Follow-up of Cataract Surgery in Remote People from the Top End of the Northern Territory

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INTRODUCTION

Cataract is a common eye condition in Australian. Given that management is solely surgical and its high prevalence, cataract forms a major ophthalmic challenge. In March 1989, the National Aboriginal Health Strategy\(^1\) was released. This report called for cataract surgery to be made freely available to Aboriginal people. Following this, the lack of ophthalmological surgical audits for Aboriginal people was highlighted in the Taylor Report\(^2\). This report stated that “clinical practice guidelines should also include the details for a surgical audit\(^2\)”, concluding that protocols on evaluation should be established.

Cataract is a common eye condition in the Top End of the NT. Surgical treatment takes place at the RDH, the Katherine District Hospital (KDH) and the Gove District Hospital (GDH). Between 1982 and 1998 the NT Aboriginal Eye Health Committee played an important role in assisting primary and specialist eye care within the NT\(^3\). Over the past two years the SOS has been involved in the case finding, co-ordination of management and the follow-up of cataract surgery patients\(^4\). However, until now there has been no comprehensive post-operative investigation of functional outcome of remote Australian patients following cataract extraction.

The aim of this study was to investigate the functional outcomes of people living in remote areas who have had cataract surgery.

METHOD

Questionnaire selection, development and adaptation

Given the limited time to build up a rapport with community members and the potentially large number of communities and patients to be seen, it was decided that an interview-administered visual function questionnaire was the most appropriate means for collecting subjective, postoperative, outcome information.

The VF questionnaires used in this study originated in a large scale clinical trial of the comparative safety and efficacy of ICCE and ECCE at the Aravind Eye Hospital in Madurai, India\(^5\). Although the adapted VF questionnaire was developed originally for a rural population in an Indian setting, the content deals with generic, vision-dependent activities of daily living that can be generalised to all people with visual impairment, regardless of their socioeconomic status or country setting. This is not the case with the
various VF questionnaires used in developed countries\textsuperscript{6,7,8,9,10} where, for example, questions could refer to activities such as driving and reading a newspaper.

The 12 item VF questionnaire comprised five separate subscales. These subscales included:

- a general subscale (a single question assessing overall vision)
- a visual perception subscale (assessing limitation in everyday activity, near vision, intermediate vision, and distance vision)
- a single question peripheral vision subscale;
- a sensory adaptation subscale (incorporating light/dark adaptation, visual search, colour discrimination, and glare disability);
- a single question depth perception subscale.

The degree of difficulty associated with each subscale question was assessed using one of three responses, ranging from “not at all” to “a lot.” Each response was scored from 1 through to 3.

Questionnaire adaptation was carried out with help from an Aboriginal health worker and involved the replacement of each example in the original question with suitable local examples. The wording for a small number of questions was simplified, ensuring the appropriate meaning of each question could be understood.

**Questionnaire administration**

The time taken for the interview varied between patients. An average time of approximately 20 minutes was spent with each person. Questioning followed a semi-structured interview format, and often took place in the community clinic setting or at a place nominated by the subject. Subjects were encouraged to tell their own story about their eyes and to talk about any problems they had with their eyes. Early in the interview broad open-ended questions were used to initiate discussion. A small number of direct questions were used either to prompt the interviewee or to elicit any information not gained from the initial line of open questioning. All information gained from the interviews was recorded on the appropriate questionnaire.

The local community health worker or Specialist Outreach Service employed health worker conducted the interviews in a number of cases. Prior to health workers conducting an interview they were informed of the reason for asking each question and the relative importance of the answer to each question. Information regarding the aetiology, signs, symptoms, and treatment of cataract was available to the interviewing health worker.

As far as possible the interviewer was unaware of the clinical examination findings until the conclusion of the interview and the results recorded.

**Clinical examination**

Subject’s VA was tested by using the Snellen tumbling E chart. The subject would stand 6 metres from the tester and chart, cover one eye and indicate by a hand movement which way the “legs” of the E pointed. If the largest letters could not be read
at six metres, the chart was moved to three metres, if this was still not adequate the
examiner tested for the ability to finger count at one metre, and if still not successful
hand movement followed by light perception was tested for. An approximate of the
best-corrected visual acuity (BCVA) was then elicited through the use of a pinhole. The
other eye was then tested.

Once the VA had been determined the subject’s pupil were dilated. Pupillary dilation
was undertaken using one drop of 1% w/v Tropicamide and one drop of 10% w/v
Phenylephrine (Metaoxedrine) Hydrochloride. Sufficient time, which on the average
was 15 minutes, was then given for the pupils to dilate.

A thorough clinical examination of each eye was conducted by an Ophthalmologist.
The eyelid, globe, anterior chamber, and lens were examined using a slit lamp. The
fundus was examined with a + 78D lens, with indirect ophthalmoscopy. The intraocular
pressure was also assessed using Goldmann applanation tonometry.

Each subject’s preoperative VA was recorded through reviewing hospital and
community health clinic records. Additional information from each subject regarding:
any pre-existing ocular comorbidity or systemic disease which could effect the surgical
outcome; date of surgery; type of surgery; and any postoperative complications was
identified and noted from medical records.

Pilot study
Before use in the community setting, the questionnaire was administered to several
outpatients attending the RDH Eye Clinic to ensure comprehension of each question.

A pilot study of the questionnaire was then conducted whilst the SOS Eye clinic was
visiting a remote community. The questions were trailed with 5 subjects, each of whom
had had cataract surgery, although one had done so in 1991. Primarily, the pilot study
was viewed as a time to identify and fix any problems with the questionnaire, and to
familiarise the researcher with the workings of a remote health clinic.

During the pilot study time was taken to talk with the relatives of 4 of the reviewed
subjects. Family members were asked how much trouble they thought the subject had
seeing and doing general activities for themselves. A high correlation between self-
assessed VA and measured VA was noted from the trial.

Patient recruitment
All cases of cataract surgery were identified from the RDH, KDH, and the GDH for the
years between June 1994 and June 1999, using computer searches of hospital records
(CareSys® Patient Record System). The patients were then sorted by residential
address into two groups, “remote” or “urban.”

Remote patients were followed-up in their community during an Ophthalmology visit
administered through the SOS. Community clinics and medical officers in the Top End
were informed of the project and encouraged to inform patients when the SOS Eye
Clinic was visiting.
Informed consent was gained from each person. Informed consent was often facilitated with the help from an Aboriginal health worker, who was familiar with the community and local language. Plain language statements and consent forms were designed in simple and clear language.

Data management and statistical methods
All information was entered into a personal computer and made such that identification of individuals involved by people other than the investigators was impossible. Data was entered into a spreadsheet, Microsoft Excel 97® and was managed using a database, Microsoft Access 97®.

Subjects were grouped into one of three categories. Group One included all subjects who had no pre-existing, sight impairing ocular pathology and who were expected to greatly benefit from cataract surgery. Group Two included all subjects with pre-existing, sight impairing ocular pathology, in whom a “guarded prognosis” prior to cataract surgery was made. Group Three included all operations where the reason for cataract extraction was not to increase VA or vision-related function but was to alleviate pain.

Total VF scores were calculated as an equally weighted average of the four major subscale scores. The total VF score did not include the “general vision” question. Within each subscale the questions were also equally weighted. A composite score was calculated as the total of individual question responses, expressed as a percentage of the maximum score possible, and then transformed such that 100 represented the best possible score (no difficulty with any of the items) and 0 the worst score (maximum difficulty with all items in the subscale).

RESULTS
Cataract surgery in the Top End
Over the past five years cataract surgery in the Top End has been performed on 1164 eyes (948 at RDH, 161 at KDH, 55 at GDH) for 888 patients. Almost a third of these patients are currently living in a remote area.

Four hundred and five (45.6%) of these patients were female, and 301 (33.9%) were Aboriginal. The mean age of patients at the time of their first operation was 64 years, with an age range from 2 to 93 years. Since the time of operation 68 (7.7%) people have died. No patient died from, or as a result of their cataract operation. Thirty-two (47.1%) patients of the 68 deceased, came from a remote community.

There have been 370 cataract operations performed for 295 people from remote areas. For these 295 patients:

♦ the mean age was 61 years old, with ages ranging from 4 years to 93 years,
♦ 129 (43.7%) of the patients were female and 166 were male,
♦ 233 (80.0%) patients were Aboriginal and 62 were non-Aboriginal,
212 (71.9%) patients were from “remote areas” while 83 were from a “remote centre” (ie Katherine or Gove),

75 (25.4%) patients had had bilateral cataract surgery and 220 had had unilateral surgery.

Demographics of the study sample

Of the 248 patients who had cataract extraction and live in a remote area at the time of follow-up, 118 (47.6%) were included in this study. Twenty-one remote communities, and both major remote centres (Katherine and Gove) were visited during this study as part of the SOS eye clinic program.

From the 118 subjects identified in the community setting, 106 (105 pseudophakic subjects and 1 aphakic subject) were interviewed for VF and postoperative satisfaction. Twelve individuals were excluded from interview due to alcoholic, age related or syphilitic dementia (8 cases); no available interpreter (3 cases); or the subject not recalling having had surgery (1 case). No subject who was recruited refused to participate. A local Aboriginal health worker acted as the key interviewer in 36 cases.

Of the 106 subjects identified:

- the mean age was 64 years old, with ages ranging from 28 years to 86 years,
- 49 (46.2%) of the subjects studied were female and 57 were male,
- 86 (81.1%) subjects were Aboriginal and 20 were non-Aboriginal,
- 73 (68.9%) subjects were from “remote areas” while 33 were from a “remote centre” (ie Katherine or Gove),
- 47 (44.3%) subjects had had bilateral cataract surgery and 59 had had unilateral surgery.

Grouping of subjects

Of the 106 subjects (total of 153 operated eyes) interviewed as part of this study 122 operated eyes from 83 subjects were categorised into Group One and were expected to benefit greatly from surgery. Twenty-nine operated eyes from 21 subjects had pre-existing sight impairing ocular pathology and were categorised into Group Two. Sixty-five (78.3%) subjects in Group One and 19 (90.4%) subjects from Group Two were Aboriginal. Two subjects, both of whom were Aboriginal, were categorised into Group Three.

Outcomes of cataract surgery for Group One (n=83)

Objective outcomes of cataract surgery — postoperative visual acuities

In total there were 122 eyes which underwent cataract surgery from this group. Preoperative information was studied in 119 of the treated eyes.

Preoperative VA ranged from 6/9 to light perception. The median preoperative VA was 6/36. Of the 119 operated eyes, 107 (89.9 %) had a preoperative BCVA of worse than 6/12.
Postoperatively, at the time of follow-up, BCVA ranged from 6/6 to no light perception. The median postoperative VA had increased dramatically to 6/9.

Comparison of each eye’s preoperative recorded BCVA against BCVA at the time of follow-up, reveals that most eyes improved from cataract surgery. In total there were 13 operated eyes (10.9%) from 10 subjects, which did not improve or worsened following surgery.

Posterior capsule opacities were the most common, principal cause for a deterioration of VA postoperatively, and was a significant contributing cause in a further 2 eyes. Three eyes’ VA worsened postoperatively due to surgical complications. Two eyes worsened due to lens subluxation. One subject whose recorded BCVA may have been associated with glare, had postoperative pupillary capture by the IOL. Postoperative trauma, unrelated to the subject’s cataract surgery was the second most common cause for a deterioration of BCVA. Postoperative trauma had resulted in 3 eyes developing central corneal opacities and one eye becoming phthisical. The phthisical eye had no light perception.

Figure 1 Scattergram of Group One subjects’ BCVA before surgery versus BCVA at time of follow-up

Eyes in which VA worsened postoperatively fall below the dashed line. The number in brackets beside each point indicates the number of eyes relative to that point. CF = count fingers at 1 metre, HM = hand motions, LP = light perception only, NLP = no light perception.
Functional outcomes from surgery

Total VF outcomes from the 12 questions, for Group One subjects ranged from 100 to 43.7. The mean score was 81.1 and the median score was 87.5. The functional subgroup which subjects reported the least difficulty with was “visual perception”, whilst “peripheral vision” was the most.

Subjects who had undergone cataract surgery in both eyes reported better functional outcomes when compared to subjects who had an operation on only one eye. The category in which there was the greatest difference between these two groups was “depth perception”, followed by “peripheral vision”.

Outcomes of cataract surgery for Group Two (n=21)

Objective outcomes of cataract surgery — postoperative visual acuities

Preoperative VA ranged from 6/9 to “detection of hand movements”. The median preoperative VA was 6/60. Of the 29 operated eyes, 27 (93.1%) had a preoperative VA of worse than 6/12. Postoperatively, at the time of follow-up, BCVA with pinhole approximation ranged from 6/6 to light perception. The median postoperative VA had increased to 6/18, but 27 operated eyes (93.1%) had a BCVA of worse than 6/12.

Comparison of each eye’s preoperative recorded BCVA against BCVA at the time of follow-up reveals that most eyes improved after cataract surgery. In total there were 19 (65.5%) operated eyes in which the VA has improved following surgery.

Functional outcomes from surgery

Total VF outcomes for Group Two subjects ranged from 100 to 15.6, with a mean score of 72 and a median score of 71.8. The mean score for Group One subjects of each VF subgroup was lower than those in Group Two. The VF subgroup which Group Two subjects reported least difficulty with was “sensory adaptation”.

Outcomes of cataract surgery for Group Three (n=2)

Two subjects presented with a hypermature cataract which caused a secondary glaucoma and optic atrophy. Both subjects had low total VF scores (25 and 34.3) however, this could not be attributed to the surgery. However, the prognosis was not expected to be positive given the natural history of lens induced glaucoma. At follow-up one operated eye had a VA of no light perception and the other had a VA of 6/24. The subject with a no light perception in the operated eye was not satisfied with surgery.

Service delivery aspects of the study

Thirty-seven (34.9%) subjects from the 106 subjects reviewed needed no further intervention at the time of follow-up. Refractive errors and posterior capsule opacities are correctable. Follow-up service was given to all subjects in whom refraction or posterior capsule opacities impaired VA. As a part of this study 38 (35.8%) subjects were given standard spectacles or were referred to an optometrist. Twenty-two pairs of sunglasses were also given to different subjects.
Figure 2  Scattergram of Group Two subjects’ BCVA before surgery versus BCVA at time of follow-up

![Scattergram of Group Two subjects’ BCVA before surgery versus BCVA at time of follow-up](image)

Eyes in which VA worsened postoperatively fall below the dashed line. The number in brackets beside each point indicates the number of eyes relative to that point. CF = count fingers at 1 metre, HM = hand motions, LP = light perception only, NLP = no light perception

YAG laser for the elimination of posterior capsule opacification was carried out in 28 eyes of 23 patients. All patients noted an improvement in VA following the capsulotomy. Sutures causing irritation were removed from 4 operated eyes, and intraocular lenses were re-positioned for two patients.

Twenty-eight (26.4%) patients were booked for cataract surgery for their other eye. At the completion of this study cataract surgery had been performed for 17 of these patients.

Ocular problems not related to cataract surgery, but still requiring specialist intervention, were also identified. Laser photocoagulation for diabetic retinopathy was performed on 3 patients’ eyes. Two patients were also booked for non-cataract related surgery (one patient for pterygium excision and another patient for entropion correction). Both of these operations were performed during the study period.

Fifty-five (79.7%) of the 69 subjects who received some form of follow-up service, were from a remote community, and 60 (86.9%) were Aboriginal.
CONCLUSION

A large proportion of patients were found to have presented with a BCVA clearly below what would be considered generally acceptable ie a VA worse than 6/60. Cataract operations for people living in urban Australia may have been carried out earlier, with “better preoperative” BCVA. Nevertheless, most subjects improved in VA postoperatively. However, some eyes were found not to have reached potentially achievable postoperative VA. A significant number of eyes in each of the first two groups had developed posterior capsule opacities. YAG laser was carried out on a large number of these subjects with good results. Given the high number of subjects in Group Three, pre-existing ocular pathology was also a significant cause for a below optimal postoperative VA. Surgical complications were not found to be a major cause of VA impairment.

We found that VF significantly improved following cataract surgery. These results support earlier observations of cataract surgery outcomes, such as those by Lawrence et al.\textsuperscript{11}, Mangione et al.\textsuperscript{8} and Pokharel et al.\textsuperscript{12}

Although this is an observational study, it must be acknowledged that there are only a small number of patients in the subject group. Only some 106 (42.7\%) subjects from 248 patients were interviewed. The small number interviewed limits the wider validity of the results. Perhaps a stronger reflection of cataract surgery outcomes could be gained through a more intensive and larger study into the VF of patients undertaking cataract surgery. Nevertheless, even if the number of cases was large enough to conduct meaningful comparisons of different types of surgery adjusted for age, sex, education, and time and place of surgery, numerous socioeconomic variables which influence prognosis, may confound results.

There are many practical implications from this study. Taylor in the most recent report on Aboriginal eye health (1997)\textsuperscript{2} called for earlier detection of cataract. Our findings support this notion. The earlier detection and presentation of patients with cataract may allow better postoperative outcomes. A large number of patients require spectacles following cataract surgery. It should be ensured that postoperative cataract patients from a remote community have access to optometry services.

This short observational study also highlights the importance of surgical follow-up. A major outcome of this study was the large number of subjects who had developed posterior capsule opacities, yet had represented to they eye clinic. The number of subjects who underwent YAG laser for posterior capsule opacity elimination may not have been identified if this study had not taken place. Remote people who have had cataract surgery should be reviewed regularly during specialist Ophthalmology visits.

Patient education should be increased. Prior to surgery, patients should be informed of the possible and likely postoperative outcomes. Patients should be encouraged to present to the Eye Clinic if they have any problems with their eyes anytime after surgery. For this encouragement of patients to be ensured there is a need for increased health worker and general practitioner awareness of cataract surgery outcomes.

Overall it can be concluded that cataract surgery for remote people is attributed with high patient satisfaction, and a general improvement in visual acuity and visual
function. Better education of patients before surgery, regarding the likely outcomes following surgery is needed. Patients from a remote area who have had cataract surgery need to be followed-up intermittently postoperatively to ensure positive postoperative outcomes.

REFERENCES


2. Taylor HR, Eye health in Aboriginal and Torres Straight Islander Communities. Commonwealth of Australia. 1997


AUTHORS

Alex Hewitt is a 6-year medical student at the University of Tasmania. The work which contributed towards this paper was undertaken as a part of a Bachelor of Medical Science research project. This research involved travelling around the top end of the NT with the mobile eye clinic of the Specialist Outreach Clinic. Recently Alex has returned from Cambodia, where he undertook his medical elective in “The rehabilitation of landmine victims”.

Associate Professor Judi Walker is the Director of the University Department of Rural Health, Tasmania. She is recognised nationally and internationally for scholarly work in rural health, primary health care and medical education, particularly the application of information and communications technology to improve access to and quality of health and education services for targeted groups. Currently she is directing a range of research projects in related rural health issues, including self-management of chronic illness, domestic violence awareness, suicide prevention, rural community mental health, rural health promotion and health informatics. Professor Walker is a member of the Council of the University of Tasmania, Academic Senate, Teaching and Learning Committee and Staff Development Committee. She is National President of the Open and Distance Learning Association of Australia and Deputy Convenor of the National Association of Rural Health Education and Research Organisations. She is married with three children and lives on a farm in north-west Tasmania.