

Subjective Assessment of the Effect of Cataract Surgery and a Review of Long Term Aims

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Summary

A questionnaire designed to test subjective assessment of functional improvement was given to 327 patients in a randomised controlled trial one year after operation for cataract. Approximately one-third of the patients had a contact lens fitted after intracapsular extraction (I/C) and two-thirds had intraocular implants after both I/C and extracapsular extraction. The great majority of patients admitted to functional improvement irrespective of treatment mode. A review of objective data from the study suggests that the beneficial effects of surgery are likely to be long lasting.

The number of cataract operations being carried out in the western world is steadily increasing. In one calendar year from August 1984 to August 1985 over 880,000 operations were performed in the USA alone.¹ A Danish survey published in 1985² pointed to an increase of 51 per cent in the number of cataract operations from 1970 to 1979 and this occurred even before the increased popularity

and general acceptance of intraocular lens implants.

Illich³ pointed out that much of medical treatment may simply replace one disability with another and this to some extent was true of cataract surgery especially when spectacles were the sole means of optical correction.

In a prospective study Hilbourne⁴ followed 66 patients from before the operation to 6

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weeks after aphakic glasses were fitted and then conducted a series of interviews. He found that 'over half those whose corrected visual acuity in the unoperated eye was 6/36 or better were bitterly and aggressively disappointed'; 'only a quarter had greater mobility and over half less mobility than before the operation'. Considering that no patient in this study had a visual acuity of 6/18 or better in the better eye pre-operatively and no eye finished with less than 6/12 post-operatively, the reaction displayed by the patients suggested that there was a big gulf between the expectations of the doctor and the patient.

A more encouraging result was reported by Bernth-Peterson² who interviewed his patients 1 year after their operation. He found that '74 per cent of all patients were satisfied and 26 per cent were dissatisfied with the outcome of cataract surgery' but, for 'mon-aphakics', '75 per cent had complaints about their vision'.

Conventional methods of aphakic correction are by spectacles, contact lenses and intraocular lenses. Some of the dissatisfaction of patients in the above studies must be due to the aberrations imposed by aphakic spectacles⁵ but do we have any evidence that contact lenses and intraocular lenses are any better and that they may not have created problems of their own?

Until we find a way of preventing or reversing cataract, surgery will remain an important component of ophthalmology. It is therefore entirely appropriate to ask how effective is the present treatment.

The desired end of any treatment is:

1. The restoration of physiological function,
2. that the treatment should not be too arduous for the patient to have,
3. that it should be relatively easy to deliver and
4. that the beneficial effects should be long lasting.

Therefore, we propose to examine each of these four points in turn and in doing so will draw largely from the data collected in a clinical trial set up some six and a half years ago. The study design and early interim results have been reported elsewhere⁶ and this paper will only describe the study in outline.

In this study we have 333 eyes in 327 patients who all had surgery at least 3 years ago and some of the patients have been followed for six and a half years. A unique feature of the study is that there was no loss to follow-up except through death up to the 5 year point but since then 2 patients have been unable to attend but have not been untraced.

Eyes were randomised to have one of 3 types of cataract surgery.⁶ The 3 treatment groups are:

- (A) intracapsular extraction and contact lens fitting 6 weeks after surgery;
- (B) intracapsular extraction with insertion of an iris supported intraocular lens (Federov I); and
- (C) extracapsular extraction and an iridocapsular lens of Binkhorst.

The number of eyes in groups A, B and C were 111, 110 and 112 respectively and nearly corresponded to the number of patients.

The age range of the patients was from 55–89 years with a mean age of 72 years.

The main objectives of the study were that we used independent assessors to evaluate:

1. Corrected visual acuity,
2. complication rates,
3. endothelial cell loss, and
4. subjective response of the patient.

We have already reported some of our interim results of visual acuity, complications^{6,7} and endothelial cell loss but not the subjective response.

There is some evidence that there is a positive correlation between subjective and objective assessments of a person's disability⁹ and to try and gain some insight into the amount of restoration of function, we propose to look at the results of a questionnaire which these patients completed. The questionnaire was administered by a naive interviewer and the 2 pages of questions were overlapping in intent in order to test for contradictions and internal inconsistency. They can be condensed into 5 main questions:

1. Has the operation improved your vision;
2. for those at work, has the operation improved the ability to work;
3. are you managing your daily chores better;
4. by how much has the operation improved your vision;

5. is the vision better or worse than expected?

'Has the operation improved your vision?' (Table I). The vast majority said yes whether they had contact lenses or implants. There were comparatively few patients who considered themselves still at work but the majority of those who were, considered that the operation had helped them in this respect (Table II). Interestingly, there is a higher proportion of patients wearing contact lenses who felt that they were not helped but as the numbers are small this difference in proportion should be interpreted with caution.

To the question of 'Can you manage your chores better?' (Table III) well over 90 per cent of all groups admitted to an improvement.

As to the amount of improvement, just under 90 per cent of the contact lens group and well over 90 per cent of the implant groups admitted to a 'lot' and 'quite a lot'

when these categories were combined (Table IV) and, as one might expect, a similar proportion admitted to having vision better than they had expected as a result of the operation (Table V).

One reason for getting a good subjective response could be due to very poor vision in the other eye. However, looking at the visual acuity of the not-to-be-operated eye at the time of operation, the majority had better than 6/18 acuity and in fact nearly a third can be regarded as having no cataract in the not-to-be-operated eye with acuities of 6/6 and 6/9 (Table VI). The result of the questionnaire suggests that there is considerable patient satisfaction and we think this reflects a genuine improvement in function, which is true both of the contact lens and the implant groups.

Only 10 per cent (34 patients) did not admit to any functional improvement and nearly all of them had suffered a complication either at

Table I. *Has the operation improved vision?*

Treatment group	No. of patients	
	No	Yes
A	8	98
B	5	95
C	3	106

No. wearing C.L. in group A = 91.

Group A = Intracapsular extraction + contact lens (C.L.).

B = Intracapsular extraction + Federov implant.

C = Extracapsular extraction + iridocapsular implant.

Table II. *Has the operation enabled you to work better?*

Treatment group	No. of patients	
	No	Yes
A	5	13
B	1	27
C	1	29

See Table I for key to treatment groups.

Table III. *Can you manage your daily chores better?*

Treatment group	No. of patients	
	No	Yes
A	9	96
B	2	94
C	7	101

See Table I for key to treatment groups.

Table IV. *By how much has your vision been improved?*

Treatment group	No. of patients			
	Not at all	A little	Quite a lot	A lot
A	8	7	23	69
B	3	3	20	75
C	3	4	17	86

See Table I for key to treatment groups.

Table V. *Is vision better or worse than expected?*

Treatment group	No. of patients	
	Better	Worse
A	89	13
B	91	7
C	101	9

See Table I for key to treatment groups.

surgery or in the early post-operative period. There were two patients without complications: one was suffering from Alzheimer's Disease and the other admitted to improvement in visual acuity even though functional improvement was not noticed.

The second desirable outcome of therapy is that the treatment should not be too arduous for the patient. To take the argument to one extreme one can ask if the operation might not have shortened the lives of the patients in the study particularly since all of them had surgery under general anaesthesia. After six and a half years 58 patients were dead. However, if we take the point 3 years from the operation there were only 34 deaths. The mean interval from surgery to death was 30 months and the mean age at death was 77. Compared with a population of similar age and sex, mortality was not increased (Table VII).

Patients' tolerance of the treatment is dependent on the ease of delivery to some extent and the two issues should be considered together. We have timed a number of our operations and on average it takes 40 minutes to get our patients on and off the operating table. For the majority of patients the treatment can be carried out under general or local anaesthesia and the stay in hospital is now generally short—mean = 3 days. Many

centres are doing day-care surgery which is already the norm in the United States.

The issue of 'delivery of treatment' is inseparable from economic factors. Faced with an increasing demand for the delivery of medical care it is important for clinicians as well as administrators to have some ideas of relative costs and how cataract surgery compares with other treatments.

Cataract surgery with lens implantation is analogous to a hip replacement in so far as each is concerned with the rehabilitation of an important organ. Compared to hip surgery the cost of cataract surgery is approximately half.¹⁰ In 1985, it cost £819 for every patient discharged from the Radcliffe Infirmary which housed the Head and Neck specialities at Oxford, but only £459 for every patient treated in the Eye Hospital.¹¹ As cataract surgery comprised 80 per cent of the inpatient work the figure relating to the Eye Hospital largely reflects the cost of treatment for cataract. Therefore, the evidence would suggest that treatment is relatively cost-effective.

Whether the beneficial results of treatment are long lasting depends on the maintenance of good vision and the lack of late complications. Data from our study is only available for every patient up to three years. Compared to the first year there is a slight drop in the percentage of eyes achieving 6/6 acuity after 3 years in all treatment groups but for eyes achieving 6/12 or better there is no significant drop except for the contact lens group (Table VIII). For contact lens wearers there is also a tendency for the proportion of eyes not wearing a C.L. to increase, but interestingly the fall out seems to be more from those wearing an extended wear lens (Table IX). Our unpublished data also suggests that patients with extended wear lenses required many more post-operative visits compared to

Table VI. *Visual acuity of the non-operated eye at the time of surgery*

	6/6-6/9	Better than 6/18	6/18-6/24	6/36 or less
No. of eyes	105	202	87	41
%	32%	61%	26%	12%

Three eyes = unknown.

Total eyes = 333.

Table VII. *Mortality*

	Male	Female
Mean age:	77 + 7.3	77 + 5.8
Mode:	80	82
Cause of death;		
Cancer	= 15	
Heart disease	= 20	
Others	= 9	
Unknown	= 1	

patients with daily wear lenses and suggest that extended wear lenses may have a more limited role in the treatment of senile cataract.

Taking the corrected visual acuity of all treatment groups at different time points, significantly more eyes of younger patients achieve 6/6 acuity or better compared with the older patients (Table X).

The interim complications of patients treated in the context of the clinical trial have already been reported.^{6,7} The results of our clinical trial showed that iris supported lenses have significantly more complications than the other treatment groups and these lenses have rightly been abandoned.

Extracapsular extraction and the use of an iridocapsular lens did not have significantly more complications than intracapsular extraction with a contact lens and the aggregate complications after 5 years were numerically very similar to those at 1 year suggesting that there are few late complications. There were however two exceptions: capsule thickening and bullous keratopathy.

The capsule thickening rate for eyes requiring capsulotomies were 3.6, 14.3, and 18.7 per cent for 1, 2, and 3 years respectively and the aggregate for the entire period was 22.3 per cent (total eyes = 112). Since YAG laser capsulotomy provides an acceptable treatment, this complication is not a serious set back. Bullous Keratopathy (B.K.) is one of the most serious complications and the incidence of B.K. certainly increased with time. No eye had developed this condition at the 2 year point but at the 3 year point there were 7 eyes and the number had increased to 12 if all eyes followed for up to 6 years were included.

As endothelial cell loss occurs with increasing age, eyes with large amounts of cell loss may reach a point of decompensation and

Table VIII. *Corrected visual acuity by treatment group in percentages (%)*

Visual acuity	Treatment group	1 year	2 year	3 year
≥6/6	A	53	48	40
	B	68	60	62
	C	67	61	56
≥6/12	A	92	91	83
	B	93	94	93
	C	95	92	92

See Table I for key to treatment group.

Table IX. *Contact lens (C.L.) wearers*

	Daily wear	Extended wear	No. with C.L.	No. not wearing C.L.
1 year	H 36	50	92	14
	S 6			
2 years	H 34	43	83	17
	S 6			
3 years	H 31	37	74	24
	S 6			

Number of eyes wearing different types of C.L.s in group A.

H = Hard.

S = Soft.

Table X. Corrected visual acuity 2 years after cataract surgery according to age

Age	>6/6	<6/6
<65	36	14
65-74	87	51
75+	45	64

$\chi^2 = 17.56.$

$p < 0.0002.$

Also significant at 1/12, 6/12, 12/12.

develop B.K. if they are followed for long enough. Knowing the rate of cell loss may predict the probable outcome: Available data suggest that cell loss rate in our patients increased for up to 3 years for the extracapsular and the contact lens groups but then returned to a level not significantly different from the unoperated eyes after that time.⁸ The intracapsular with implant group had a greater cell loss rate even after the 3 year point but loss is related to complications and the rate of loss is no greater than the other two groups in eyes devoid of complications.⁸ In all three groups the mean cell loss rate drops to less than 3.3 per cent per annum (Table XI) which suggests that if complications can be avoided even eyes with the previous genera-

tion of implants are unlikely to develop B.K. as an inevitable outcome of treatment.

The present trend in cataract surgery is to use extracapsular extraction and posterior chamber lens implants.¹ An independent review of the first 70 consecutive eyes treated in this manner showed that 70 per cent of eyes had 6/6 acuity or better and 97 per cent had 6/12 or better which compares favourably with the other treatment modes. A review of available cell loss data from these patients suggest that cell loss after surgery is small and cell loss rate becomes insignificant after the second year (Table XII).

In conclusion, the evidence derived from our study has shown that intraocular lenses or contact lenses successfully rehabilitate the majority of patients. Intraocular lenses are more cost-effective and patients require fewer post-operative visits. The treatment is well tolerated and delivery is comparatively accessible. The beneficial effects also appear long lasting and in the absence of complications, B.K. is unlikely to be a major problem in elderly subjects.

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Table XI. Endothelial cell loss rate after cataract surgery in percentages

Treatment group	1-12 months	1-2 years	2-3 years	3-4 years
A	4.2 (N = 78)	0.4 (N = 79)	1.2 (N = 71)	-0.2 (N = 44)
B	10.0 (N = 78)	2.7 (N = 78)	4.2 (N = 69)	3.2 (N = 44)
C	8.4 (N = 86)	5.1 (N = 83)	2.6 (N = 75)	0.8 (N = 47)

N = Number of eyes.

For key to treatment group see Table I.

Table XII. Endothelial cell loss after extracapsular extraction and posterior chamber (Sinsky style) implantation—a cross-sectional study of the first 70 eyes

Time post-op	1 month	6 months	1 year	2 years	3 years	4 years
No. of eyes	15	24	24	21	16	5
Mean % cell loss	4	4.5	8.1	10.7	10.7	15.4
S.D.	10.2	7.7	4.6	12.8	10.6	9.6

Only 53 had preoperative photographs or an unoperated eye. Sixteen had pre- and post-operative photographs. Cell loss = difference in density between operated and unoperated eyes or pre- and post-operative counts. Mean cell density pre-operative or of unoperated eye = 2,644; S.D. = 355; (Range = 3,410-1,860).

Vision and Contact Lens Manufacturing for supplying contact lenses and also Allergen for supplying contact lens solutions.

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