

Intraocular lenticuli

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1950 was an inspiring year when Harold Ridley reported his first results using an intraocular lenticulus. This was placed in the posterior chamber but the procedure was followed by many complications to prevent which an anterior chamber lens was introduced. The author inserted a few of these shortly before the high incidence of endothelial dystrophy was reported which led to their abandonment except by a few ophthalmologists. Most of the problems were directly related to the contiguity between implant and cornea—all the cases seen by the author had such contact and that part of the cornea near a foot-piece was usually the first to show endothelial dystrophy.

The concept of the iris-supported pupillary lens remained more acceptable but by that time opinion had swung against all intraocular lenses (Binkhorst, 1961).

Most of the complications arising from the use of anterior chamber lenses occurred within 2 years and it seemed unlikely that important complications would fail to be seen in a follow-up of 5 years. The author decided to delay the use of pupillary lenses for this period and assess the incidence of endothelial dystrophy in his small series. In 1970 the pupillary lens was found to be much safer, and a trial of the Binkhorst design was started (Pearce, 1972).

Pupillary lenses have many theoretical advantages. There is normal orientation, no ring scotoma, objects appear to be normal in size, the visual field is wide, the standard of vision without further correction is often good, and maintenance or recovery of binocular vision is possible in cases of unioocular cataract.

Material

Between December, 1970, and October, 1972, 50 intraocular pupillary lenses were placed in 47 patients at the Birmingham and Midland Eye Hospital. These were made to the design of Binkhorst and supplied by Rayner of England or Morcher of Germany. Some were provided sterile in weak sodium hydroxide in suitable containers. Some concern had been engendered by the possibility of overlong storage of these implants leading to the absorption of caustic soda into the plastic. A fairly intense but short-lived anterior uveitis, which occurred in three patients, was thought to be related to chemical irritation from the implant, which had been stored for more than 3 months in the sterilizing solution.

Indications

Most of the patients were those with unilateral cataracts or cataracts of widely different maturity so that the visual acuity in the less affected eye was at a level of 6/12 or better. Most of the patients had senile cataract, but a few had unilateral traumatic cataracts. The operation was carried out on both eyes in three patients at their special request. They had given consideration to the probable

intolerance of aphakic spectacles and contact lenses before accepting the surgical treatment of their cataracts.

A subsidiary indication was for patients who were likely to be disorientated or off balance; that is to say, disorientated mentally and off balance physically. The smoothness of the postoperative course in terms of patient rehabilitation has proved a great advantage in some of these patients in marked contrast to one's previous experience.

Methods

Steps were taken before surgery to see that the intraocular pressure, especially the vitreous pressure at the time of extraction, was as low as possible. For practical purposes this meant the use of acetazolamide with or without mannitol preoperatively and a method of anaesthesia which was likely to reduce the intraocular pressure, commonly general anaesthesia with a careful, slow induction and the avoidance of muscle relaxants which might have a rebound effect. Ideal conditions were often obtained, but this was not fully predictable and there was sometimes little room for manipulation in the anterior chamber.

In the early cases some embarrassment occurred because nursing staff had been accustomed to dilate the pupils, whereas in this operation it is necessary to constrict the pupil around the implant. However, this was not as important as had seemed at first. Acetylcholine could usually overcome the atropine at the time of operation and strong miotics would resist the later dilatation. At first miotics were used deliberately to reduce the size of the pupil preoperatively, but this caused difficulty in extraction, and recently no mydriatic or miotic has been used, except perhaps a short-acting drug at the time of surgery if the pupil is extremely small.

A two-step corneal incision was made to avoid hyphaema. A guard filament silk suture was placed at the 12 o'clock position. One peripheral iridectomy was performed before the cryo cataract extraction using chymotrypsin in all cases. The implant was put into place and an iris suture was then passed through the stroma and tied around one of the upper anterior loop arms. It was found easier to place this suture by introducing a needle at the edge of the iridectomy. A second peripheral iridectomy was then performed and the guard suture tied at the 12 o'clock position. The wound was closed with continuous 10/0 nylon tied at each end, and the anterior chamber was re-formed with Miochol. Particular attention was given to the avoidance of contact between the anterior loops and the cornea, the internal aspect of the wound, and the achievement of a regular anterior chamber depth with no leakage. Subconjunctival steroids were injected at the end of the operation.

Special points

The avoidance of hyphaema is important because the presence of coagulated blood makes it very difficult to place the lens correctly. The implant is dried off with sponges, re-washed in physiological solution, and dried off again before implantation. Corneal manipulations are avoided as far as possible and the endothelium is not allowed to touch the implant. The operation is made very easy if the intraocular pressure is so low that air would be introduced into the anterior chamber if the cornea were lifted, and it has been observed that in such cases there is very little postoperative corneal disturbance. The security of the implant is achieved by the use of acetylcholine during operation and by the tension of the iris suture. No dislocations occurred in the series. In three cases vitreous presented during surgery and anterior vitrectomy was performed; the operation was completed using an implant. Two of these were cases of traumatic cataract, and the other an apparently normal senile cataract.

Postoperative complications

Corneal striation is usually present until the third day when it clears very rapidly between one day and the next. Predictably, the absence of endothelial contact during surgery appears to be important.

Four patients had postoperative glaucoma, and three of them required drainage surgery. It seems probable that this was due to the subconjunctival injection of steroids, as there was no evidence of pupil block and the anterior chambers remained deep. The response to surgery was good. Two of these cases were traumatic, one with siderosis.

There was a very slight increase in the incidence of postoperative aqueous flare compared with simple extraction, but in three cases already mentioned, there was a severe uveitis with a peculiar yellowish hypopyon which appeared suddenly 48 hours after operation and cleared as dramatically about 2 days later. The sudden onset and sudden resolution were thought to be due to the release of sodium hydroxide, perhaps at the point where the legs of the implant were attached posteriorly, because in two of these cases there was an intense inflammatory reaction at these points for a few days after the rest of the uveitis appeared to have settled.

One patient in the series had a loop touching the endothelium because of traumatic adhesions and developed endothelial dystrophy. In one patient the anterior loop above is caught in the lip of the corneal section, with no evidence of endothelial damage in over 2 years since the operation.

One patient had a severe myocardial infarct and another developed epilepsy a few days post-operatively.

Results

No other surgical complications have been seen in these cases. The visual acuity was 6/6 or better in fifteen out of the fifty cases (one of the patients with vitreous loss was included), 6/9 in seventeen (one was traumatic and another had lens rupture at the time of extraction, which was due to the small size of the pupil), 6/12 in five, 6/18 in five, and less than that in only four. Three cases have been excluded from the visual results, two because the notes have been mislaid and one because mental defect in the child prevented assessment.

Among the patients with a visual acuity of 6/18 or less, there was one who suffered a coronary thrombosis and died, so that no refraction later than 2 weeks after operation was possible. Two other patients have also died. Another had vitreous organization due to trauma as a preoperative complication, but this could not be seen until the lens had been extracted. One patient had siderosis and two senile macular degeneration. Only one patient, mentioned already, has shown endothelial dystrophy.

Summary

The operation adds to the complications of cataract surgery. In some patients the implantation is very easy, but in some in whom it is most desirable it can be quite difficult. In only two cases was the operation not performed because of technical difficulty.

This report presents the author's early experiences with intraocular pupillary lenses between November, 1970, and October, 1972. An increasing number of these lenses has been used since October, 1972, and our results encourage their continued use. Long-term results (Pearce, 1972) indicate a low incidence of late complications with iris-supported pupillary lenticuli compared with lenses supported in the angle of the anterior chamber.

In terms of the postoperative course, apart from the first few days in hospital, these patients seem to be much easier to manage and their rehabilitation is quicker because their vision is more natural than after standard cataract surgery.

References

- BINKHORST, C. D. (1961) Personal communication
 PEARCE, J. L. (1972) *Brit. J. Ophthalm.*, **56**, 319