Outcomes of Cataract Surgery – What are we Measuring?

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Abstract

As the criteria for assessing the need for cataract surgery is moving away from the clinically based measurement of visual acuity to a subjective assessment of visual impairment by the patient, the same cannot be said for the outcome of cataract surgery. Outcomes are still assessed by complication rates and visual acuity. This paper aims to measure the outcome of cataract surgery using the same criteria that is used to judge the timing of cataract surgery, that is impairment of visual functioning. One hundred patients booked for first eye cataract surgery at the Royal Victorian Eye & Ear Hospital were interviewed using the VF14 questionnaire to assess functional impairment. Visual acuity was taken from the patients' records and patients were asked about their general satisfaction with their vision. Seventy four of these patients were followed post-operatively. Results show 90% of patients had an improvement in visual acuity, 80% had improved visual functioning as measured by the VF14 and 76% were more satisfied with their vision post-operatively. This study shows that the success rate of cataract surgery depends upon the outcome measure being used.

Introduction

Traditionally the outcomes of cataract surgery are measured by the technical success of the surgery or complication rates, and the clinical measure of visual acuity. Although modern cataract surgery is a low risk procedure it is not risk free. Major complications include endophthalmitis, bullous keratopathy, malposition or dislocation of the intraocular lens, clinical cystoid macula oedema, sub-clinical cystoid macula oedema, retinal detachment, wound gape/iris prolapse, anterior chamber haemorrhage, hypopyon, iris trauma, posterior capsule rupture, vitreous loss, vitreous haemorrhage, choroidal haemorrhage, uveitis, raised intraocular pressure and posterior capsule opacification.[1] Powe et al[1] conducted a review of 90 studies published in America between 1979 and 1991 on complication rates following cataract surgery. Although complication rates varied in the different studies, the pooled rate for the serious complication of endophthalmitis was 0.13% rising to 19% for the less serious complication of posterior capsule opacification. The average rate for serious complications was 2%. In the United Kingdom, a study of complication rates of all patients undergoing cataract surgery in 1990 reported results similar to the American study for serious complications.[2] However, technical success of the operation does not necessarily translate into better vision for the patient.

Visual acuity is the other traditional outcome measure of cataract surgery. Powe et al[1] using 6/9 as a successful outcome measure, found 89.7% of eyes achieved this acuity post-operatively. Desai[2] defined a good visual outcome as visual acuity of 6/12 or better and found 80% of patients achieved this result. Defining a good visual outcome as a visual acuity of 6/9 or even 6/12 has limited meaning when in the present study undertaken 34% of eyes listed for surgery had a visual acuity of 6/12 or better. The question is then raised, does the patient have better visual functioning post-operatively? How does the measure of visual acuity equate with a patient's visual symptoms? The limitations of visual acuity as a measure of visual function are well

Table 1.
Distribution of Visual Acuity Pre and Post Operatively.

Visual Acuity	Pre-operative % of Patients N=100	Post-operative % of Patients N=73
6/4	0	12
6/5	0	22
6/6	0	27
6/9	17	27
6/12	17	1
6/18	16	3
6/24	12	1
6/36	16	4
6/60	7	0
less than 6/60	15	1

Table 2.
Distribution of VF14 Scores Pre and Post Operatively.

VF 14	Pre-Op % of Pts N=100	Post-Op % of Pts N=74
0-10	0	0
11-20	2	1
21-30	0	0
31-40	4	0
41-50	10	7
51-60	12	4
61-70	17	5
71-80	19	4
81-90	21	14
91-100	15	65

Table 3.
Distribution of Satisfaction Scores Pre and Post Operatively.

Satisfaction Score	Pre-Operative % of Patients N=100	Post-Op % of Patients N=74
1 (very dissatisfied)	28	9
2 (dissatisfied)	55	15
3 (satisfied)	17	32
4 (very satisfied)	0	41

known. Visual acuity does not necessarily reflect a patient's visual functioning or the symptoms associated with cataract. Indeed it can be difficult to equate a patient's symptoms with the objective measure of visual acuity. Many studies[3-10] have shown correlations between the two to be only in the poor to moderate range. Therefore, from the patient's perspective, an increase in visual acuity on the Snellen chart may not equate with their perception of better vision.

A patient's satisfaction with their surgical outcome will depend upon their ability to function better. As early as 1981, Bernth-Petersen[3] demonstrated that cataract surgery improved a patient's ability to function as well as improving their vision. Questionnaires have been developed to assess this functional status.[8-10] These questionnaires provide a score which gives a level or grade of functional impairment. Impairment of visual functioning is now recognised as the primary indicator for cataract surgery[12] but the outcomes of cataract surgery are still expressed by the clinical measure of visual acuity.

This study aims to investigate the outcomes of cataract surgery at the Royal Victorian Eye & Ear Hospital using the multiple outcome measures of visual acuity, visual functioning and patient satisfaction.

Method

Subjects

This study recruited 100 patients from the outpatients department, Royal Victorian Eye & Ear Hospital. There were 41 males and 59 females ranging in age from 48 years to 91 years with a mean age of 74 years. Subjects were excluded if they had a previous intraocular lens, myopia greater than 5 dioptres, were booked for a simultaneous ocular procedure or did not have enough English skills to complete the questionnaire. Post-operatively, patients were excluded if they had second eye cataract surgery within the 3–4 month follow up period.

Apparatus

The questionnaire chosen to assess impairment of visual functioning was the VF14, an index of Functional Impairment in Patients with Cataract, developed by the Cataract Patient Outcome Research Team[9] in 1994. Questions relate to everyday activities including seeing steps, writing cheques, playing table games, taking part in sports, cooking, reading small print, doing fine handiwork, reading a newspaper or a book, daytime driving, night driving, reading traffic signs, reading large print and recognising people. Subjects were asked to rate the degree of difficulty they had with each activity because of their vision, with 0 being inability to do the activity and 4 no difficulty at all with the activity. A score out of 100 resulted, with 0 being an

inability to do any of the activities because of vision and 100 being able to do all of the activities without difficulty. Subjects were also asked about their overall satisfaction with their vision and a Satisfaction Score between 1 and 4 was given, with 1 being very dissatisfied with vision and 4 very satisfied with vision. Visual acuity was measured on the Snellen chart, a standard instrument used in the clinical setting.

Procedure

Patients attending clinics for their pre-operative assessment were invited to participate. Informed consent was obtained and the patient was interviewed. Interviews took up to ten minutes to complete. The most recent recording of Snellen visual acuity using the patient's current glasses was taken from the medical records. Three to four months post-operatively the same patients were mailed the VF14 questionnaire and invited to complete and return it. Of the 100 patients booked for surgery, 10 patients cancelled the operation and 12 had bilateral cataract surgery within 3 - 4 months and so were excluded. Of the remaining 78 patients who were sent post-operative questionnaires, 4 did not return the questionnaire. This left 74 patients remaining in the post-operative group. One patient was followed up elsewhere, and although her visual acuity results were unavailable, did participate in the VF14.

Results

Pre-operatively visual acuity ranged from 6/9 to Perception of Light with a median acuity of 6/24 (Table 1). The pre-operative VF14 scores ranged from 13 to 100 with a mean of 72 (Table 2). The Satisfaction Scores are shown in Table 3.

Of the 74 patients remaining in the study 92% (68 patients) had surgery by phacoemulsification while the remainder had extracapsular cataract extraction. All had posterior chamber intraocular lenses inserted. The complication rate was seven patients (9.5%).

Post-operatively visual acuity ranged from 6/4 to 6/120 with a median acuity of 6/6 (Table 1). The VF14 scores ranged from 11 to 100 with a mean of 87 (Table 2). The Satisfaction Scores are shown in Table 3.

Using visual acuity as an outcome measure 90% (67 patients) improved. Using the VF14 as an outcome measure 80% (59 patients) improved, and using Satisfaction Scores, this figure was 76% (56 patients). A distribution of change in each of these measures are shown in Figures 1, 2 and 3 where change is calculated by subtracting the pre-operative score from the post-operative score, where visual acuity was converted into a scale of 1-10 as per line of visual acuity. A positive score indicates improvement whereas a negative score indicates a decrease in measure. Looking at multiple outcome

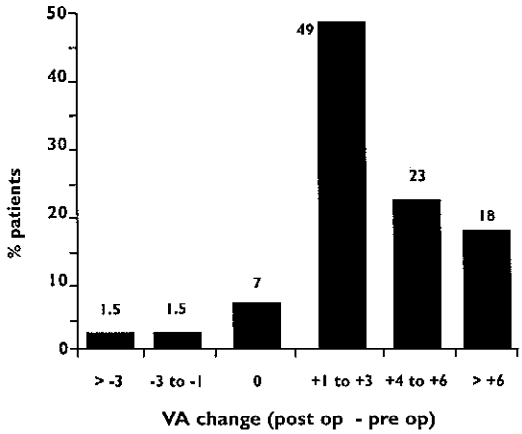

Figure 1.
Distribution of change in VA scores post operatively.

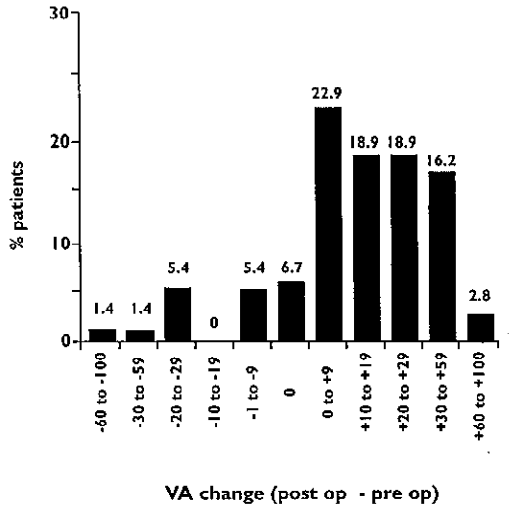

Figure 2.
Distribution of change in VF14 scores post operatively.

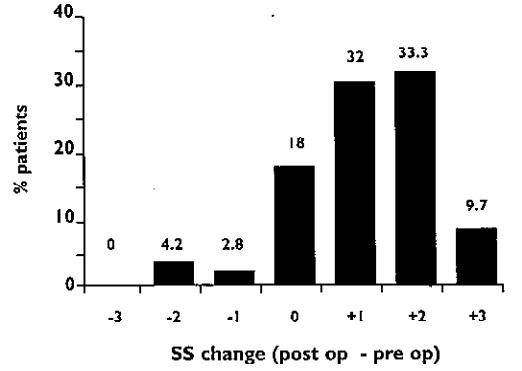

Figure 3.
Distribution of change in satisfaction scores post operatively.

measures, 64% (46 patients) improved on all three measures, 18% (13 patients) improved on two measures, 14% (10 patients) improved on one measure only. Two patients (3%) did not improve on any measure at all.

Discussion

Several studies have demonstrated that cataract surgery improves the visual functioning of elderly people, resulting in an improvement in their overall quality of life.[13,14,15] This involves not only visual functions but mental status and manual performance. Brenner[15] indicated that this function only improves when cataract surgery results in a significant improvement in visual acuity. Any meaningful definition of the success of cataract surgery should include, not only visual acuity, but the patient's perceptions of improvement in visual functioning. Measures that emphasise the patient's perception of health are now increasingly recognised as important indicators to evaluate the effectiveness of surgical intervention. This study showed 90% of patients improved on the clinical measure of visual acuity, while only 80% had improved visual functioning, so it can be seen that patients may have an improvement in visual acuity without an improvement in visual functioning or satisfaction with vision, a similar result to that shown by others. Steinberg et al[16] found a 96% improvement in visual acuity, an 89% improvement in visual functioning using the VF14 and an 85% improvement in patient satisfaction. Mangione et al[14] showed a 95% improvement in visual acuity and an 80% improvement in visual functioning as measured by the Activities of Daily Vision Scale. Schein et al[17] found a 96% improvement in visual acuity and a 92% improvement in visual functioning using the VF14. These results show visual acuity may not be a particularly valid measure of success if the patient does not perceive any improvement.

Only 64% of patients improved on all three outcome measures, when it may be presumed that patients have a reasonable expectation to improve on all outcome measures. Indeed, a study by Tielsch et al[18] showed that patients have very high expectations of surgery. Failure to improve on any outcome measures has been linked to increasing preoperative age, minimal preoperative functional impairment, minimal symptoms associated with cataract and ocular co-morbidity.[17]

This current study showed 20% of patients reported either no improvement or a reduction in VF14 scores. This and other studies[14,15,16] have defined improvement in visual functioning as any increase in VF14 scores, however a small increase in score may not translate into any meaningful improvement for the patient. This present study showed 23% of patients had a change of only 1-9 points on the VF14. If the criteria for success is changed to exclude these small figures, the success rate drops to 57%. However, a patient satisfaction level of 76% as measured by the increase in Satisfaction Score suggests that perhaps an improvement in only one function of daily living is significant to the patient or, patients may be satisfied with a dimension not measured by the VF14. The VF14 questionnaire, although questioning many aspects of visual functioning may not detect all the symptoms associated with cataract as there are no specific questions on glare, distorted vision or loss of colour.

Conclusion

Cataract surgery is now the most common surgical procedure performed under Medicare with the number of operations more than doubling in the 10 year period between 1985 and 1994.[19] As health costs soar, governments as well as patients are becoming interested in the outcomes of expensive, high volume surgery. The success rates of cataract surgery depend upon the outcome measure being used. The very high level of success rates expressed when using visual acuity or complication rates as outcome measures may not necessarily reflect a change in quality of life for the patient and therefore may not be the most appropriate measure as determined by the patient. Patients' perception of their health and visual status are perhaps more valid outcome measures than the clinical measure of visual acuity.

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