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"A CLINICAL EVALUATION ON VISUAL OUTCOME AFTER CATARACT SURGERY IN A TERTIARY CARE HOSPITAL"

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ABSTRACT:

Background: Cataract surgery is the only method of restoring vision for those with visual impairment due to cataract and is the second most cost effective public health intervention following immunisation to prevent communicable disease [(1)].
Objectives:
• To study the incidence of poor visual outcome in patient after cataract surgery.
• To study the causes of poor visual outcomes in pseudophakic patients.
Material & Methods: Study Design: Prospective observational study.**Study area:** The study was done at Department of Ophthalmology, Akash Institute of Medical sciences and Research center, Bangalore, Karnataka.**Study Period:** Jan. 2021 – Dec. 2021. **Study population:** Patients attending to ophthalmology outpatient department for treatment of defective vision due to senile cataract. **Sample size:** 200 cases were included in our study.**Sampling method:** Simple random sampling method.**Ethical consideration:** Institutional Ethical committee permission was taken prior to the commencement of the study. **Study tools and Data collection procedure:** All patients who were to undergo small incision cataract surgery for senile cataract underwent a detailed pre-operative checkup which included.
Results: BCVA Improvement of 68.5% is significant with P<0.001** paired Proportion test. Good outcome was achieved in 3.5% in day 1, 96.5% at 1 week, 96% at 3 weeks and 91.5% cases at 6 weeks post –surgery respectively.
CONCLUSION: Hence it can be concluded that small incision cataract surgery done by an experienced surgeon achieves good visual outcomes with low complication rates. Our study also points out the relevance of a through pre- operative check up to rule of out pre-existing causes for poor visual outcomes and a close follow up of patients after surgery to ensure good outcomes are maintained.
Key words: Cataract surgery, pre operative K1 and K2, Phacoemulsification

INTRODUCTION:

Cataract surgery is the only method of restoring vision for those with visual impairment due to cataract and is the second most cost effective public health intervention following immunisation to prevent communicable disease [(1)].
In the present day scenario it is important that high quality of surgery be maintained with respect to the outcome. Performing surgical audit is one of method to keep a check on quality control [(2)]. Good surgical outcomes are not only essential to reduce the load of cataract blindness but also to promote the acceptance of surgical treatment among common people [(3)].
The main cause of avoidable blindness is cataract. Three quarters of the burden of blindness is in the developing world.[(4)] Cataract blindness is thorough to the increasing by 1-2 million/ year despite the fact that cataract operations are performed in numbers as great as 10 to 12 million globally.[(5)] In order to effectively address this increasing backlog, significant steps are being

taken to increase the output of cataract surgical services in many developing countries and to make cataract surgery affordable to all people irrespective of their economic status. [6]
Phacoemulsification (PE) with all its benefits may not be an affordable technique due to the cost involved in the developing countries. Manual small incision cataract surgery (MSICS) being cost effective and having similar advantages as PE is preferred in most of these countries. Manual SICS offers added advantages of having wider applicability, better safety and a shorter learning curve [7] There is growing concern regarding the quality of cataract surgery with the aim of improving the post-operativevisual outcome. This study aims to evaluate the post-operative visual outcome of patients undergoing cataract surgery in this hospital and identify the factors associated with the poor outcomes. Visual outcome of cataract surgery is measured either as visual acuity in the operated eye or in the patient, in terms of ability to function, quality of life, or economic rehabilitation. The visual outcome can be assessed with full spectacle correction (‘‘best visual acuity’’) or with presenting vision. Good visual 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 visual outcome as <6/60 (available and best correction =<5% for each type) [8]. But for this study, poor visual outcome after cataract surgery was taken as patients presenting with <6/24 BCVA.
Post-operative quality of vision and early visual rehabilitation are important parameters which determines the success of modern cataract surgery. To study the incidence of poor visual outcome after cataract surgery and to evaluate the causes of the same is hence important today. With advent of better instrumentalisation, microscopes and good training cataract surgery has becomes remarkably safe procedure, Nonetheless, complication can occur at any stage. It is hence very important to recognize them at earliest and manage them appropriately.

Objectives:
• To study the incidence of poor visual outcome in patient after cataract surgery.
• To study the causes of poor visual outcomes in pseudophakic patients.

Material & Methods:
Study Design: Prospective observational study.
Study area: The study was done at Department of Ophthalmology, Akash Institute of Medical sciences and Research center, Bangalore, Karnataka.
Study Period: Jan. 2021 – Dec. 2021.
Study population: Patients attending to ophthalmology outpatient department for treatment of defective vision due to senile cataract.

Sample size: 200 cases were included in our study.

Sampling method: Simple random sampling method.
Inclusion criteria: Patients who underwent small incision cataract surgery for senile cataract of 45years age and above
Exclusion criteria:
• Patients presenting with traumatic cataract.
• Patients with squint or known history of amblyopia.
• Patients with complicated cataract.
• Patients for whom no IOL was placed.
Ethical consideration: Institutional Ethical committee permission was taken prior to the commencement of the study.
Study tools and Data collection procedure:

All patients who were to undergo small incision cataract surgery for senile cataract underwent a detailed pre-operative checkup which included.

• Ocular examination:

 Visual acuity uncorrected, with pinhole and with refractive correction using LogMAR chart and Snellen's chart.LogMAR chart was used for all patients to measure visual acuity in this study.

 Slit lamp examination and applanationtonometry .

 Dilated fundus examination.

 Keratometry.

 A scan biometry.

• General examination and systemic examination

• Systemic Investigation - Fasting blood sugar and ECG, HBsAG, HIV (TRIDOT).

All patients under went manual small incision cataract surgery with superior sclero- corneal tunnel with an incision size of 6.5 mm. All patients had a posterior chamber IOL placed. Postoperative follow up was done on day 1, 1 week, 3 weeks and 6 weeks post surgery.

Parameters assessed at follow up were.

• Visual acuity –best corrected visual acuity and uncorrected visual acuity.

• Slit lamp examination, fundus evaluation.

• Keratometry and refractive correction at 6 weeks.

• Treatment given at each visit.

Out come of surgery was based on visual acuity and was graded poor outcome if BCVA was less than 6/24 and good outcome when BCVA was 6/18 or better

If visual Outcome was poor or did not correspond to anterior segment findings the patients underwent detailed examination after dilation. Surgically induced astigmatism was calculated using the algebraicsubtraction method with pre operative K1 and K2 values and post operative K1 and K2 values obtained at 6 weeks post surgery.

Cases with poor visual outcome were evaluated thoroughly and relevant investigations done and managed according to the individual case need. All the data was tabulated and statistically analysed with p value less than 0.05 to be significant.Student t test (two tailed, dependent) has been used to find the significance of study parameters on continuous scale within each group. Paired proportion test has been used to find the significance of proportions in paired data.

OBSERVATIONS & RESULTS:

Table 1: Age wise distribution of the study population

Ageinyears	No.of.patients	Percentage
41-50	6	3.0
51-60	43	21.5
61-70	92	46.0
71-80	58	29.0
>80	1	0.5
Total	200	100.0

There were 6(3%) patients between the age of 45 and 50 years , 43(21.5%) between 5-60, 92 (46%) between 61-70 , 58(29%) between 71 and 80, and 1 patients of the age more than 80 years .

Table 2: Gender Distribution of Cases

Gender	No.ofpatients	Percentage
Female	125	62.5
Male	75	37.5

Total	200	100.0

There were 125(62.5%) female patients and 73(37.5%) male patients in the study.

Table 3: Pre –existing ophthalmic disease in the study population

Pre-existingophthalmicdisease	No.ofpatients(n=200)	Percentage
Absent	153	76.5%
Diabeticmaculopathy	7	3.5%
Glaucoma	1	0.5%
ARMD	1	0.5%
Diabeticretinopathy	30	15.0%
NA	8	4.0%
Total	200	100.0%

Diabetic retinopathy was the most common pre-existing ophthalmic disease, followed by diabetic maculopathy.

Table 4: Assessment of BCVA at presentation and follow up

BCVA	Preop	Day1postsurgery	At1week postsurgery	At3 weekspostsurgery	At6weeks postsurgery
6/6	0(%)	0(%)	41(20%)	116(58%	126(63%)
6/9	0(%)	6(3%)	108(54%)	60(30%)	44(22.5%)
6/12	25(12.5%)	2(10%)	40(20%)	6(3%)	8(4%)
6/18	95(47.5%)	45(22.5%)	4(2%)	8(4%)	4(2%)
6/24	47(23.5%)	73(36.5%)	5(2.5%)	7(3.5%)	14(7.5%)
6/36	14(7%)	52(26%)	2(1%)	1(0.5%)	3(1.5%)
6/60or less	18(9%)	4(2%)	0(%)	0(%)	0(%)
Total	200(100%)	200(100%)	200(100%)	200(100%)	200(100%)

BCVA Improvement of 68.5% is significant with P<0.001** paired Proportion test

Good out come was achieved in 3.5% in day 1, 96.5% at 1 week, 96% at 3 weeks and 91.5% cases at 6 weeks post –surgery respectively.

Table 5: Assessment of UCVA at Presentation and follow up

UCVA	Preop	At6weeks
6/6	0(0%)	33(16.5%)
6/9	0(0%)	80(40.5%)
6/12	17(8.5%)	56(30.5%)
6/18	52(26%)	8(4%)
6/24	62(31%)	11(5.5%)
6/36	43(21.5%)	10(5%)
6/6orless	26(13%)	2(1%)
Total	200(100%)	200(100%)

UCVA Improvement of 73.0%is significant with P<0.007

33 patients did not require any refractive corrections. Comparing the results of UCVA assessment and BCVA assessment it was noted that 4 patients improved to good outcomes with refractive corrections.

Table 6: Assessment causes of poor outcome based on BCVA

Diagnosis	**BCVAat6 weeks**							**Total**
	6/6	6/9	6/12	6/18	6/24	6/36	6/60 or less	

Nil	109(86.5%)	26(59%)	2(25%)	1(50%)	0(0%)	0(0%)	0(0%)	138 (69%)
Posteriorcapsular opacity	1(0.5)	6(14%)	4(50%)	1(50%)	1(14%)	3(27.3%)	0(0%)	16(8%)
DiabeticMaculopathy	0(0%)	0(0%)	0(0%)	0(0%)	4(57%)	3(27.3%)	1(33.3%)	7(33.5%)
Cystoidmacular edema	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	3(27.3%)	1(33.3%)	4(2%)
Diabeticretinopathy	16(13%)	11(25%)	1(12.5%)	0(0%)	2(29%)	0(0%)	0(0%)	30(15%)
Glaucoma	0(0%)	1(.02%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	1(0.5%)
Cornealedema	0(0%)	0(0%)	1(12.5%)	0(0%)	0(0%)	1(9.1%)	0(0%)	2(1%)
Agerelatedmacular degeneration	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	1(9.1%)	0(0%)	1(0.5%)
Macular scar	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	1(33.3%)	1(0.5%)
Total	126(100%)	44(100%)	8(100%)	2(100%)	7(100%)	11(100%)	3(100%)	200

On evaluating the BCVA poor visual outcome was noted in 14(8.5%) patients. The causes noted were diabetic maculopathy in 4 patients, CME in 4 patients, PCO in 3 patients,corneal edema in 1 patient, ARMD in 1 patient and macular scar in 1 patient.

Table 7: ASSESSMENT OF VISUAL OUTCOME BASED ON UCVA

Diagnosis	UCVAat6weeks							Total
	6/6	6/9	6/12	6/18	6/24	6/36	6/60orLess	
Nil	29(88%)	65(81%)	40(71.4%)	3(37.5%)	1(9%)	0(0%)	0(0%)	137(68.5
Posterior capsular opacity	0(0%)	1(1.2%)	9(16%)	1(12.5%)	4(36.3%)	1(10%)	0(0%)	16(8%)
Diabeticmaculopathy	0(0%)	0(0%)	0(0%)	0(0%)	3(27.2%)	4(40%)	0(0%)	7(3.5%)
Cystoid macular edema	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	3(30%)	1(50%)	4(2%)
Diabeticretinopathy	4(12%)	13(16.25%)	7(12.5%)	3(37.5%)	2(18.1%)	1(10%)	0(0%)	30(15%)
Glaucoma	0(0%)	1(1.2%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	1(0.5%)
Corneal edema	0(0%)	0(0%)	0(0%)	1(12.5%)	1(9%)	0(0%)	0(0%)	2(1%)

Agerelated maculardegeneration	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	1(10%)	0(0%)	1(0.5%)
Macularscar	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	1(50%)	1(0.5%)
Total	33(100%)	80(100%)	56(100%)	8(100%)	11(100%)	10(100%)	2(100%)	200(100%)

DISCUSSION:

This study was a prospective observational study of 200 patients who underwent cataract surgery for senile cataract. Wu B.-C et al did a prospective study of 124 eyes with age related cataract who received treatment comparing two study groups. One group underwent small incision cataract surgery (SICS), while other group to phacoemulsification (PE) surgery. Postoperative visual acuity, corneal astigmatism, surgically induced astigmatism (SIA) and intra operative and postoperative complications were compared between the two groups and after 1d and 1wk of post-op, there were64.4% and 69.5% having a better visual acuity of 0.5 in the SICS group. The SICS group showed a better visual outcome compared to the phacoemulsification group. There was nostatistically significant difference in visual out comes between the two groups at 1month and 3 months post surgically. At 3 months there was no statisticalsignificance in comparing SIA in both groups. The comparison of Posterior capsular rupture, the postoperative corneal edema and anterior chamber pigment membrane reaction in two groups showed no statistical significance [(9)].

Majority of the patients in the study were between the ages of 61-70 years , consisting of 92 in number . There were 58 patients aged between 71-80 years, 43 cases aged between 51-60 years and 6 patients in the 45-50 years age group. 125 cases were females while 75patients were male.

Good visual outcomes were noted in 71 (35.5%), 193 (96.5%) , 190(95%) and 180(90%) patients in day 1, 1st week, 3rd week and 6 weeks post operative respectively . Similar results were noted in Kongsap P et al [(10)]andVenkatesh R et al [(11)]. KongsapP al[(10)] showed visual acuity (BCVA) was 6/12 or better in 83 eyes (87.37%) at one week postoperatively, in 86 eyes (90.53%) at one month, 87 eyes (91.58%) at 3 months, and in 85 eyes (89.48%) at 6 months %). Venkatesh R et al [(11)] showed that at 6 weeks, the UDVA was 20/60(60/18) or better in 87.6% patients in the phacoemulsification group and 82% patients in the manual SICS group and the CDVA was 20/60 or better in 99.0% and 98.2%, respectively. In our study, the uncorrected visual acuity at week 6 post surgery was 6/18 or better of 177 cases (88.5%).

On evaluating the refractive error after surgery, 68.5% (137) cases developed against the rule astigmatism .10.5% (21) developed with rule astigmatism .Pai S.G. et al [(12)] also showed the commonest refractive post-surgery was against the rule astigmatism coming to 57.3% in their study.

Kongsap P et al[(10)] did a post-operative non-randomized comparative study to assess the outcomes of cataract surgery using the Blumenthal technique and Ruittechnique . the study included 129 patients with senile cataracts. Visual acuity, complications and SIA calculated by simple subtraction were compared between the two groups . The study showed that good visual outcomes were achieved in both groups. The corrected visual acuity was 0.73 in the Blumenthal group and 0.69in the Ruit group 3 months after surgery. The average (SD) postoperative astigmatism was 0.87 dioptre (D) for the Blumenthal group and 0.86D the Ruit group.

Jongsareejit A et al[13] did a prospective and comparative study to analyse cost effectiveness of manual small incision cataract surgery [MSICS]and PE. patient interviews and medical records were used for data collection .material and capital costs were recorded . Visual acuity, complications and astigmatism were recorded at 90 days post surgical procedure. The average total cost per case was more for PE group compared to MSICS. There was no statistically significant difference noted in the visual acuity achieved between the two groups. The average astigmatism at 90 days after surgery was 1.01+/- -0.733 D and 0.99+/-0.713 d for MSICS and PE method. Vitreous loss of 1.4% was the common intra operative complication seen in the PE group . In MSICS group corneal edema (5.6%) was recorded as the common post op complication. There was no statistically significant difference in the number of postoperative complications in the both groups.

Wu S-Y et al [14] did a prospective study on 282 cases comparing efficacy and safety of PE and SICS. The study compares the post operative visual acuity and complication rates of 168 patients in PE group and 114 patients in the MSICS group. Each group was further categorised depending on the grade of nuclear hardness. MSICS group had a visual acuity of >0.3 in 78% patients on day 1 after surgery. Capsule rupture and vitreous prolapse were seen in 3.8% to 5.7% in different groups. Corneal edema was 19% and 14.3% in the two groups.

On evaluating the visual outcome using BCVA the incidence of poor visual outcome was found to be 14(8.5%) cases in this study. The most common cause of poor outcome noted in this study was maculopathy or retinal disease. The group consisted of 10 cases ;4 cases of diabetic maculopathy, 4 cases of cystoids macular edema and 1 case of ARMD and old scar each . Other cases of poor visual outcome noted were PCO 1.5% (3 cases) and corneal edema 0.5% (1 case). Results from Abdelmoaty S wt al [15] shows the causes for poor outcomes were coexisiting ocular disease(9.7%), complications included posterior capsule tears and vitreous loss (10%), cystoids macular edema (0.6%) and endophthalmitis (0.9%). In the study by TalukderAK .et al [16] , 15% were found having low vision and 3% were found blind.

Among the causes of dimness of vision, maculopathy occupies the topof the list (58.14%) followed by optic disc pathology (30.23%) and posterior capsular opacity (11.65 %.) In our study, among the causes for poor outcome, macular disease comprises of 76.47%, PCO amount to 17.6% cases.

CONCLUSION:

Hence it can be concluded that small incision cataract surgery done by an experienced surgeon achieves good visual outcomes with low complication rates . Our study also points out the relevance of a through pre- operative check up to rule of out pre-existing causes for poor visual outcomes and a close follow up of patients after surgery to ensure good outcomes are maintained.

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