Research Article

Influence of surgical time on post-surgical visual acuity in patients undergoing small incision cataract surgery: a prospective study

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ABSTRACT

Background: Cataract surgery is one of the commonest surgical procedures in Ophthalmology. This study aimed at evaluating the influence of duration of surgery on post-operative vision in patients who underwent uneventful small incision cataract surgery.

Methods: All patients (66.3±8.6 years of age), who underwent small incision cataract surgery after a complete preoperative evaluation. Duration of surgery starting from draping to sub conjunctival injection of amikacin after surgery was noted. The patients were grouped based on surgical time. Best corrected visual acuity was recorded in all patients on post-operative day one and also one month after surgery. The data was subjected to statistical analysis.

Results: Ninety one patients were included in this study. More number of patients (47/91) was found in group with 26-35 min surgical time, whereas only 9 patients were found in 46-55 min group. A week correlation was found between surgical timing with PSVA on 1st (r = 0.2034, 95% CI = -0.00772-0.3971, two tailed p = 0.051) or on the 30th day (r= 0.1024; 95% CI = -0.1107-0.3066, two tailed p =0.33). No significant difference was found in the PSVA of 1st day (p=0.699) or 30th day (p=0.150) when compared between the groups. However, the difference was found to be significant between the mean value of POVA between the 1st and 30th day in all groups.

Conclusions: Surgical time did not emerge as a significant influence on long term post-operative visual outcome following uncomplicated Small incision cataract surgery.

Keywords: Amikacin, Cataract, Cystoid macular oedema, Steroids, Tonometry, Visual acuity

INTRODUCTION

Senile cataract is an age-related and vision-impairing disease. It is one of the leading causes of blindness in the world and affects approximately 18 million people mainly in low- and middle-income countries.[1] In India; cataract was reported as the main cause of blindness.[2]

The pathogenesis is found to be multifactorial and multiple mechanisms have been suggested for the progressive deterioration of lens transparency. Visual impairment in the elderly has also been associated with impaired cognitive function.[3] Most morbidity of cataract was found to be associated postoperatively. Cataract surgery is one of the commonest surgical procedures in

ophthalmology with a high rate of successful visual rehabilitation. Newer technological advances have helped in reducing complication rates further. Identifying and addressing factors which can influence final best corrected vision in uncomplicated surgeries is important in maximizing visual benefits to the patient.

Duration of surgery could be a modifiable factor which has been thought to be associated with more incidence of cystoid macular oedema (CME) and photostress to macula which can lead to decreased vision after surgery.

The CME, may need to be treated by perioperative oral steroids which can lead to systemic morbidity too.[4] Another such risk factor is age. We know that increasing

age is one of the most important risk factors for the development of cataract.[5] Further, increasing age can be a negative influence on postoperative visual acuity gain.[6,7] But, unfortunately age is a non-modifiable risk factor unlike surgical time which can be modified and optimized to achieve desirable surgical outcomes.

Studies showing the exact correlation between surgical time and post-operative vision, which can guide surgeons in this aspect are few. Here in lies the relevance of this study, aimed at evaluating the influence of duration of surgery on post-operative vision in patients who have undergone uneventful small incision cataract surgery (SICS).

METHODS

A prospective analysis of patients who underwent SICS with PCIOL at Amala Institute of Medical Sciences between June 2012 and Sept 2014 was done. Patients with ocular morbidities other than cataract which could cause post-operative defective vision were excluded from the study. Patients who had intra operative or post-operative complications within one month of surgery were also excluded.

The study was approved by the institutional ethics committee. All patients, 66.3±8.6 years of age, underwent small incision cataract surgery (SICS) after a complete preoperative evaluation including best corrected vision assessment, anterior and posterior segment examination, tonometry and Ascan biometry.

Superior section SICS was done and PMMA posterior chamber intra ocular lens implanted in all cases. Duration of surgery was noted in every case starting from insertion of speculum to sub conjunctival injection of amikacin after surgery.

Patients were categorized into 4 groups based on based on the duration of surgery as follows-

- Group 1-surgical time-15-24mts,
- Group 2-surgical time-25-35mts,
- Group 3-surgical time-36-45mts and
- Group 4-surgical time-46-55mts.

Best corrected visual acuity was recorded in all patients on post-operative day one and also one month after surgery using Snellen visual acuity chart and converted to log mar scale for analysis. Patients were divided into 3 groups based on their post-operative visual acuity,

- Post-surgical best corrected visual acuity (BCVA) of 6/6 - considered as normal vision,
- BCVA 6/9 to 6/12 was taken as mild visual deficit.
- BCVA worse or equal to 6/18 was taken as moderate visual deficit. The data was subjected to statistical analysis to find the correlation between surgical time and post-operative best corrected visual acuity.

Statistical analysis

Values are expressed as mean±SD. Visual acuity between groups was compared using fisher exact test and Chi-square test.

Difference in average BCVA between first day and 30th day after surgery within each group was compared using the Wicoxon matched pairs signed-rank test.

Further, significant correlation between the time of surgery and post-surgical BCVA was analyzed using Spearman's rank correlation. P<0.05 was considered as significant.

RESULTS

Total of 91 patients were included in this study. The surgical time was found to range from 15 minutes to 55 minutes with an average of 32.83±9.51 minutes.

Table 1: Mean best corrected visual acuity on day one and day 30 in the various subgroups.

Groups	Duration of surgery (min)	BCVA On day 1 (logmar)	BCVA on day 30 (logmar)
I	15-25 (n=21)	0.176±0.154	0.080±0.107[a]
II	26-35 (n=47)	0.200±0.126	0.058±0.102[b]
III	36-45 (n=14)	0.210±0.181	0.060±0.108[c]
IV	46-55 (n=9)	0.233±0.180	0.144±0.113[d]

Values are mean ± SD, [a] p = 0.02, [b,c] and [d] p=0001 (Wicoxon matched pairs signed-rank test) Mean BCVA on day one is significantly less compared to day 30. Visual acuity differences between various subgroups of different surgical times were non-significant (Kruskal-Wallis test).

Majority of patients (47/91) belonged to the group with surgical time of 26-35mts, whereas only 9 patients were in the 46-55 minutes group. The mean post-operative BCVA on post-operative day one and day 30 in each of the four subgroups based on surgical timings is given in Table 1. No significant (p=0.699) difference was found in the mean post-operative BCVA either on 1st day or on 30th day between the groups But, the difference in BCVA was found to be significant between the 1st day and 30th day in all the groups.
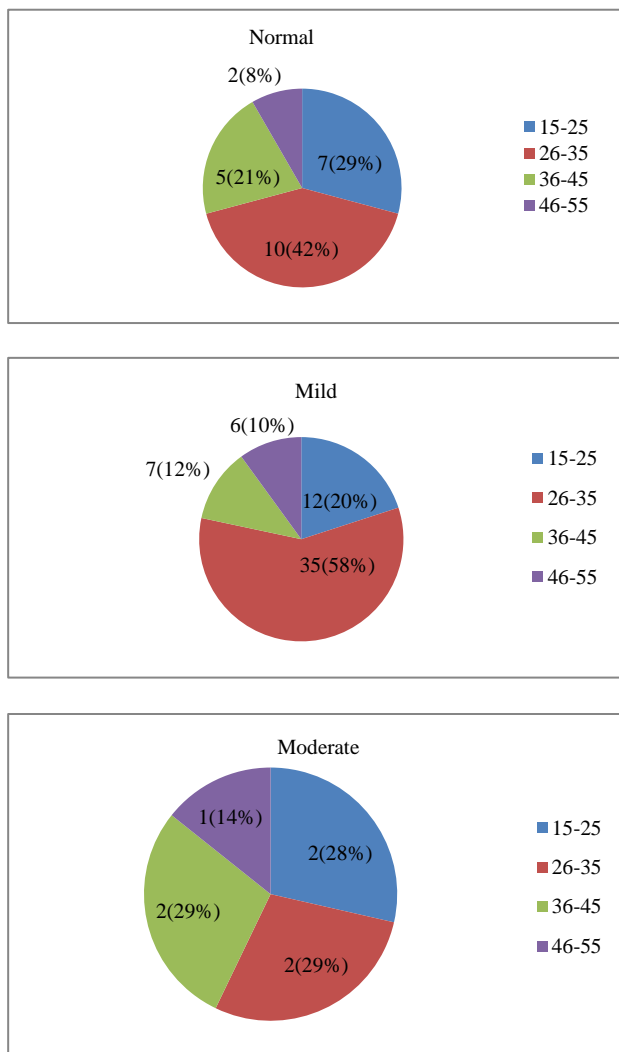
Analysis on day 1

Seven patients/21 in group 1, 9/47 patients in group 2, 5/14 patient in group 3 and 2/9 patients in group 4 attained full normal BCVA of 6/6. The rest had either mild or moderate visual deficit (Table 2). The percentage distribution of patients attaining different grades of vision on day 1 is depicted in Figure 1. Of the total no: of patients (n- 24) who attained full vision, majority (42%) of patients belonged to group-2, whereas only 8% of patients in group 4 had attained 6/6 on day one.
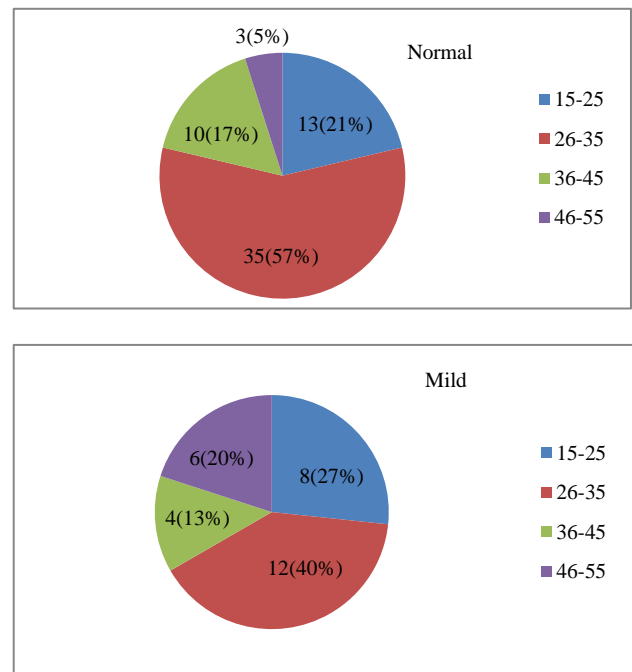
Table 2: Distribution of BCVA on day one.

Time	Vision						Total	P value
	Normal		Mild		Moderate			
	N	%	N	%	N	%		
15-25	7	33.33	12	57.14	2	9.52	21	R
26-35	10	21.28	35	74.47	2	4.26	47	0.340*
36-45	5	35.71	7	50.00	2	14.29	14	0.878*
46-55	2	22.22	6	66.67	1	11.11	9	0.831*
Total	24	26.37	60	65.93	7	7.69	91	

*Fisher exact test

Figure 1: Percentage distribution of patients who attained different grades of BCVA on day 1.

Analysis on Day 30

As shown in Table 3, 13/21 patients in group 1, 34/47 patients in group II (surgical time of 26-35 min) 10/14 in group 3, and 3/9 in group 4 gained normal vision acuity (6/6).The rest in each group had only mild visual deficit (BCVA-6/9 or 6/12) (Table 3).

Figure 2: Percentage distribution of patients who attained different grades of BCVA on day 30.

No patient in any group had moderate visual deficit (BCVA 0f 6/18 or less). The percentage distribution of patients attaining different grades of vision on day 30 is

depicted in the Figure 2. Of the total no: of patients (n= 61) who attained full vision, maximum number (57%) of patients belonged to group 2, whereas only 5% of patients in group 4 had attained 6/6 on day 30. A weak correlation was found between surgical timing with postoperative

BCVA on 1st day (r = 0.2034, 95% CI = -0.00772-0.3971, two tailed p = 0.0512) (Table 4), whereas no correlation between the two was found on 30th day (r= 0.1024; 95% CI = -0.1107-0.3066, two tailed p = 0.33) (Figure 3).

Table 3 Distribution of BCVA at one month.

Time	Vision				Total	P value
	Normal		Mild			
	N	%	N	%		
15-25	13	61.90	8	38.10	21	R
26-35	35	74.47	12	25.53	47	0.294^
36-45	10	71.43	4	28.57	14	0.561*
46-55	3	33.33	6	66.67	9	0.151*
Total	61	67.03	30	32.97	91	

*Fisher exact test , ^Chi -square test

Table 4: Correlation (Spearman Rank correlation) of BCVA with surgical time (32.83±9.51).

	Correlation coefficient (r)	P value
Day one logmar (0.198±0.14)	0.203	0.052
One month logmar (0.074±0.106)	0.102	0.331

Though the percentage of people attaining normal vision on day one as well as day 30 was considerably more in patients whose surgery took less time, the results were not found to be statistically significant in any of the groups.
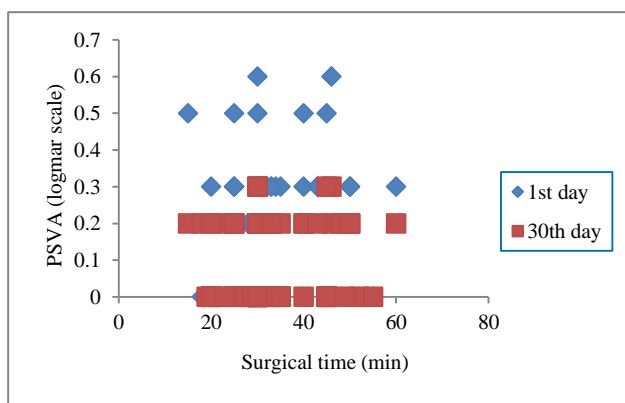

Figure 3: Correlation of post-operative BCVA with surgical time.

DISCUSSION

The surgical time in present study group was found to range from 15 minutes to 55 minutes with an average of 32.83±9.51 minutes. This was mainly due to two reasons. One could be that the surgeries were done by surgeons of different caliber ranging from residents in training to senior surgeons with many years of experience. The second reason could be that nine patients had systemic

complications like hypoglycaemia, vasovagal attacks, shoot of B.P etc which prolonged the total surgical time to beyond 45 minutes. On analysis of post-operative visual acuity on the first day after surgery, 92.3% of patients had attained BCVA of 6/12 or better. Of these, majority (65.93%) had mild post-operative visual deficit (6/9-6/12), whereas 26.37 % had attained normal BCVA of 6/6 on post-operative day one.

Comparing these results with a study from Chitrakoot, MP India by Khandekar et al, we find that One day after surgery, only 46% of the operated eyes in their study group had visual acuity of greater than 6/18.[8] Our better visual outcome could be due to the fact that we were dealing with a semiurban health conscious population compared to the predominantly tribal, rural population from central India.

Looking further into our patients (n=24) who attained full vision on post-operative day one, majority n=17, (72%) had surgical time of less than 35 mts, This means that only 28% of those who attained full vision exceeded the average duration of surgery in the study group (32.83±9.51 minutes). But, this difference did not attain statistical significance. Similarly, the mean post-operative BCVA attained by the patients on the first day after surgery did not show any statistically significant difference when compared between any of the four groups having varying durations of surgery.

However, a weak correlation was found between surgical timing and postoperative BCVA on 1st day after surgery

(r=0.2034, 95% CI = -0.00772-0.3971, two tailed p=0.0512). On analysis of BCVA one month after surgery, all 91 patients had visual acuity of 6/12 or better. 67.03 % had regained full vision of 6/6, the majority of whom belonged to the third group with surgical duration of 35-45 minutes.

However, the differences in the percentage distribution of patients who attained full vision were not statistically significant when compared between the different subgroups. Similarly, the mean post-operative BCVA attained by the patients on day 30 after surgery did not show any statistically significant difference when compared between any of the four groups having varying durations of surgery.

The percentage of full visual rehabilitation in our study group was less compared to a study done in Srinagar by Ahmad et al which found that 95.65% of patients achieved a best corrected visual acuity of 6/12 or better.[9] Comparing visual outcomes one day and one month following surgery, we found that the mean BCVA at one month was better compared to the mean BCVA on day one and this difference was found to be statistically significant. This implies that BCVA improves with wound healing over time. This observation was in concurrence with a study from Chitrakoot, MP, India by Khandekar et al which concluded that BCVA increased by 41% between day 1 and 6 weeks after surgery.[8]

CONCLUSION

Present study concluded that small incision cataract surgery provides excellent visual rehabilitation to patients irrespective of time taken for the procedure, as long as there are no intra operative or post-operative ocular complications. There is only a weak correlation between surgical time and visual outcome that too in the immediate post-operative period. As recovery and healing proceeds, this influence becomes statistically insignificant over one month. Thus surgical time did not emerge as a significant influence on long term post-operative visual outcome following uncomplicated Small incision cataract surgery.

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REFERENCES

1. Foster A, Gilbert C, Johnson G. Changing patterns in global blindness: 1988–2008. Community Eye Health. 2008; 21: 37-9.
2. Murthy GV, Vashist P, John N, Pokharel G, Ellwein LB. Prevalence and causes of visual impairment and blindness in older adults in an area of India with a high cataract surgical rate. Ophthalmic Epidemiol. 2010;17:185-95.
3. Spierer O, Fischer N, Barak A, Belkin M. Correlation Between Vision and Cognitive Function in the Elderly: A Cross-Sectional Study. Medicine (Baltimore). 2016;95:e2423.
4. Wielders LH, Lambermont VA, Schouten JS, van den Biggelaar FJ, Worthy G, Simons RW, et al. Prevention of Cystoid Macular Edema After Cataract Surgery in Nondiabetic and Diabetic Patients: A Systematic Review and Meta-Analysis. Am J Ophthalmol. 2015;160:968-81.
5. Martinez GS, Campbell AJ, Reinken J, Allan BC. Prevalence of ocular disease in a population study of subjects 65 years old and older. Am J Ophthalmol. 1982;94:181-9.
6. Westcott MC, Tuft SJ, Minassian DC. Effect of age on visual outcome following cataract extraction. Br J Ophthalmol.2000;84:1380-2.
7. Khanna RC1, Pallerla SR, Eeda SS, Gudapati BK, Cassard SD, Rani PK, et al. Population based outcomes of cataract surgery in three tribal areas of Andhra pradesh, India: risk factors for poor outcomes. PLoS ONE. 2012;7: e35701.
8. Khandekar RB, Jain BK, Sudhan AK, Pandey KP. Visual acuity at 6 weeks after small incision cataract surgery and role of audit in predicting visual acuity. Eur J Ophthalmol. 2010; 20:345-52.
9. Ahmad I, Wahab A, Sajjad S, Untoo RA. Visual Rehabilitation Following Manual Small Incision Cataract Surgery. JK Science. 2005;7:146-8.