

## EVALUATION OF CATARACT SURGERY OUTCOME IN WESTERN NIGERIA

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### SUMMARY

**Objective:** To evaluate the baseline visual outcome of cataract surgeries and improve on these towards achieving one of the objectives of vision 2020.

**Design:** A retrospective study.

**Setting:** Hospital-based, utilizing 3 eye centres in Osun State, Nigeria between January 2000 and December 2002.

**Methods:** Records of 283 hospital-elective-cataract-surgeries only of all ages in 3 centres were evaluated.

**Results:** Mean age was 62.2 years. Fifty-eight 58% were blind before while only 6.3% remained blind post op. With best correction, visual outcome was good in 47.5%, moderate in 37.6% and poor in 15%. The commonest co-morbidity was glaucoma 33 (71.7%). The most common intra operative complications were vitreous loss 61 (27.35%) and posterior capsular rupture (6.28%). Capsular opacity (6.28%) was commonest post operatively with significantly poor visual outcome ( $\chi^2 = 51.46$ , p-value = <0.05). Causes of poor visual outcome were uncorrected refractive error (59.37%), co-morbidity (24.22%), and surgery related complications (16.41%). Visual outcome was significantly better with IOL or prescribed glasses ( $\chi^2 = 19.66$ , p-value <0.05) and better still with ECCE +IOL ( $\chi^2 = 8.46$ , p-value <0.05). Poor visual outcome was significantly associated with co-morbidity ( $\chi^2 = 23.88$ , p-value <0.05), surgical complications ( $\chi^2 = 51.46$ , p-value = <0.05).

**Conclusion:** The baseline cataract visual outcome was poor due to delay in correction of refractive error, co-morbidities, and surgical complications. Good outcome could be attained by routinely ensuring different methods of adequate postoperative visual rehabilitation. Skills acquisition, availability of adequate equipments, establishment of a good records system to achieve effective evaluation and monitoring of outcome cannot be over emphasized.

**Keywords:** Cataract surgery, Evaluation, Visual outcome

### INTRODUCTION

Cataract is a major cause of visual impairment and blindness worldwide, especially in India, China and sub-Saharan Africa, where<sup>1</sup> an estimated 19.34 million (43% of all blindness) are bilaterally blind from age related cataract.<sup>1</sup> It is therefore a significant public health problem.<sup>2</sup>

Surgery still remains the only method of treatment of cataract.<sup>1</sup> However, this surgery is not equally available to all, and where it is available, it does not produce equal outcomes.<sup>1,2</sup> It aims to rehabilitate the blind or visually impaired persons by restoring their eyesight so that their quality of life and ability to function are returned to normal or as near normal as possible.<sup>3</sup> We are not only interested in how many operations are performed, but in how many blind people have had their sight restored, and to what extent.<sup>4</sup>

Cataract surgery visual outcome can be used as an indicator required by ophthalmologists, to measure performance so as to monitor the quality of their services. The outcome can be assessed with full spectacle correction ('best vision') or with available correction ('functioning vision'). Good outcome is defined as 6/6-6/18 (available and best correction grades = >85% and >90% respectively), borderline outcome as <6/18-6/60 (available and best correction = <15% and <5% respectively), and poor outcome as <6/60 (available and best correction = <5% for each type). These broad categories can further be subdivided into: 6/6 excellent, 6/9 very good and 6/12 good.<sup>5</sup>

Cataract surgery outcome can also be measured, either as visual acuity in the operated eye or in the patient, in terms of ability to function<sup>4</sup>, quality of life, or economic rehabilitation.<sup>1</sup> However, visual acuity is the most suitable to measure since the rest are time consuming and not readily available to the routine cataract surgeon.<sup>3</sup>

Outcome or quality of vision can still be assessed, using one of the following:

- Percentage of cataract operation achieving a certain post op vision in the operated eye;
- Number of blind eyes, which have been restored i.e. blind eyes pre-op minus blind eyes post op.
- Number of blind patients to which vision has been restored i.e. blind patients pre-operative minus blind patients post-operative.<sup>4</sup>

Good visual outcome often help in promoting cataract surgery to the people as well as being helpful in achieving the objectives of vision 2020. The routine types of surgery performed are intracapsular cataract extraction (ICCE) and intracapsular cataract extraction (ECCE) with glasses or with intraocular lens (IOL) insertion. Biometry was usually not done before surgery. This study evaluated the visual outcome of cataract surgeries in the major eye centres of Osun State so as to improve upon our performance.

## MATERIALS AND METHOD

A three year audit (January 2000 to December 2002) was carried out in 3 Eye Centres in Osun State, to evaluate the outcome of cataract surgery. Ethical approval was obtained from research and ethical committee of the centres. All elective cases were included in the study while the emergency cases were excluded. Information obtained from the patients included name, sex, age, and the estimated distance travelled. Documented ocular examination findings included visual acuity (VA) recorded for one eye (read from a distance of 6 metres from the Snellen's chart), light projection, presence of co-morbidity such as corneal opacities, glaucoma or previously recorded retinal scars or pathology, and the type of cataract (congenital, presenile or age related). Complicated and post traumatic cataract was excluded. Post operatively, the visual acuity was assessed with +10 dioptre sphere (DS) lens (for those who had no IOL inserted and best corrected VA recorded for those who had IOL and /or prescribed glasses. These were recorded at 12-14 weeks post operatively.

The types of surgery performed were recorded as intra capsular cataract extraction (ICCE), or extra capsular cataract extraction (ECCE) only, or ECCE + posterior chamber intra ocular lens (PCIOL) depending on the center. Operative complications and period of follow up from discharge were also recorded. A maximum period of 6 weeks from ward discharge after surgery was taken into consideration for evaluation.

### Data Management

Specially designed computer database software (Epidata 1.5 version of Epi Info 6) was used to create the

questionnaire (QES) and the record (REC) files for data entry. Data was analyzed with Epi Info 6 software. Analysis included frequency distributions of the variables of interest and cross tabulations for chi square and p-values determination. The World Health Organisation criteria for grading post-operative visual acuity<sup>5</sup> were used to determine post-operative visual outcome. This grading shows that good outcome is attained when post-operative visual acuity of 6/6-6/18 is >80%, or VA <6/18-6/60 is <15% or VA 6/60 is <5% with best correction in this study. Possible effects of co-founders on post op VA were also explored. Mantel Haenszel method of stratified analysis was used.

## RESULTS

A total number of 283 patients that had surgery were evaluated from three eye centres in Osun State of Nigeria. The distribution of cases showed 127 (44.9%), 27 (9.5%) and 129 (45.6%) from centers 1, 2, and 3 respectively.

There were 170 (60.1%) males and 113 (39.9%) females, giving a male to female ratio of 1.4:1. Their ages ranged between 2 and 95 years with the mean as 62.2years. The age group 50yrs and older made up 241(85.1%) while the below 50yrs age group made up 42(14.9%). (Table 1)

**Table 1** Distribution of Age group by Sex

Age grouping	Males	Females	Total
<50 yrs	26 (61.1%)	16 (38.9%)	42 (14.9%)
>=50 yrs	144 (59.9%)	97 (40.1%)	241 (85.1%)
Total	170 (60.1%)	113 (39.9%)	283 (100%)

Types of cataract included 231 cases of age related, 8 of childhood, while 34 were pre-senile. The commonest type of surgery performed was ECCE only with 147 (51.9%) cases, followed by ICCE only 98(34.6%), (ECCE +IOL 38(13.42%), while no case was recorded for ICCE + IOL.

The pre-operative visual acuity showed that 166(58.7%) persons were blind while no patient presented with normal vision. Post operatively (33.2%) improved to normal vision, 41.3% had low vision, while only (6.1%) remained blind (Table 2).

**Table 2** Pre and post-operative visual acuities

VA	Pre op		Post op	
	Fre- quency	%	Fre- quency	%(95%CL)
6/6-6/18	0	0	94	33.2 (27.3-39.9)
<6/18-6/60	11	3.9	117	41.3 (34.7-47.9)
<6/60-3/60	106	37.4	55	19.4(14.38-25.0)
<3/60- NPL	166	58.7	17	6.1(3.39-10.1)
<b>Total</b>	<b>283</b>	<b>100.0</b>	<b>283</b>	<b>100.0</b>

(NPL= No Perception of Light)

The Sight Restoration Rate (SRR)<sup>7</sup> was 70.7%. This shows the level to which the visual acuity has improved to at least 2 lines more than what it was before surgery. The number of cases refracted postoperatively

was 135 (47.7%). Out of these, only 90 (67%) were wearing glasses at time of discharge from hospital follow up at six weeks after being discharged from the ward. Those who received correction with IOL with or without spectacles had significant post op visual acuity compared to those using +10 lenses (Chi-square =19.66, p-value <0.05) Table 3

The post-operative visual acuity was significantly better in ECCE+IOL compared to other types of surgery where there was no case of blindness and highest percentage (45.7%) with normal vision were recorded (Chi square =8.46, p-value <0.05) Table 4. The total number of cases with co-morbidity was 49(100%) The most frequently associated type of co-morbidity detected was glaucoma which made up 33 (67.36%) of all co-morbidity cases. Out of these, 19 were detected pre-operatively and 14 postoperatively. The others were optic atrophy 7 (14.28%), maculopathy 6 (12.24 %), and corneal opacity 3 (6.12%).

**Table 3** Visual outcome according to type of correction received postoperatively.

Types of Correction	Post op VA				
	6/6-6/18	<6/18-6/60	<6/60-6/18	<3/60- NPL	Total
IOL ± correc- tive glasses	59(47.5%)	47(37.6%)	15 (11.9%)	4 (3%)	125 (44.3%)
+10 lens	35 (22%)	69 (44.1%)	40 (25.2%)	14 (8.7%)	58 (55.7%)
<b>Total</b>	<b>94 (33.3%)</b>	<b>116 (41.2%)</b>	<b>55 (19.3%)</b>	<b>18 (6.1%)</b>	<b>283 (100%)</b>

**Table 4** Post-operative VA by surgery types

Surgery type	Post op VA				
	6/6-6/18	<18-6/60	<6/60-3/60	<3/60-NPL	Total
ICCE	31 (36.2%)	31 (36.2%)	15 (17.4%)	9 (10.1%)	86(30.3%)
ECCE	43 (28.2%)	68 (44.4%)	34 (21.8%)	9 (5.6%)	154(54.4%)
ECCE+IOL	20 (45.7%)	17 (40.0%)	6 (14.3%)	0	43 (15.4%)
<b>Total</b>	<b>94 (33.3%)</b>	<b>116 (41.2%)</b>	<b>55 (19.3%)</b>	<b>18 (6.1%)</b>	<b>283 (100%)</b>

**Table 5** Post op VA by co-morbidity

Co-morbidity	Post-operative VA				
	6/6-6/18	<6/18-6/60	<6/60-3/60	<3/60-NPL	Total
<b>Present</b>	2.4(22.2%)	2.4 (22.2%)	1.2 (11.1%)	5 (44.4%)	11(3.9%)
<b>Absent</b>	92 (33.8%)	114 (42%)	53 (19.6%)	13 (4.6%)	272(96.1%)
<b>Total</b>	94.4 (33.3%)	116.4 (41.2%)	54.2 (19.3%)	18 (6.1%)	283 (100%)

Males 10/11(91.2%) had highly significant associated co-morbidity (Chi square = 4.12, p-value <0.05) more than the females. The age group <50 years had significantly more blinds (14,8%) than the age group  $\geq$  50years(5.1%). (Chi square =3.75, p-value <0.05). The group with associated co-morbidity had worse post op visual acuity with blindness rate of (44.4%) as against the group with no associated co-morbidity (4.6%). They also had a lesser percentage of patients with normal vision (22.2%) when compared to the latter group (33.3%). occurred This finding was highly statistically significant (Chi square = 23.88, p-value <0.05) (see Table 5). Poor visual outcome was as expected, significantly associated with the presence of surgical complications (chi-square = 51.46, p-value = <0.05).

There were 223 cases of operative complications. The intra operative complications included vitreous loss 61(27.35%), posterior capsular rupture 14(6.28%), incomplete cortical clean up 10 (4.48%) IOL /lens loss into vitreous 2(0.90%) and others 5(2.24%). Post operative complications included capsular opacity, 14 (6.28%), retained lens material 5(2.24%), bullous keratopathy and intra ocular lens dislocation 2 (0.90%) each endophthalmitis 1(0.45%) and others 7(3.14%).

The main causes of poor visual outcome were uncorrected refractive error 76(59.37%), associated co-morbidity 31(24.22%), and surgical complications (especially posterior capsular opacity) 21 (16.41%).

## DISCUSSION

The distribution of cases reflected how large a centre was and how frequent surgeries were performed. The reasons for male predominance were unknown. However, it's been found that there's gender inequality in the uptake of cataract services where women are disadvantaged.<sup>8</sup> All the elective cataract surgeries performed on all ages were taken into consideration. The ages therefore spread between the infants and the very aged (2-95years). It was not however surprising that the age

group  $\geq$  50years constituted the highest number since age is the highest causative factor in cataract formation. (See Table 1)

The age group <50 years seemed to have worse outcome than the older age group because of the higher proportion of significantly blind patients (p=0.005). This could have been attributable to the congenital cataracts, which often have associated amblyopia which is difficult to treat as well as having some other previously unknown abnormality in the retina before surgery. Difficulty in rehabilitation either with glasses or IOL is usually encountered in children. This is because parents may not co-operate with the child wearing glasses, or may not afford the glasses. It could also have been due to the problem of unioocular aphakia then when intra ocular lens insertion was not yet practiced by many. This allowed for the types of cataract surgeries performed then to be more of ICCE for ages >50years and ECCE for < 50 years. Age group less than 50years could also have developed posterior capsular opacity since this was the most common post op complication.

This may appear to contradict some studies which showed better outcome with decrease in age, and worse outcome with increased age because of age related maculopathy as found by Minassian and Westcott.<sup>9</sup> The high proportion of blindness (58.7%) and severe visual impairment (37.4%) showing as the presenting visual acuity before surgery in this study was seen to be similar to previous Indian and Nigerian studies where over 86% presented with visual acuity <6/60.<sup>3,10</sup> This therefore appears to be a common presentation among the low income level countries such as ours. This was in contrast to findings among the high income level countries, such as the United Kingdom where no patient presented with a vision poorer than 6/18.<sup>11</sup> These poor visual acuity presentation before surgery could be explained by the fact that, ICCE had been the most common type of surgery before the gradual shift to ECCE, which used to allow for 'maturity' of cataract

prior to surgery. Besides this, is another socio-medico-legal factor, which allows doctors to make most patient wait so that they can actually 'see' the difference after surgery; especially when there were no instant intraoperative visual rehabilitation.

The common types of surgery performed were ECCE, followed by ICCE only, and lastly ECCE + IOL. This showed a trend in the shift towards ECCE, and later IOL insertion with better post op visual rehabilitation; which is very encouraging.

The results of the visual outcome graded according to WHO<sup>5</sup> showed a generally poor outcome (47.5% good and 15% poor). This has been found to be similar to other studies done in India.<sup>3,12</sup> In contrast the UK study had 85% good outcome achieving > 6/12.<sup>11</sup> The Kaduna study was however a mixture of 85% good and 10.4% poor outcome.<sup>10</sup>

Among those who had good outcome in this study, better outcome was noticed among those who had IOL implants or were wearing prescribed glasses than those without. Further still, those who had ECCE+ IOL were found to have significantly better outcomes than the rest. The sight restoration rate calculated for all patients was 70.7%. This represented the level at which the blind had become sighted. This is encouraging but the best should be strived at to achieve WHO standard.

The visual outcome result in this study seemed to reflect the norm when visual rehabilitation was lacking due to inability to insert IOL. The better outcomes were a consequence of IOL implantation during surgery. However, studies have shown that good results have been achieved also with use of aphakic glasses.<sup>13</sup> It should also be noted that other factors such as lack of expertise and difficulties in surgical technique during IOL conversion training was found to have led to poorer outcome results than the use of glasses in India, despite having favourable surgical conditions.<sup>3</sup> Good surgical skills can therefore be said to be a precondition or prerequisite to having a good outcome, apart from the use of IOL itself.

Some of them were not wearing glasses at the end of 6 weeks after discharge from hospital. This delay in wearing spectacles could have contributed to the poor outcome. Some could also have lost or broken their glasses.<sup>14</sup> The timing of this study in assessment of visual acuity 6 weeks from discharge also possibly affected the results. However, study of outcomes of a longer period may show a different result. Even though spectacles may give almost same degree of sight restoration with IOL, the Aravind survey demonstrated that aphakic patients who did not receive IOL were at a

disadvantage in terms of presenting vision post op, especially.<sup>15</sup>

The frequency of co-morbidity was 11(3.9%). As could be expected, the visual outcome was significantly worse in the presence of associated co-morbidity ( $p=0.00026$ ). The number blind from co-morbidity (44.4%) doubled those whose vision remained within normal (22.2%). The most commonly detected type of co-morbidity was glaucoma. Most patients' late presentation especially with glaucoma, which is, painless could explain this. Glaucoma is also the second commonest cause of blindness in southern Nigeria, apart from cataract related causes.<sup>16</sup> Others were optic atrophy, maculopathy and corneal opacity similarly found by other workers.<sup>11</sup>

The most common intra operative complications were vitreous loss 61 (27.35%) and posterior capsular rupture (6.28%), while capsular opacity (6.28%) was commonest post operatively. Similarly results were also found by other authors.<sup>11, 17</sup> Operative complications especially posterior capsular opacity led to significantly poor visual outcome (chi-square = 51.46,  $p$ -value = <0.05). With advances in technology, it's been found that phacoemulsification and manual small incision cataract surgeries achieve excellent visual outcome with lower complication rates<sup>18</sup> i.e. in the hands of the experts. Continuous microsurgical training is therefore advisable.

## CONCLUSION

The baseline evaluation of our cataract surgery visual outcome from this study is poor.

The main causes of poor visual outcome were uncorrected refractive error, associated co-morbidity, and surgical complications, especially posterior capsular opacity.

In order to achieve good visual outcome, continuous skill acquisition by training, taking care of co-morbidities where possible, and the use of biometric measurements for IOL power calculation, are required to be put in place. Regular monitoring and evaluation cannot be over emphasized

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