EXPERIMENTAL CATARACT SECTION*

A PRELIMINARY REPORT

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THE classical cataract section, either by a von Graefe knife or by a keratome and scissors, is essentially a section in which the cornea is sliced (Fig. 1). An enormous number of techniques has been developed which incorporate this slicing section; these usually involve direct suturing either of the cornea after its section, or of the corneo-scleral margin with or without a flap to cover the incision.

The two fundamental objects of any cataract section are that an adequate opening is made in the globe for the extraction of the lens and that the section is closed post-operatively so that the normal globular shape of the eyeball is reassumed without aqueous leak or iris prolapse; but in my opinion the classical type of section is unsatisfactory in that, when normal intra-ocular pressure is built up, the anterior and posterior surfaces of the incision tend to be forced apart so that, were it not for the normal process of healing aided by corneal suturing or a covering flap, the natural course of events would be a constantly leaking wound. With this objection in mind I turned to the development of a corneal section which would jam the section edges together instead of forcing them apart, or which would at least create the maximum amount of friction between the cut edges. The section upon which I have been engaged has been a slanting one, with the slant inclining from the direction of the corneal centre towards the angle of the anterior chamber and in a posterior direction. This is similar to the way in which a watch glass fits into the rim of a watch (Fig. 2).

FIG. 1.—Section by the classical method.

FIG. 2.—Section by the watch-glass method.

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Instruments.—The first is a 10.5 mm. Franceschetti trephine, which is sharp on only 180° of its cutting edge (Fig. 3). The second instrument is a block of metal slightly hollowed out at one end to the same radius of curvature as the cornea and angled so that it inclines on the cornea at about 30° from the perpendicular. On one plane of this block is attached a sharp knife, with the blade 1 mm. or so from the concave end (Fig. 4). The complete instrument is shown in Fig. 5.

FIG. 3.

FIG. 4.

FIG. 3.—Modified Franceschetti trephine.

FIG. 4.—Corneal knife.

FIG. 5.—Corneal knife and trephine.

FIG. 5.

Method.—With the trephine a groove is cut in the upper 180° of the cornea, about 0.25 mm. deep and about 1 mm. within the limbus. The trephine is removed and the groove is stained with fluorescein for identification. The knife attached to the metal block is then placed inside this groove and the section is gradually cut sloping into the anterior chamber. When eventually the anterior chamber has been reached at one point it is not usually possible to continue cutting the section with this knife, so a von Graefe knife is gently inserted into the anterior chamber, taking care not to injure the iris, and with this knife later combined with scissors the section is completed and has more or less the same dimensions as a normal classical section.

When the anterior chamber is reached it is not immediately lost and an appreciable time remains for manoeuvring the von Graefe knife in the angle; when eventually the anterior chamber collapses it is possible to pick up the posterior lip of the incision with forceps and to lift the cornea away from the angle so that no damage should be done to the angle of the anterior chamber or to the iris.

The cataract is then removed by whichever method is suitable and three corneal sutures are inserted. It is interesting to note that this type of section renders the application of corneal sutures extremely simple.

Results

23 cataracts have been operated upon by this method (Table, overleaf).

There have been five cases of slight iris incarceration in the inner part of the corneal wound, but only one was severe enough to give an irregular pupil. No case of hyphaema occurred. There were three cases of accidental iridodialysis caused by the scissor blades, and while the result was of no functional importance it was aesthetically objectionable.

There was only one case of iris prolapse and this was so minute as not to require surgical correction.

The degree of post-operative astigmatism is interesting: twelve of the 23 cases showed no astigmatism whatsoever, and of four cases in which the watch glass section was carried out in one eye and the classical section in the other, two showed the same degree of astigmatism at the same axis in each eye, and two showed no astigmatism at all in the eye with the watch glass section, but a certain degree of astigmatism (moderate in one and marked in the other) in the eye which had had the classical section.

Advantages and Disadvantages

Disadvantages

(1) The watch glass section takes much longer to do and is much more difficult. Much firmer fixation of the globe is required and, with a very friable conjunctiva in elderly people, fixation is almost impossible with the knife that I have been using at present. To overcome this I have tried inserting sutures in the limbus, cutting them short and then using them as a basis of fixation, but this has proved to be disappointing.

TABLE
RESULTS IN 23 CASES

Case No.	Complications				Type of Extraction	Later Visual Acuity	Post-operative Astigmatism		Astigmatism in other eye if classical section done or Remarks
	Iris Incarceration in Section	Hyphaema	Accidental Iridodialysis	Iris Prolapse			D cyl.	axis	
1					Intra	6/9	+4.5	140°	
2	Minute			Minute	Intra	6/6	+2.5	20°	+2.5 D cyl., axis 15°
3					Intra	6/9	+1.75	20°	
4					Intra	6/9	None		
5					Intra	6/60	None		Diabetic retinopathy
6					Extra	6/9	None		
7					Intra	6/12	None		+2.5 D cyl., axis 10°
8					Intra	6/6	None		+4 D cyl., axis 180°
9	Slight				Intra	6/6	+1.5	60°	
10					Intra	6/9P	+3	170°	
11					Intra	6/9	None		
12			Yes		Extra	6/6	None		
13	Slight				Intra	6/9P	+2.5	30°	
14					Intra	6/60	None		Old corneal scars and vitreous opacities
15					Intra	6/9	None		
16	Severe				Intra	6/60	+3	160°	Diabetic retinopathy
17					Intra	6/9	+2	15°	
18					Intra	6/6	None		
19	Slight				Intra	6/18	+0.75	75°	
20			Slight		Intra	6/12	None		
21			Slight		Intra	6/6	None		
22					Intra	6/6	+1	30°	+1.5 D cyl., axis 180°
23					Intra	6/6	+2	180°	

- (2) This method is not suitable where the anterior chamber is shallow.
- (3) Accidental iridotomies and iridodialyses may occur from time to time. While these are of no functional significance unless very large, they are aesthetically objectionable.
- (4) The degree of access to the interior of the eye is less than when the section is placed more peripherally, but this has not proved to be a disadvantage in practice.

Advantages

- (1) A firmly apposed and fairly leak-proof section was achieved in every case but one. The sharp acute-angle edges of the section are extremely easy

to grasp with forceps and to suture, and radial apposition of the wound edges is certain.

(2) As the section is entirely corneal no haemorrhage occurs and the eye appears to settle down post-operatively very much more quickly than by the usual method.

Summary

An experimental corneal section is described in which the wound edges fit in the same way as a watch glass fits into the rim of a watch. The advantages claimed are that this section forms a more leak-proof wound than the classical one. 23 cases are analysed and the results show that it is possible to make a corneal section slanting into the anterior chamber without too much difficulty. However, further improvements in instrumentation and in the fixation of the globe are required. It is hoped to develop a rotating corneal knife which is expected to simplify the procedure.

I wish to thank Messrs. John Weiss for making the knife, and Messrs. Dixey for making the trephine.