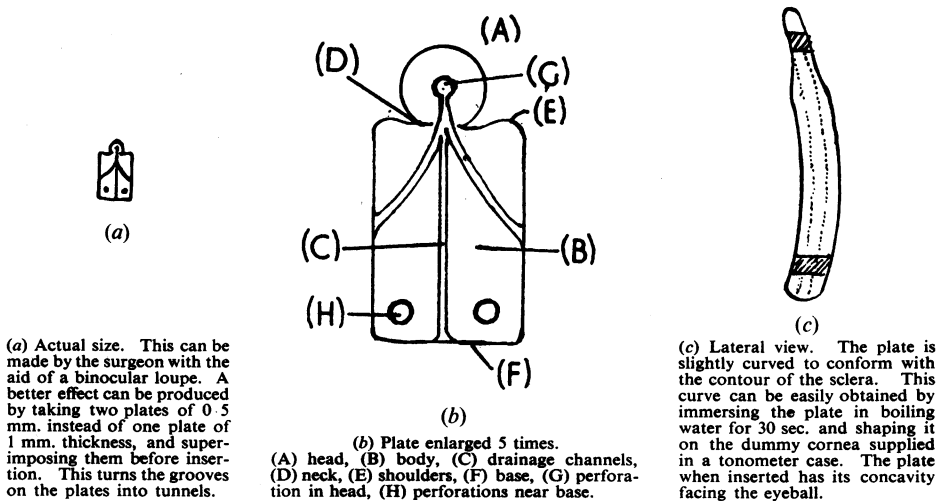


FIG. 1.—Construction of acrylic plate.

**Procedure.**—After the usual type of local analgesia has been given and the speculum inserted, a superior rectus stitch is taken with No. 1 white silk and clamped to the towel covering the head so that eye is turned down. A subconjunctival injection of 5 minims Novutox and adrenaline is injected under the bulbar conjunctiva from 9 to 1 o'clock in right eye. The conjunctiva is picked up 8 mm. behind the limbus in the 10 o'clock meridian and snipped with a spring scissors. The wound is enlarged on each side to extend it from 9 to 1 o'clock concentric with the limbus (Fig. 2). The conjunctiva is now undermined with a few snips of the scissors downward to the limbus. An area of about 6 mm. round the limbus is cleared off with a muslin swab held in a mosquito forceps. With a Took's knife the episcleral tissue is cleared away from the sclera. The conjunctival flap is now retracted forward and a little downward by the assistant. The surgeon fixes the eye with a forceps in his left hand at 4.30 o'clock, and with a narrow cataract knife in his right hand makes a puncture into the corneo-scleral junction at 10.30 o'clock, so that its apex just appears in the anterior chamber. An opening wide enough to accommodate the head of the plate (*i.e.* about 2 mm.) is made, and the knife quickly withdrawn. The posterior lip of the wound is now depressed with an iris repositor; a manoeuvre by which the iris prolapses into the wound. With a fine iris forceps the iris is picked up and a button-hole

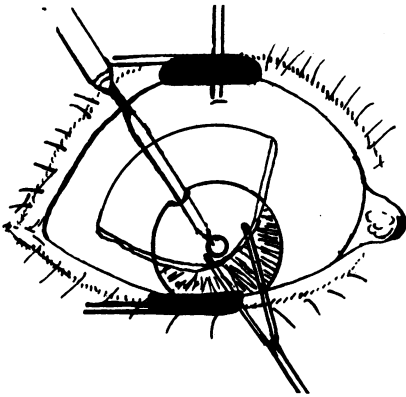


FIG. 2.—Enlargement of wound from 9 to 1 o'clock concentric with limbus.

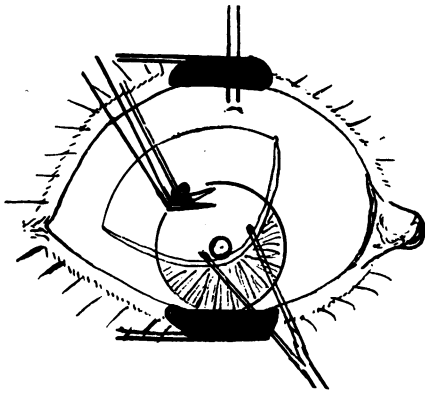


FIG. 3.—Button-hole iridectomy with fine iris forceps.

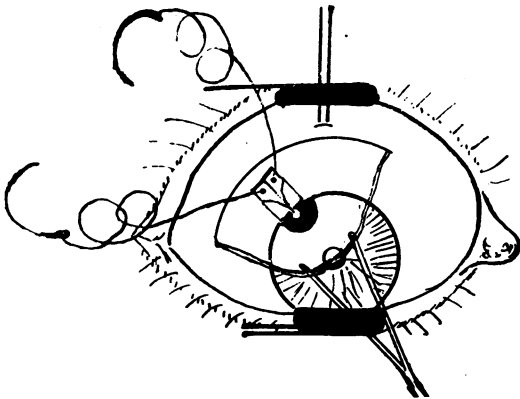


FIG. 4.—Head of plate inserted into anterior chamber with shoulders abutting against the intact limbus.

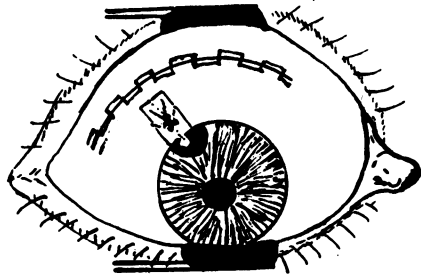


FIG. 5.—Closure of wound with key-pattern suture.

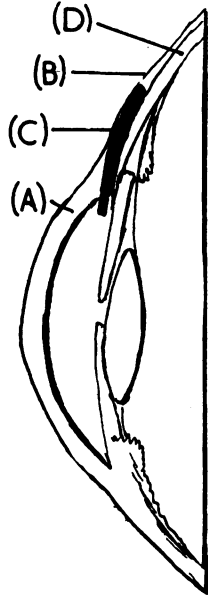


FIG. 6.—Sagittal section of the eye with plate *in situ*.  
(a) cornea, (b) conjunctiva  
(c) plate, (d) sclera.

iridectomy performed in the usual way (Fig. 3). The iris is stroked back in its place with an iris reposer, and the head of the plate is inserted into the anterior chamber, so that its shoulders abut against the intact limbus (Figs 4 and 6). This manoeuvre is facilitated if the anterior chamber is previously irrigated with normal saline to allow the reformation of the anterior chamber. The conjunctival flap is stroked back into place (Fig. 5) and the wound

closed by a continuous key-pattern suture. The speculum is removed, gutt. atropine and a drop of ol. parolein are instilled, and the dressing is applied.

Care should also be taken to instill gutt. eserine into the unoperated eye. Post-operative care is the same as for a simple iridectomy.

**Complications.**—There are two dangers peculiar to this operation:

(1) *Slipping of the plate into the anterior chamber.*—This can occur only if the corneo-scleral wound is inadvertently enlarged beyond the size of the plate. As a precaution two holes are made in the body of the plate which is threaded and later secured to the overlying conjunctival flap.

(2) *Slipping of the head out of the anterior chamber.*—This can be avoided by the same manoeuvre of securing the plate with extra holes to the conjunctival flap. Even if it does slip out, no great harm is done, since the wound will stay open because of the presence of the plate and a good filtering channel may still be formed. Failing this the whole procedure may have to be repeated.

The reduction in tension may not be adequate with one plate. Should this occur a second plate may later be introduced at 1.30 o'clock. This is why the first operation is planned at 10.30 instead of 12 o'clock. It will be noted that both the plates lie under the upper lid and can only be seen with difficulty.

**Indications.**—All cases of chronic glaucoma are amenable to this surgical procedure. No objection to its use in cases of acute glaucoma has so far been met with. The only case that we had in our series gave a very satisfactory result.

### Results

Of the eleven cases, three had glaucoma (acute in one case) in both eyes and both were operated upon; four had absolute glaucoma in the second eye, and since the latter was not painful, it was not interfered with; in the remaining four cases the second eye was normal.

The fourteen eyes so far treated have shown a very good response. Two have been followed-up for 6 months after operation. In two other cases a second plate had to be incorporated before the tension was restored to normal. Six patients were lost sight of after only three monthly visits but the rest have maintained normal ocular tension to date.

We are anxious to try the operation on a wider scale, so that it may be compared with the other methods already in use.

### Summary

A new operation is described for the treatment of chronic glaucoma. A plastic plate is incorporated in the subconjunctival tissue, which has drainage channels engraved on it prior to its introduction. Part of the plate (the head) lies in the anterior chamber, and a hole directs the aqueous into the drainage channels on the body of the plate.

Good results were achieved in all the fourteen eyes operated upon, one being a case of acute glaucoma.

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### REFERENCES

- CLAY, G. E. (1928). *Trans. Amer. Acad. Ophthalm. Otolaryng.*, **33**, 279.  
 GRADLE, H. S. (1924). *Amer. J. Ophthalm.*, **7**, 851.  
 — (1931). *Ibid.*, **14**, 936.  
 — (1935). *Ibid.*, **18**, 730.  
 MAYOU, M. S. (1912). *Ophthalmoscope*, **10**, 254.  
 — (1913). *Ibid.*, **11**, 258.  
 RIDLEY, H. (1952). *British Journal of Ophthalmology*, **36**, 113.  
 ROW, H. (1934). *Arch. Ophthalm. (Chicago)*, **12**, 325.  
 STEFANSSON, J. (1925). *Amer. J. Ophthalm.*, **8**, 681.  
 WEEKERS, L. (1922). *Arch. Ophthalm.*, **39**, 279.  
 WOLFE, O. R., and BLAESS, M. J. (1936). *Amer. J. Ophthalm.*, **19**, 400.  
 ZORAB, A. (1912). *Ophthalmoscope*, **10**, 258.  
 — (1913). *Ibid.*, **11**, 211.