Research Article

Visual outcome with superior, superotemporal and temporal incisions used in phacoemulsification surgery - a comparative study

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Abstract

Introduction: Quality of vision and early rehabilitation are two critical parameters that determine the success of modern cataract surgery. To achieve this, length and location of incision are the most important factors which play crucial role in reducing surgically induced astigmatism and rehabilitation time after surgery. **Aims and Objectives:** To compare Visual outcome with superior, superotemporal and temporal incisions used in phacoemulsification surgery **Materials and Method:** This prospective study comprised of 150 patients of cataract operated by using phacoemulsification using superior, superotemporal and temporal incisions. All the patients were divided in three groups containing 50 patients each depending upon the type of incision used. The outcome measures were uncorrected and best corrected visual outcome post operatively. **Results:** Majority of the cases were having visual acuity (VA) in the range 4/60 - 6/60 preoperatively. The mean uncorrected visual acuity on 40th post-operative day in Group A, B and C was 0.4862±0.2199, 0.5522±0.2386 and 0.5810±0.2102 in decimals. There was no statistically significant difference in the post-operative uncorrected visual acuity at day 40 between Group A, B and C (95% confidence interval) using one way ANOVA test. The BCVA on 40th post-operative day was 6/6 and 6/9 in 30 (60%) in Group A, 33 (66%) cases in Group B and 37 (74%) cases in Group C. There was no statistically significant difference in best corrected visual acuity between Group A, B and C (p=0.6628, p>0.05) using one way ANOVA test. **Conclusion:** The uncorrected visual acuity was slightly better in the temporal incision group as compared to the superior incision group. Thus the efficacy of superior, superotemporal and temporal incisions in view of post-operative visual rehabilitation is similar.
Keywords: uncorrected and best corrected visual outcome, phacoemulsification surgery.

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INTRODUCTION

These eyes and the delightful sense of sight are most commonly affected by cataract, which is the most common cause of avoidable or preventable blindness all over the world[1,2] Cataract surgery is the commonest procedure performed in ophthalmology[3]. The surgical procedure for cataract removal has come a long way from Sushruta's 'couching' method. It has gone through Intracapsular Cataract Extraction (ICCE), Conventional Extracapsular Cataract Extraction (ECCE), Small Incision Cataract Surgery (SICS), Phacoemulsification surgery to the most recent femto second cataract surgery[4].

In 1961, Charles Kelman, American surgeon developed an instrument that used high intensity sound waves to remove cataracts. This procedure was called as Phacoemulsification.[5] Phacoemulsification with a foldable posterior chamber intraocular lens is considered to be the gold standard of the cataract surgical techniques available today[6]. Quality of vision and early rehabilitation are two critical parameters that determine the success of modern cataract surgery. To achieve this, length and location of incision are the most important factors which play crucial role in reducing surgically induced astigmatism and rehabilitation time after surgery.

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Improvements in the calculation of intraocular lens power and design have allowed complete spherical correction of preexisting refractive error with intraocular lens implantation. Advances in incision construction have improved the refractive results of cataract surgery by minimizing surgically induced astigmatism[7]. Keeping in mind the necessity to have an operating method that minimizes astigmatism, the length and architecture of the incision, site of incision, types of suture and suture materials have all been modified over the years.

AIMS AND OBJECTIVES

To compare Visual outcome with superior, superotemporal and temporal incisions used in phacoemulsification surgery

MATERIAL AND METHOD

The present prospective study was conducted to compare the visual outcome in patients undergoing phacoemulsification surgery with various types of incision. The study was conducted in the Department of Ophthalmology, Government Medical College, Aurangabad. The study was conducted from September 2011- November 2013. Following inclusion and exclusion criteria was used to select the study patients.

Inclusion Criteria

- Immature senile cataract
- Willingness to give an informed written consent.

Exclusion Criteria

- Preoperative astigmatism > 1.5 D, Oblique astigmatism
- Diabetic or Hypertensive Retinopathy
- Nuclear Cataract Grade IV and above, Developmental cataract, Traumatic cataract, Cataract with glaucoma or Complicated cataract
- Preoperative decompensated cornea, previous ocular surgeries or trauma or Pseudo exfoliation syndrome.

By using the above mentioned inclusion and exclusion criteria a total of 150 patients with varying degree of cataract were enrolled in the study. All the selected patients were randomly distributed in three groups containing 50 patients each.

Group A: 50 patients undergoing phacoemulsification surgery with superior- posterior limbal incision by stop and chop method.

Group B: 50 patients undergoing phacoemulsification surgery with supero-temporal posterior limbal incision by stop and chop method.

Group C: 50 patients undergoing phacoemulsification surgery with temporal- posterior limbal incision by stop and chop method.

Written informed consent was obtained from each patient. All eyes underwent a complete ophthalmological examination preoperatively and postoperatively at 1 month and 3 month, including a manifest refraction using a refractometer and snellen projector chart. Astigmatism was measured from the keratometry readings. Data on gender, age, UCVA, manifest refraction, and automatic keratometry (ARK 510A, NIDEK) were collected. All patients were given antibiotic steroid eyedrops for a period of one month in tapering doses starting with a frequency of 6 times per day. Systemic antibiotic, NSAIDS and antacid were given to the patients if needed. A detailed post-operative evaluation of the patients was done on 1st, 15th, 40th day. The uncorrected and best corrected visual acuity after 40th day of operation was measured in all the three groups and was compared. Visual acuity was converted to decimal format for the convenience of statistical analysis. One way ANOVA analysis with Tukey's multiple comparison test was used to compare the finding of study.

RESULTS

Table 1: Pre-operative visual acuity

Visual Acuity	Group A superior- posterior limbal incision		Group B supero-temporal posterior limbal incision		Group C temporal- posterior limbal	
Snellen	No. of cases	Percentage (%)	No. of cases	Percentage (%)	No. of cases	Percentage (%)
1/60-3/60	8	16	14	28	14	28
4/60-6/60	29	58	19	38	22	44
6/36-6/18	13	26	17	34	14	28
Total	**50**	**100**	**50**	**100**	**50**	**100**

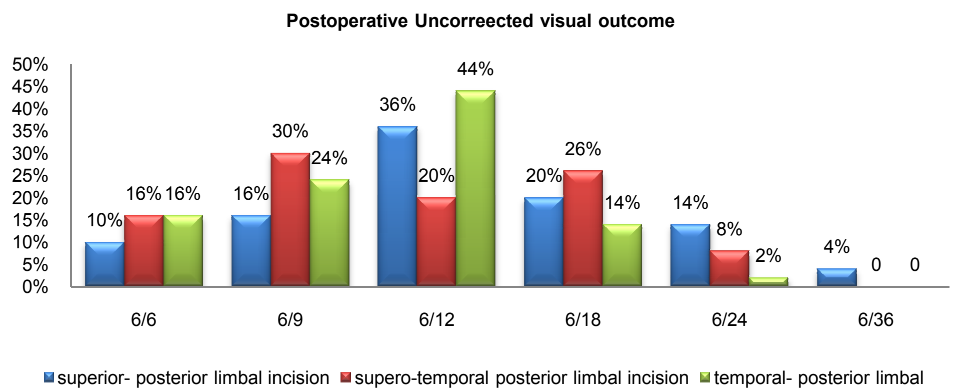
By chi square test, (P value= 0.3032)

It was observed that majority of the cases were having visual acuity (VA) in the range 4/60 - 6/60 preoperatively. There was no statistically significant difference in pre-operative visual acuity between all the three groups (p= 0.3032, p>0.05) using Chi square test. The mean pre-operative visual acuity (in decimals) in Group A was 0.1149±0.0760, in Group B was 0.1118±0.0715 and in Group C was 0.1079±0.0696.

Table 2: Comparing the UCVA on 40th day in Group A, B and C

UCVA		Group A superior- posterior limbal incision		Group B supero-temporal posterior limbal incision		Group C temporal- posterior limbal	
Snellen	Decimal	No. of cases	Percentage %	No. of cases	Percentage %	No. of cases	Percentage %
6/6	1	5	10	8	16	8	16
6/9	0.63	8	16	15	30	12	24
6/12	0.50	18	36	10	20	22	44
6/18	0.32	10	20	13	26	7	14
6/24	0.25	7	14	4	8	1	2
6/36	0.16	2	4	-	-	-	-
Total		**50**	**100%**	**50**	**100%**	**50**	**100%**

By one way ANOVA analysis with Tukey's multiple comparison test, (P value= 0.0969)

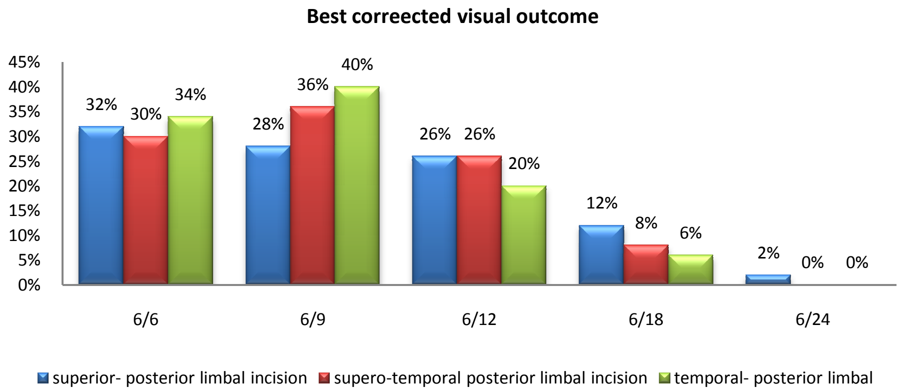


In Group A on the 40th post-operative day majority (36%) of the cases were having uncorrected visual acuity 6/12, followed by 6/18 (20%) and 6/19 (16%). In Group B 16% cases had 6/6 uncorrected visual acuity (UCVA), whereas 30% cases had 6/9 UCVA followed by 6/18 in 26% and 6/12 in 20% cases. In Group C, 8 (16%) cases had 6/6 uncorrected visual acuity (UCVA), 12 (24%) cases had 6/9 UCVA and 22 (44%), 7 (14%) and 1 (2%) cases had 6/12, 6/18 and 6/24 UCVA respectively. The mean uncorrected visual acuity on 40th post-operative day in Group A, B and C was 0.4862±0.2199, 0.5522±0.2386 and 0.5810±0.2102 in decimals. According to the Tukey's multiple comparison test between three groups, there was no statistically significant difference in the post-operative uncorrected visual acuity at day 40 between Group A, B and C (95% confidence interval).

Table: 3: Comparison of Best Corrected Visual Acuity (BCVA) on 40th day in Group A, B and C

BVCA		Group A superior- posterior limbal incision		Group B supero-temporal posterior limbal incision		Group C temporal- posterior limbal	
Snellen	Decimal	No. of cases	Percentage (%)	No. of cases	Percentage (%)	No. of cases	Percentage (%)
6/6	1	16	32	15	30	17	34
6/9	0.63	14	28	18	36	20	40
6/12	0.50	13	26	13	26	10	20
6/18	0.32	6	12	4	8	3	6
6/24	0.25	1	2	-	-	-	-
Total		**50**	**100**	**50**	**100**	**50**	**100**

By one way ANOVA test, (P value= 0.6628)



It was observed that cases with 6/6 Best Corrected Visual Acuity (BCVA) on 40th day in group A were 32%, in group B were 30% and in group C were 34%. The mean best corrected visual acuity (BCVA) was 0.6698 (SD= 0.2496) in Group A, 0.6824 (SD= 2268) in Group B and 0.7112 (SD= 2238). There was no statistically significant difference in best corrected visual acuity between Group A, B and C ($p=0.6628$, $p>0.05$) using one way ANOVA test.

DISCUSSION

The present study conducted to study the visual outcome in cataract patients by using various types of incision. The etiologic types of cataract include congenital, developmental, senile, traumatic, radiational, drug induced, complicated and metabolic. Out of all the mentioned types' senile cataracts is the most common entity. Surgery is the only effective modality of treatment available[8]. The visual outcome depends upon various factors. Such as type of surgery, site and size of incision used and type of lens used etc. In a study conducted by Uusitalo RJ[9] who compared the patients operated with small-incision surgery (incision 4.0 mm) with those with large-incision surgery (incision 7.5 mm). They observed Visual rehabilitation was faster in the small-incision group and 70% of the eyes gave uncorrected visual acuity better in this group as early as the first postoperative day. Levy *et al*[10] also stated uncorrected visual acuity during the postoperative period was also better in the smaller incision group. Zheng L *et al*[11] showed that Maximum visual acuity was reached after a mean of approximately 6 weeks after ECCE, 2 weeks after phaco. Oslon RJ *et al*[12] compared sutureless cataract surgery by phacoemulsification with a 3.2-mm surgical incision (55 patients) with a 5.5-mm surgical incision 56 patients. They observed that statistically significant differences were seen in favor of the 3.2-mm incision group at the final examination for astigmatism (Cravy analysis) and uncorrected visual acuity The pre-operative uncorrected visual acuity ranged from 2/60 to 6/18 (0.033- 0.33). In 29 (58%) cases of Group A, 19 (38%) cases of Group B and 22 (44%) cases of Group C it was in the range of 4/60 to 6/60 (0.066 to 1). The mean pre-operative visual acuity (in decimals) in Group A was 0.1149 ± 0.0760, in Group B was 0.1118 ± 0.0715 and in Group C was 0.1079 ± 0.0696. There was no statistically significant difference ($p= 0.3032$, >0.05) in pre-operative visual acuity in all the groups. The mean uncorrected visual acuity on 40th post-operative day in Group A was 0.4862 ± 0.2199, in Group B was 0.5522 ± 0.2386 and in Group C was 0.5810 ± 0.2102 in decimals. According to the one way ANOVA analysis with Tukey's multiple comparison test between three groups, there was no statistically significant difference in the post-operative uncorrected visual acuity at day 40 between Group A, B and C (95% confidence interval). In a study done by Cillino S *et al*[13] more patients in the temporal group had an uncorrected visual acuity of 20/25 (0.8 in decimal) or better 2 weeks postoperatively and the difference between temporal and superior phacoemulsification groups was not statistically significant ($p = 0.562$; chi-square) which was consistent with the present study. The mean best corrected visual acuity (BCVA) was 0.6698 ± 0.2496 in Group A, 0.6824 ± 2268 in Group B and 0.7112 ± 2238 in decimals. The BCVA on 40th post-operative day was 6/6 and 6/9 in 60% cases in Group A, 66% cases in Group B and 74% cases in Group C. There was no statistically significant difference in best corrected visual acuity between Group A, B and C ($p=0.6628$, $p>0.05$) using one way ANOVA test. Oshika T *et al*[14] in their study found that there was no significant difference in the uncorrected and corrected visual acuity between superior and temporal incision groups post-operatively. And the results were comparable with our study.

CONCLUSION

Thus from above discussion we conclude that Phacoemulsification permits faster and better visual rehabilitation. The uncorrected visual acuity was slightly better in the temporal incision group as compared to the superior incision group. Thus the efficacy of superior, superotemporal and temporal incisions in view of post-operative visual rehabilitation is similar.

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