

ORIGINAL ARTICLE

A comparative evaluation of outcome of cataract surgery at Ago-Iwoye, Ogun State

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Abstract

Objective: To compare the outcome of cataract surgery using intracapsular/ extracapsular extraction alone to surgery with lens implantation.

Methods: A retrospective review of all patients who had cataract surgery by all methods between February 1998 and October 1999 at St Mary's Catholic eye hospital Ago-Iwoye, Ogun state, for post operative visual acuity and surgery related complications.

Results: Two hundred and forty nine eyes of 211 patients were reviewed. 128 (60.7 %) were males and 83(39.3) were females. The age range was from 9years to 90years. Post op vision of 6/18 or better was present in 71% of the posterior chamber intra ocular lens (PC-IOL) group; 50% of anterior chamber lens (AC-IOL) group, 62% of intracapsular cataract extraction (ICCE) group and 31.2% of the extracapsular cataract extraction group. Preventable causes of poor visual outcome were present in 14.9% Of the cases reviewed especially the ECCE and ICCE groups and included: posterior capsule opacity, uveitis, cystoid macular oedema and endophthalmitis. Poor outcome was associated with pre-existing ocular disease in 10.8% of the eyes operated and were due to pre-existing glaucoma, macular degeneration, optic atrophy and diabetic retinopathy.

Conclusion: Best functional visual results are obtained by modern techniques of ECCE with IOL, which ensures that the patient has adequate post op vision for his needs. Adequate case selection to exclude pre-existing ocular morbidity as well as prevention or proper management of surgery related complications when they occur are also essential for satisfactory results. Older techniques of ICCE or ECCE with out IOL are associated with less satisfactory functional visual acuity and should therefore be discouraged.

Key words: Cataract extraction, visual acuity, complications, intraocular lens

Introduction

Cataract is responsible for more than half of the world blindness with majority of these cases in developing countries.¹⁻³ Cataract surgical rates are however in most cases low in many developing countries due to numerous socio-economic factors including: lack of trained personnel, disproportionate distribution of available ophthalmic resources with many ophthalmic centres located in teaching hospitals and in big cities not accessible to many rural blind people.

Low capacity utilization of available resources due to lack of awareness of the cataract blind, fear of surgery and high cost of surgery.⁴ Many developing countries such as India, Pakistan, Kenya and Gambia have demonstrated that ophthalmic services can be brought closer to the people through use of mobile camps, cottage hospitals and outreach clinics from distant or bigger city hospitals.² The advantage in this

arrangement is that it brings both clinic and surgery into the patients own familiar environment thus providing treatment with a minimum alteration in their way of life in the village. Another advantage in this arrangement is that it provides large number of cataract cases for the trainee ophthalmologist (residents, diplomates) to improve his surgical skills with the large number of available patients as opposed to the situation in teaching hospitals where several residents compete for the few cases booked for surgery.

The St Mary's Catholic Specialist Eye Hospital is a mission hospital located in a rural setting providing secondary level eye care. It is affiliated to the ophthalmology department of the University College Hospital, Ibadan. Surgical services are provided by a resident consultant ophthalmologist or visiting resident from the University College Hospital and diplomates in training under supervision by the

consultant. IOL surgery was commenced in a small way during rotary organized eye camps at the hospital in 1996, there was there after a gradual change from the conventional ICCE to ECCE but it was not until late 1998 that ECCE-IOL surgery completely took over at the hospital. This comparative evaluation of the quality of care became necessary as a way of comparing outcome of care using ICCE/ ECCE to that of PC-IOL/AC-IOL surgery at Ago-Iwoye, the findings and subsequent recommendations would be useful for the maintenance of a high standard quality of eye care.^{1, 5} It could also be of use to Ophthalmologists yet to commence IOL surgery as well as those already involved as a reference material. The focus in this review is on functional outcome measured by postoperative visual acuity as well as complication rate as indices of quality of care.

Materials and Methods

A review of case notes of all patients who had cataract extraction between February 1998 and October 1999 at the St Mary's Catholic Eye Hospital Ago-Iwoye was done retrospectively. Method of cataract extraction employed for the patients varied from, intra-capsular cataract extraction (ICCE), extra-capsular cataract extraction (ECCE), ECCE with Posterior chamber intra-ocular lens (PC-IOL) implant, and ICCE or ECCE with anterior chamber intra-ocular lens (AC-IOL) implant. All Surgeries were performed by a resident consultant ophthalmologist or visiting resident from the University College Hospital and diplomates in training under supervision by the consultant.

No randomization was done in determining the type of surgery offered to a particular patient. The earlier surgeries done in early 1998 tended to be ECCE, ICCE was mostly reserved for the older patients. By late 1998, the main consideration was ability of the patients to pay for IOL. All patients had visual acuity of 6/60 or worse not improved with pinhole or spectacle correction. Optic nerve and retinal functions were inferred from response to pupillary reaction to light and light projection test respectively. Slit lamp examination was done to determine corneal integrity as well as examination for evidence of previous trauma, past or present intra-ocular inflammation. Intra-ocular pressure measurement was done with Goldman applanation tonometer. Patients were admitted one day before the operation and were commenced on topical antibiotic Chloranphenicol or Gentamycin, oral diazepam 5mg at night, vitamin C 100mg three times daily and Acetazolamide 250mg at night. On Morning of operation, the eyelashes were trimmed, the same dose of Acetazolamide was repeated, and the pupil was dilated with Phenylephrine and topical tropicamide (Phenylephrine was omitted in hypertensives). Pre-medication with Promethazine 12.5-25mg and Pentazocine 15-30mg given intra-muscularly were reserved for young or anxious patients only. Local anaesthesia was used for all cases and consisted of peribulbar injection of 3-4ml 2% xylocaine with adrenaline 1:100,000 without hyalase as well as facial anaesthesia using O'Brien method. Ocular massage was done for between 5-10 minutes to ensure a soft eye before surgery. A fornix based conjunctival flap was used in all cases and minimal cautery was applied. A limbal groove incision was made between 2 and 10 o'clock before anterior chamber (AC) was penetrated with a blade fragment. For the ICCE group, the wound was widened with corneal

scissors and peripheral iridectomy was done, 2 pre-placed sutures were inserted and routine ICCE using cryo-extraction with a cyro-probe was done the wound was subsequently closed with 8-0 sutures(6-7 sutures). For the ECCE-IOL group, following entry of blade fragment into AC, the AC was reformed with 2 % Hydroxymethylcellulose and an improvised cystotome fashioned from a size 25G needle was used to achieve a can opener capsulotomy. The lens nucleus was delivered by counter pressure at the superior and inferior limbus. A simcoe irrigation and aspiration canular was used for irrigation aspiration of soft lens matter using normal saline in which 0.5ml adrenaline was added to 500ml irrigation fluid. Cortical fibres were striped from the posterior capsule from the periphery towards the centre in all quadrants. AC was reformed with 2% methylcellulose before IOL insertion. Majority of the IOLs were from Aurolab, the rest were from Alcon. They were of modified J loop or C loop varieties. Power of IOL was determined from the patients' refraction in the operated eye before the development of cataract or from the refraction of the other eye. Where neither is possible a power was chosen arbitrarily from a standard hospital stock of lenses that ranged from +19-+21 diopters. IOLs were inserted into the posterior chamber by initially sliding in of the inferior haptic into the capsule bag or in the sulcus behind the iris followed by insertion of the superior haptic using compression dialing technique with the aid of Shepherds forceps or Kelman -Mc pherson forceps. Final centration was done with Sinskey's hook to dial the lens into position. For the AC-IOL group, following routine or inadvertent posterior capsule rupture during routine ECCE pupil was constricted with intra -cameral pilocarpine, vitreous when present was cleared from the anterior chamber by manual vitrectomy using curved verners and cyclodialysis spatula. Obvious peripheral anterior synechia were broken. All manipulators in the anterior chamber were carried out only after reformation of AC with 2% methylcellulose. AC IOL of chosen power was subsequently introduced into the anterior chamber using shepherds forceps. All IOLs were Kelman type multiflex single piece lenses. They were 12.5mm in length and were either +18.5 or 19.0 Diopters. They were mostly sourced from Aurolab or Alcon. The power of the IOLs were determined by addition of a factor of 7 Diopters to the aphakic spectacle correction or where this is not possible, from the refraction of the other eye or the powers were arbitrarily chosen from the stock of available lenses. The inferior haptic was first placed into the inferior anterior chamber angle care being taken to avoid iris tuck, followed by insertion of the superior haptic. Centration and dialing was done with the aid of a Sinskeys hook. Viscoelastic material was washed out using the irrigation fluid. The incision was closed with five 8-0 virgin silk sutures or 9-0 nylon. The wound was covered with conjunctival flap without suturing. Sub-conjunctival Gentamycin 20mg, and methyl-prednisolone 20mg, were given, topical antibiotic was instilled and the eye was padded overnight. Post-operative examination included daily slit lamp examination, intra-ocular pressure measurements and visual acuity using Snellens chart with and without pinhole. Patients were discharged as from the third Post operative day on topical steroid, antibiotic and tropicamide. Initial follow up was at two weeks. Subsequent visits were at 3 weeks intervals and by 6-8 weeks topical drops were tailed off and refraction was done. The following studied factors were compared between the different patient groups. Intra-operative complications, post operative complications and post operative visual acuity with plus 10-diopter lens/ refraction for the aphakic patient or with pin hole/ refraction for patients with IOL. Cases with poor visual acuity less than

6/24 were noted and further examined to determine the cause.

Results

A total of two hundred and forty nine eyes of 211 patients were reviewed. 128 (60.7 %) were males and 83(39.3%) were females. The overall age range was from 9 years to 90years mean 62.3 years, and over 85% of the patients had uncomplicated senile cataract

which were evenly distributed amongst the groups. The contributions from the different surgical groups were: ICCE 24 eyes (9.6%) mean age 66.6years; ECCE 150 eyes (60.2%), mean age 61.9 years; PC-IOL 61eyes (24.5%), mean age 58.2years; and AC-IOL, 14 eyes (5.6%), mean age 62.6 years. A comparison of the intra and post-operative complications, as well as post-operative visual acuity is shown in tables 1, 2, and 3 respectively.

Table 1: Intra-operative complications of 249 cataract extractions

| Complication | ICCE(24) No. (%) | ECCE(150) No. (%) | ECCE-PC-IOL(61) No. (%) | AC-IOL(14) No. (%) | Total (%) |
|------------------|---------------------|----------------------|----------------------------|-----------------------|-----------|
| PC rent | - | 17 (11.3) | 3 (4.9) | - | 20 (8.1) |
| Vitreous loss | 5 (20.8) | 22 (14.7) | - | 3 (21.4) | 30 (12.2) |
| Zonuler dialysis | - | 6 (4) | - | - | 6 (2.4) |
| Iridodialysis | 1 (4.2) | 4 (2.7) | 1 (1.6) | 1 (7.1) | 7 (2.8) |
| Unplanned ECCE | 6 (25) | - | - | - | 6 (2.4) |
| Iris tear | 1 (4.2) | 3 (2) | 2 (3.3) | - | 6 (2.4) |
| Hyphema | - | - | 3 (4.9) | - | 3 (1.2) |
| Total | 13 (54.2) | 52 (34.7) | 9 (14.8) | 4 (27.5) | 78 (31.3) |

Table 2: Post- operative complications of 249 cataract extractions

| Complication | ICCE/ECCE(174) No. (%) | ECCE-PC-IOL(61) No. (%) | AC-IOL(14) No. (%) | Total (%) |
|--------------------------------|---------------------------|----------------------------|-----------------------|-----------|
| Cornea striae/ oedema/ opacity | 9 (5.3) | 6 (9.8) | 2 (14.3) | 17 (6.9) |
| Posterior capsule opacity | 10 (5.8) | 2 (3.3) | 3 (21.4) | 15 (6.1) |
| Elevated IOP | 12 (12.3) | 10 (16.4) | 2 (14.3) | 33 (13.4) |
| Wound gape/iris prolapse | 1 (0.6) | 1 (1.6) | - | 2 (0.8) |
| Uveitis | 4 (2.3) | 10 (16.4) | 6 (42.9) | 20 (8.1) |
| Peaked/irregular pupil | 1 (0.6) | 6 (9.8) | - | 7 (2.9) |
| Pupil capture | - | 1 (1.6) | - | 1 (0.4) |
| Hyphema | - | 1 (1.6) | - | 1 (0.4) |
| Soft lens matter | 3 (1.8) | 4 (6.6) | - | 7 (2.9) |
| Endophthalmitis | 2 (1.2) | 3 (4.9) | - | 5 (2.0) |

Table 3: Post operative visual acuity of cataract patients

| Visual acuity (I) | ICCE No. (%) | ECCE No. (%) | PC-IOL No. (%) | AC-IOL No. (%) | Total (%) |
|-------------------|-----------------|-----------------|-------------------|-------------------|-----------|
| 6/6-6/9 | 4 (16.7) | 14 (11.5) | 22 (36.1) | 3 (21.4) | 43 (17.3) |
| 6/12-6/18 | 11 (45.8) | 24 (19.7) | 25 (40.9) | 4 (28.6) | 64 (25.7) |
| 6/24-6/60 | 5 (20.8) | 65 (53.3) | 9 (14.8) | 5 (35.7) | 84 (33.7) |
| 5/60-3/60 | - | - | - | - | - |
| 3/60-1/60 | 3 (12.5) | 13 (10.7) | 3 (4.9) | 2 (14.3) | 21 (8.4) |
| 1/60-LP | - | 3 (2.5) | - | - | 3 (1.2) |
| NLP | 1 (4.2) | 3 (2.5) | 2 (3.3) | - | 6 (2.4) |
| Not available | - | 28 (18.7) | - | - | 28 (11.3) |
| Total | 24 (100) | 150 (100) | 61 (100) | 14 (100) | 249 (100) |

Table 4: Causes of poor visual outcome (<6/24) amongst post operative cataract patients

| Cause | ICCE | ECCE | PC-IOL | AC-IOL |
|---------------------------|----------|-----------|----------|----------|
| | No. (%) | No. (%) | No. (%) | No. (%) |
| Corneal opacity | 1 (4.2) | 4 (2.7) | - | - |
| Posterior capsule opacity | - | 10 (6.7) | 1 (1.6) | 2 (14.3) |
| Uveitis | - | 7 (4.7) | 2 (3.3) | 2 (14.3) |
| Glaucoma | 1 (4.2) | 9 (6) | 1 (1.6) | - |
| Endophthalmitis | 1 (4.2) | 2 (1.3) | 3 (4.9) | - |
| Optic atrophy | - | 3 (2) | - | - |
| Cystoid macular oedema | 4 (16.7) | 3 (2) | - | - |
| Macular degeneration | - | 5 (3.3) | - | - |
| Retinal detachment | - | 1 (0.7) | - | - |
| Diabetic retinopathy | - | 2 (1.3) | - | - |
| Total | 7 (29.2) | 46 (30.7) | 7 (11.5) | 4 (28.6) |

Abbreviations

ICCE: intra-capsular cataract extraction, ECCE: extra-capsular cataract extraction, PC-IOL: posterior chamber intra-ocular lens, AC-IOL: anterior chamber intra-ocular lens, NLP: no light perception, IOP: intraocular pressure, PC: posterior chamber

Discussion

There was a high default rate amongst the reviewed patients and 92(36.9%) of the patients did not have their final refraction after 2months of surgery, they were assessed with the best available visual acuity with pin hole or plus 10 diopter lens correction. High default rate is a recognised problem in less developed countries.^{6,7,14} This is probably related to transportation difficulties often encountered by many patients travelling long distances from their homes in rural areas to urban centres where most eye centres are located.

One hundred and seven (43%) of the reviewed patients had post-operative visual acuity of 6/18 or better. Majority of these were contributed by the PC-IOL group (47 out of 61 eyes),¹⁶ followed by ICCE (15 out of 24 eyes), AC-IOL (7 out of 14 eyes).¹⁷ The least proportionate contribution was from the ECCE group (43 out of 150 eyes). Over thirty-three percent (33.7%) of the patients had post op vision of 6/24 or worse but better than 6/60 while 12 % had 3/60 or worse. The reason for poor post operative visual outcome varied between the groups with the ECCE group having posterior capsule opacity, pre-existing glaucoma and uveitis as the main reasons. For PC-IOL endophthalmitis was the main reason, for AC-IOL it was posterior capsule opacity/pupillary membrane while for ICCE it was mainly cystoid macular oedema which was mostly associated with vitreous loss. One surprising observation was the relatively fewer number of posterior capsular opacity (PCO) in the PC-IOL group compared to the ECCE group, the presence of the PC-IOL may have helped to prevent proliferation and spreading of equatorial lens fibres to the posterior capsule. The post operative visual acuities were slightly less impressive than those by previous workers; Osuntokun,⁶ 89.9%; Abiose,⁷ 69.9%; Nwosu⁸ 70.8%, from Senegal¹² 90%, Uganda¹³ 84% and Norway¹⁸ 88% for post operative visual acuities of 6/18 or better. But were superior to that of 11% for vision better than 6/18 and 78% for vision better than 6/60 reported from Zimbabwe⁹ and

28.6% for vision better than 6/60 for 28 couched eyes in Nigeria.¹⁰ Pre-existing ocular conditions such as glaucoma, optic atrophy, macular degeneration and diabetic retinopathy were responsible for poor vision in 10.8% of the patients. Better case selection would therefore have excluded them from surgery but most were operated purely for cosmetic reasons. Avoidable conditions such as posterior capsule opacity, uveitis, endophthalmitis, and cystoid macular degeneration were responsible for poor outcome in 14.9% of the reviewed cases. More attention to greater detail in preventing these problems such as adequate posterior capsule clean up, insertion of a PC-IOL in the bag if possible to prevent PCO, adequate cortical mop up, aspiration of visco-elastic from anterior chamber, and use of topical steroid prophylaxis to reduce postoperative uveitis; prevention of vitreous loss by adequate pre-operative ocular massage, or use of Horner's balloon/super pinky to ensure a soft eye, doing ECCE instead of ICCE and carrying out adequate anterior vitrectomy when ever there is posterior capsular rent with vitreous loss; and ensuring strict asepsis in the care of patients to prevent endophthalmitis. Poor visual outcome was found to be associated with pre-existing ocular morbidity (half of those involved), age over 80 years, known diabetes, bilateral blindness and vitreous loss by an East African study.¹⁴

The surgery related complications were few and varied between the groups except vitreous loss which was common to all except the PC-IOL group, it accounted for 12.2% of the cases reviewed, this is more than 2.3% reported by Nwosu,⁸ 3.3% by Osuntokun⁶, 11.1% by Abiose,⁷ 10.3% from Norway¹⁸ and 1.68% by a USA study.¹⁵ It is however less than 16.2% reported by Erechalu¹¹. Vitreous loss can be complicated by persistent ocular inflammation, cystoid macular oedema and retinal detachment. Maintaining a soft eye during surgery therefore best prevents it. The post op complications in this series include elevations of intra-ocular pressure 13.4%, as opposed to 0.9% reported by Erechalu,¹¹ post op glaucoma was present in 4.4% and 1.2% of the cases

reported by Osuntokun⁶ and Abiose⁷ respectively. Elevations of intra-ocular pressure were particularly common with the PC-IOL group and were in most cases transient due to insufficient wash out of the visco-elastic material from the anterior chamber. This is similar to a report from the USA¹⁹. Management consisted of use of antiglaucoma medications such as oral Acetazolamide 250mg twice daily for about 5 days. Timolol eye drops twice daily was added if pressure remained elevated despite Acetazolamide. Most post op complications observed such as corneal striae, transient elevations of intra-ocular pressure, uveitis and posterior capsule opacity were readily treated by adequate intervention measures such as peri-ocular steroid injections, frequent topical steroid drops, to reduce inflammation, anti-glaucoma medications such as timolol eye drops twice daily to control pressure until uveitis was controlled. The most devastating complication in 2% of this series was endophthalmitis which was almost impossible to control once it was established and is therefore best prevented by ensuring adequate asepsis. It was more common in the PC-IOL group¹⁶ probably because of increased instrumentation, use of irrigating fluids and intra-ocular lens. The best vision obtained from any of the patients with this complication was count fingers at 3meters. Endophthalmitis was present in 0.5% 9.4% in other reports.^{6-8, 12, 20}

Cataract is an avoidable cause of blindness treatable by surgical extraction. Best functional visual results are obtained by modern techniques of ECCE with IOL, which ensures that the patient has adequate post op vision for his needs, the need for adequate case selection to exclude pre-existing ocular morbidity is also essential for satisfactory results. Complications of ECCE -IOL surgery can in most cases be prevented or adequately managed when they occur, older techniques of ICCE or ECCE without IOL are associated with less satisfactory functional visual acuity and should therefore be discouraged.

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