Differences and similarities in a series of cases with bilateral intraocular lenses and evaluation of the results

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SUMMARY A review is given of the results of intraocular lens implantation in 38 patients, that is, 76 eyes. The observation time was up to 7½ years. Only 5 cases were done as a secondary procedure. The Binkhorst 4-loop lens was preferred. Most of the lenses were fixated with an iris-lens suture. Out of 8 lens luxations 2 were fixed with an iris suture. The final visual acuity and the difference in refraction in spherical as well as cylindrical power are surveyed. The astigmatism and the astigmatic axis are compared in the 2 eyes of each patient. Most of the patients regained stereoscopic vision. It is concluded that neither the lens position, the lens type, the number of iris sutures, nor the number of iridectomies had any influence on the eventual results.

Of 134 patients in my care who had 172 intraocular lens implantations, 38 had bilateral implantations. The follow-up varied from 2 months to 7½ years. Details such as lens position, lens fixation, and number of iridectomies constituted the difference between the eyes. In all cases I was the surgeon, and the surgical technique was fairly constant.

INDICATION FOR INSERTION OF BILATERAL INTRAOCULAR LENSES

Monocular cataracts originally constituted the indication for insertion of intraocular lenses. With the realisation of the safety of intraocular lenses, and owing to the number of patients who had an intraocular lens in 1 eye and an increased lens opacity in the other eye, it was not only natural but also obligatory to insert an intraocular lens in the second eye.

LENGTH OF TIME BETWEEN OPERATIONS (Table 1, Fig. 1)

As Table 1 shows, in 8 of my bilateral cases the length of time between the 2 implants was more than 1 year, in 2 cases more than 4 years, but in 21 cases 6 months or less, and in 9 cases 4 weeks or less. The short duration between the 2 eyes is especially noticeable in the older age group.

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SECONDARY PROCEDURES

(Table 2)

In 5 patients lens implantation was performed as a secondary procedure 10 months to 7½ years after a conventional cataract extraction. Having experienced the benefits of an intraocular lens, some patients asked to have a lens inserted as a secondary procedure in the first-operated, aphakic eye. The fate of the secondary implants is seen in Table 2.

A bilateral secondary operation was carried out in only 1 patient. The patients in the other 3 cases of monocular secondary implant were unable to comply with the use of contact lenses or the functional monocularity imposed by cataract glasses. The eventual results suggest that the secondary implantations have not proved to be any exception in the group.

Fig. 1 Time between operations, 38 patients

Table 1 *Binocular cases*

<i>Under 50 years of age: 8 patients</i>			
<i>Age in years at time of operation</i>	<i>Time in weeks between implants</i>	<i>Final vision</i>	
		<i>First eye</i>	<i>Second eye</i>
17	36	0.5	0.7
27	256	1.0	0.7
28	64	1.0	0.2
33	80	0.4	0.2
40	8	1.0	1.0
44	92	0.9	1.0
46	12	1.0	1.0
47	3	0.4	0.7
Average 35	<69	≤0.7	≤0.7
<i>Over 50 years of age: 30 patients</i>			
51	256	1.0	1.0
52	3	0.4	0.8
53	32	1.0	1.0
53	8	0.2	1.0
54	60	1.0	0.7
54	32	0.1	1.0
55	40	1.0	1.0
57	1	0.4	0.4
58	40	1.0	1.0
59	20	1.0	1.0
59	96	1.0	1.0
60	33	0.7	0.5
61	1	1.0	0.9
62	44	1.0	0.6
64	1	1.0	1.0
64	4	1.0	0.8
64	28	0.7	1.0
64	177	0.2	0.1
66	4	1.0	1.0
67	8	0.9	1.0
68	28	0.2	1.0
69	13	1.0	1.0
69	8	0.2	0.4
70	1	0.9	0.8
71	22	1.0	1.0
72	24	1.0	0.9
72	8	0.8	0.7
75	8	0.9	0.6
80	4	0.4	0.1
82	20	0.8	0.1
Average 63½	34	≤0.7	≤0.8

Even though the final results of the secondary implants are good, I am not in favour of exposing a good surgical result to the hazards of another surgical procedure, but I admit that in special cases it may well be justified.

TYPES OF LENSES

Four Worst lenses have been used with a Binkhorst 4 loop lens in the other eye. Two Fedorov lenses have been used with a Binkhorst 4 loop lens as well as 18 Binkhorst 4 loop lenses with the Lurie modification of the black posterior loop. These have been used in combination with another type of lens in the other eye, except in 4 patients in whom both eyes have a Lurie lens.

POSITION OF LENS

Twenty eight lenses have been placed in the horizontal position, 15 in the oblique position, and 29 in the vertical position. Only in 13 cases has the position of the lens been the same in both eyes.

The types of lenses used and the position of the lens have had no influence on the condition of the cornea, the postoperative course, or the final visual acuity.

IRIS-LENS SUTURES

In the first 12 cases iris-lens sutures were not routinely used. In the following cases I varied the insertion of the iris-lens suture in the 2 eyes: no suture, 1 suture, 2 sutures, and transiridectomy suture. This variation in technique has not had any detectable influence on the condition of the cornea, the iris, or the duration of the postoperative irritation (Fig. 2). However, without any proof I have the impression that the transiridectomy sutures cause a slightly more intense reaction in the first few postoperative days. It is difficult to ascertain whether the suture in the iris has actually perforated the pigment layer or not, but I have the impression that the least irritation is found when the nylon suture is placed inside the iris stroma without perforation of the pigment epithelium.

Table 2 *Secondary implants*

<i>Patient born</i>	<i>M</i>	<i>F</i>	<i>R</i>	<i>L</i>	<i>Vision after cataract extr.</i>	<i>Eventual vision after lens implant</i>
41	X		X		1.0	1.0→0.2 (2 grafts)
41				X	1.0	1.0
09		X	X		0.7	1.0
10		X	X		1.0	0.8
03		X	X		1.0	1.0

Fig. 2 Number and type of iris-lens sutures in the 2 eyes of 38 patients

NUMBER OF IRIDECTOMIES (Fig. 3)

Variation in the number of iridectomies has also been examined in relation to postoperative tension and eventual results, but no associations have been found.

LENS LUXATION (Table 3)

Lens luxation has occurred 8 times in 7 eyes; 1 eye had a luxation twice. Luxation has occurred in 2 eyes in which the lens had been fixated with a suture. Three eyes have had fluid vitreous. In 1 patient 1 eye with a Worst Medallion lens sutured to the iris luxated with the nasal loop into the anterior chamber. In the other eye the lens, which had been inserted as a secondary procedure with no iris suture, luxated with both anterior loops behind the

Fig. 3 Number of iridectomies in the 2 eyes of 38 patients

iris. In both of these cases surgical repositioning was required.

While it may be possible to reposition the unsutured lenses medically by dilating the pupil, it has not been possible to do so with the lenses fixated with a suture to the iris.

Significant vitreous opacities have not appeared in any of the cases.

RETINAL OEDEMA (Table 4)

Five eyes in 4 patients have had central transient retinal changes 12 to 128 weeks postoperatively. Four of the eyes regained their vision 58 to 124 weeks postoperatively. One of the retinal changes in a 60 year old male appeared 128 weeks (2½ years) postoperatively. Fluorescein angiography did not disclose the aetiology. The changes encountered in the other cases retained an oedematous appearance which decreased slowly when the vision returned. Only 1 of the patients had a bilateral transient retinal change, but as he has diabetes he should be excluded from these considerations. Fluorescein angiography pointed to an Irvine-Gass syndrome in the left eye, but not in the right eye. It is interesting to note that 1 eye in each of the other patients has not had any retinal disease. I would like to take this fact as a hint that the presence of the intraocular lens has not been responsible for the changes encountered.

Table 3 Subluxations

Patient born	Type of lens	Iris suture	Time after operation	Treatment
19	Binkhorst-Lurie	0	3½ years	Medical
27	Binkhorst-Lurie	0	2 years	Medical
27	Binkhorst-Lurie	0	2½ years	Medical
17	Binkhorst-Morcher	0	4½ years	Medical
20	Binkhorst-Morcher	0	8 months	Surgical
09	Worst	1	3 years	Surgical
09	Binkhorst-Morcher	0	2 weeks	Surgical
95	Binkhorst-Morcher	1	3 days	Surgical

Table 4 Transient retinal changes

Patient born	Postop. vision first eye	Postop. vision second eye	Decreased vision first eye	Decreased vision second eye	Weeks postop first eye	Weeks postop second eye	Regained vision first eye	Regained vision second eye	Weeks postop. first eye	Weeks postop. second eye	Not regained
43	1.0	0.9		1/60		44		0.7		84	
16	0.9	1.0	0.3			128					X
13	1.0	1.0		0.6		28		1.0		124	
20	1.0	1.0	0.5	0.3	16	20	1.0	0.5	69	58

Fig. 4 Final visual acuity, 38 patients

Fig. 5 Difference between refraction in the 2 eyes of 36 patients

IRITIS

One patient, 52 years of age, has had an iritis of equal severity in both eyes between 8 and 12 weeks postoperatively. The length of time between the operation on the 2 eyes was 21 days. Apart from a cold and the fact that she works in a dry cleaners, no special aetiology has been found.

FINAL VISUAL ACUITY (Fig. 4)

Owing to special conditions (corneal changes, glaucoma, amblyopia, pigmentary retinopathy, and senile degeneration) 11 patients have been excluded from the evaluation of the final visual acuity and refraction.

From the table of final visual acuity, it appears that 45% have acquired a visual acuity of 1.0 or 0.9 in both eyes, 16% have acquired a vision of 1.0 or 0.9 in 1 eye and better than 0.6 in the other eye; 3% (i.e., 1 patient) is represented in each of the three columns: 1.0 and 0.5, 0.8 and 0.7, and 0.4 and 0.8. That is, 9% have acquired a good vision in 1 eye and a usable vision in the other eye, while 1 patient acquired a vision of 0.2 and 0.4 and another patient 1.0 and 0.1.

Fig. 6 Total value of spherical power in first and second eye, 54 eyes; 1 D sph = $\frac{1}{2}$ D cyl

The former of these 2 patients was born in 1905 and has a senile degeneration in both eyes. The latter has a senile degeneration in only 1 eye.

DIFFERENCE IN TOTAL REFRACTION IN BOTH EYES (Fig. 5)

If it is presumed that a 1.0 cylinder equals close to 0.5 spherical, the difference in total refraction between the 2 eyes has been estimated, as seen from the chart. Thirty of the patients have had less than 2 dioptres' difference and 23 have had less than 1 dioptre's difference between the 2 eyes.

TOTAL SPHERICAL POWER (Fig. 6)

From the value of total spherical power of the first and second eye (1 cylinder equals approximately 0.5 spherical) it appears that 4 eyes have obtained emmetropia, 8 have obtained a spherical refraction of less than +1.0, 15 have less than +2.0, 12 have less than -1.0, and 24 have less than -2.0. As intended, the major part of the eyes have attained a slight myopia.

DIFFERENCE IN CYLINDER IN THE FIRST AND SECOND EYE (Fig. 7)

Difference in cylinder between the 2 eyes is in 15 cases less than 0.5 dioptres and less than 1 dioptre

Fig. 7 Difference in cylinder, 36 patients

Fig. 8 Value of cylinder power in first and second eye, 64 eyes

Fig. 9 Astigmatism preoperatively and postoperatively, 27 patients. $16+18=34$ eyes had no astigmatism preoperatively; $3+2=5$ eyes had no astigmatism postoperatively

in a total of 26 cases. In 9 cases there is a difference of 2 to 3 dioptres and in only 1 case a difference of 4 dioptres.

VALUE OF CYLINDER POWER IN THE FIRST AND SECOND EYE (Fig. 8)

The value of cylinder power shows that 15 eyes have less than 1 dioptre, 42 eyes have less than 2 dioptres, and 18 have between 2.5 and 4.5 dioptres. This indicates that the surgical technique has been fairly constant.

AXIS OF ASTIGMATISM (Fig. 9)

It appears that while 81.41% had no astigmatism preoperatively, 9.2% had no astigmatism postoperatively. 11.1% had astigmatism against the rule preoperatively in relation to 59.3% postoperatively.

Fig. 10 Titmus stereoscopic test, 31 patients

15% had preoperative astigmatism with the rule while 9.2% had astigmatism with the rule postoperatively. 11.1% had oblique astigmatism preoperatively while 22.2% had oblique astigmatism postoperatively. Thirty-six eyes, or 66.6% of the astigmatism, was less than 1.5 and 90% less than 2.0 dioptres.

In conclusion it can be stated that the corneal curvature changes after a cataract extraction in the usual way from slightly with the rule to slightly against the rule. The amount of astigmatism created

has in most cases not been more than 2 dioptres. There has been no significant difference between the axis of the astigmatism in the right and the left eye. The presence and position of the lens has had no influence on the amount of astigmatism or the axis.

TITMUS STEREOSCOPIC TEST (Fig. 10)

As Fig. 10 shows, 20 patients have a stereoscopic appreciation of 60 arc seconds or better, and 65% have completely regained their stereoscopic vision. Those who have less stereoscopic appreciation have not achieved equal vision or a vision better than 0.5.

DIPLOPIA

None of the patients in this series has complained of diplopia.

Conclusion

It seems justifiable to conclude that neither the position of the lens, the type of lens used, the number or position of iris-lens sutures, nor the number of iridectomies has had, in this series, any influence on the conditions of the cornea, iris, or eventual function of the eyes in the same patient. The similarity of the results obtained in the 2 eyes of the same patient is striking. The good stereoscopic appreciation achieved is noteworthy.