

# Review of Binkhorst intraocular lenses

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**SUMMARY** Experience is described of 150 cases in which an intraocular lens of the Binkhorst (iris clip and iridocapsular type) was introduced after cataract extraction. The most serious complications are dislocation and corneal dystrophy.

Replacement of the cataractous lens by an intraocular device dates back from the work done by Harold Ridley (1951). Others (Strampelli, Choyce, Binkhorst, Worst, Dannheim, Federov, and Copeland) followed, modifying the type of lens used.

Interest in these optical devices remained because of the great advantages gained—for example, good visual field and the refractive state of the eye approaching the normal (Hall, 1974; Percival and Yousef, 1976). (The power of the correcting glasses is minimal.) So far over 200 intraocular lenses of the Binkhorst types have been inserted in this unit.

This paper deals with the first 150 of these. The cataractous lens was replaced by the Binkhorst clip lens type of pseudophakos (117 cases) and the Binkhorst iridocapsular lens type of pseudophakos (33 cases) (Binkhorst, 1973). These 150 cases were not selected in any way. The operations were performed when an intraocular lens became available, and the next person on the waiting list for cataract surgery was chosen. The use of these lenses in this study started in December 1970, when the first lens was inserted, and the last lens in this series was introduced on 9 November 1975. The longest period of observation is consequently nearly 6 years and the shortest period is 6 months. These dates are important in the evaluation of the results. Excluded from the series were patients (11 eyes) who died before they could be followed up for 6 months or who did not attend for follow-up.

## Patients and methods

### VISUAL RESULTS

Apart from eyes with badly injured corneae due to trauma and those with retinal disease the corrected visual acuity was 6/12 or better in 80% of eyes.

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### OPERATIVE TECHNIQUE

Nearly all the operations were done under local anaesthesia unless the patient specially requested general anaesthesia or was unable to co-operate.

A limbal section nearly 180° with limbus-based conjunctival flap was the usual procedure. A Flieringa ring was often used fastened to the sclera by at least 12 sutures, and the corneal incision was closed with a minimum of 4 virgin silk sutures. Initially air was used to reform the anterior chamber, but latterly saline. Zonulysin was used in all but the extracapsular operations, and some of the extracapsular extractions were also fitted with the iris clip lens when it was thought that insufficient capsule had remained to use the iridocapsular lens with safety from dislocation.

### COMPLICATIONS

(a) *Dislocation of lens* (4 cases). Initially dislocation of the lenses was feared and the patients were maintained on 2% pilocarpine drops 3 times a day. However, a number of eyes developed a thin membrane in the pupil, and further miotic treatment to retain the lens in place was not necessary. A special paper deals with these 4 dislocated lenses.

(b) *Deposit on lens*. Some lenses showed a deposit of what can best be described as mutton fat keratic precipitates. The cornea was not involved and the visual acuity did not seem to be affected. These deposits may be due to accumulation of cells and exudates on the pseudophakos as a result of static electricity.

(c) The most serious complication was *corneal dystrophy*. We found 2 types of dystrophy, localised and general.

#### *Localised dystrophy*

This classification (an alternative term is localised endothelial decompensation) (Binkhorst, 1973) was made when the corneal oedema was confined to a

small localised area of the cornea only. These eyes did not have their pseudophakos removed, and the visual acuity remains good. We found 10 cases of this kind and all in eyes fitted with iris clip lenses.

#### *General dystrophy*

This classification (alternative term generalised endothelial decomposition) (Binkhorst, 1973) was made when the whole of the cornea was involved with perhaps some clear areas. We found 16 cases of this kind. Two of these had an iridocapsular lens, and the other 14 had been fitted with an iris clip lens. All these cases have had the pseudophakos removed at a subsequent operation. These cases of corneal dystrophy warrant further comment.

*Onset*—Binkhorst (1973) mentions that all cases of corneal dystrophy in his series developed immediately after surgery. In our series of 16 cases of generalised corneal dystrophy there was great variation in the time of onset of the dystrophy: 2 cases developed dystrophy after 4 years; 2 cases developed dystrophy after 2 months. In the other eyes the dystrophy had its onset between 1 and 3 years.

*Possible causes (considering the 16 eyes with generalised corneal dystrophy only)*—We found 2 diabetics among the 16. In view of the fact that 5 of the 16 started off with badly traumatised cornea, the incidence of 2 out of 11 (18%) is extremely high.

One patient with corneal dystrophy suffered from polycythaemia vera. One other patient suffered from chronic bronchitis, emphysema, gout, and congestive heart failure. One eye had an unintentional filtering bleb covered by conjunctiva. In many of the other cases there had been contact between the cornea and the lens initially, though subsequently there seemed to be no problem.

Looking back at these cases it seems to me that some of these corneal dystrophies could have been prevented by removing the pseudophakos in time and by excluding cases with the above diseases. Slit-lamp examination to observe the endothelium is now done in all eyes in which introduction of an artificial lens is planned.

*Type of lens*—If one considers the total number of 26 eyes with localised and general corneal dystrophy, then the ratio between iris clip and iridocapsular lenses is 24:2 or 12:1, respectively. Of the total of 150 eyes studied the ratio of clip lenses to iridocapsular lenses is  $3\frac{1}{2}$ :1. It follows, therefore, that corneal dystrophy is about 3 times more common when an iris clip is used than if the iridocapsular lens is used. This, however, may be caused by numerous other factors. Three obvious ones spring to mind: (1) The younger age group in which the iridocapsular lens is used in contrast to the older

age group in the iris clip type. (2) The different kind of operations: the iris clip lens used with mainly intracapsular lens extractions (but also in some extracapsular lens extractions). The iridocapsular lenses used exclusively with extracapsular lens extraction. (3) The use of Zonulysin exclusively when the iris clip lens is used.

There may be numerous other factors. Van Balen *et al.* (personal communication) and Binkhorst (1973) think that contact between anterior loop and endothelium plays a role. This may be so in some cases, but I do not think this is the main cause. Corneal dystrophy also occurred in 2 eyes with an iridocapsular lens, where anterior loop contact is excluded.

Since corneal dystrophy in our series had its onset even 4 years after lens implantation, we expect further cases of corneal dystrophy in the present series. The percentage of corneal dystrophy, if one includes localised dystrophy, is high, namely 26 out of 150 (17%).

However, it is difficult to compare series. Our cases were not selected, and 5 serious corneal perforating injuries were fitted with these lenses (the lenses had to be removed eventually). If these 5 cases are subtracted from the 16 with generalised corneal dystrophy one arrives at a figure of 7 to 8%, which is in keeping with the results of the Rotterdam University Eye Clinic (Van Balen *et al.*, personal communication). Yet the percentage of dystrophies in this present series might rise if patients live long enough and when the follow-up time is increased.

*Postoperative iritis*—This occurred in a minority of cases. The exact number is not known because a definite diagnosis of iritis after operation is difficult to make. By definition inflammation (response to injury) is always present in any eye after operation; posterior synechiae are difficult to form, and a flare in the anterior chamber is often seen after any trauma; exudate on the endothelium may be lens matter. Postoperative routine steroid drops (with antibiotics) were given. They may be a factor in the low incidence of postoperative iritis. This complication never gave rise to anxiety, though the pupil cannot be dilated.

*Secondary glaucoma*—Again this is not always easy to evaluate. Fear of infection excludes tonometry in the early stages. One eye with iridocapsular lens needed a filtering operation (Stallard's) and shows localised corneal dystrophy (included in the series). There is a broad sheath of anterior synechiae in this eye probably caused by pressure of the posterior loop, since these synechiae overlie the position of the posterior loop (Pearce, 1972; Smith and Anderson, 1976). Apart from the above case we encountered only temporary rises of intraocular

pressure which did not cause anxiety. It must be remembered that pilocarpine 2% drops were given routinely to retain the lens in place, and therefore possible glaucoma was already being treated medically. One bonus of the pseudophakos may even lie in the fact that possible glaucoma (unrelated to the pseudophakos) is being treated prophylactically.

*Retinal detachment.*—Needling is often necessary (not only in extracapsular extractions) and slightly more difficult in that one has to introduce 2 knife needles between pupil and lens. The use of Flieringa's ring (this time fastened to the sclera by only 5 or 6 sutures) is most helpful for fixation of the eye.

It is all the more striking, therefore, that we had only 1 case of retinal detachment. The vitreous does seem to have support from the pseudophakos.

#### REMOVAL OF THE PSEUDOPHAKOS

We have removed 23 lenses, 21 of the iris clip type and 2 of the iridocapsular type. The reasons are as follows: 4 lenses had dislocated, all of the iris clip type; 16 because they caused corneal dystrophy; 2 because of persistent pain, and in 1 of these there was direct contact between the iridocapsular lens and the cornea as well, so that corneal dystrophy was feared; 1 pseudophakos was removed because there was contact between the lens and the cornea but there was no pain—at least yet.

#### OPERATIVE TECHNIQUE

Apart from removal of dislocated lenses, which technique is described elsewhere, the removal of pseudophakos of the clip type is straightforward. Flieringa's ring (fastened to the sclera by at least 12 sutures) was always used. The pupil was semidilated just before surgery. A limbus type of incision with limbus-based conjunctival flap was made, and 1

set of anterior loops was grasped by iris forceps. The iris was pulled off the corresponding posterior set of loops and the lens removed. Sometimes before this manoeuvre the pseudophakos was rotated by anterior synechiae spatula so as to lie vertical. The above procedure was facilitated thereby.

The removal of iridocapsular lenses can be much more difficult, since adhesions form between the loops and capsule. Vannas scissors are helpful in cutting the posterior loops from the capsule remnant.

#### STATE OF VITREOUS

The introduction of an intraocular lens is not always possible. Whether it is depends on the state of the vitreous. Vitreous loss by itself is thought to be a contraindication for the introduction of a lens, but 1 case in which vitreous loss occurred and in which an iris clip lens was nevertheless introduced showed a visual acuity of 6/9 with correction, and there were no complications. It is not, however, recommended by Binkhorst (1973).

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