

Comparison of Postoperative Visual Acuity in Frown versus Straight Incision in Manual Small Incision Cataract Surgery

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Abstract:

Background: Cataract surgery is considered refractive surgery. Apart from implanting the posterior chamber Intra ocular lens (PCIOL), establishing good visual rehabilitation is an important part. Hence, which surgical incision is to be used is of major importance. Hence the aim of the present study is to compare post-operative visual acuity in frown and straight incision in manual small incision cataract surgery with PCIOL implantation.

Material & Methods: This retrospective study was conducted among two groups of patients undergoing MSICS, where the straight incision was performed in one group with 50 cases and the frown incision was performed in the other group with 50 cases. Postoperatively, patients were followed up on postoperative day 1, week 1, and week 6. Uncorrected visual acuity was noted at each postoperative visit.

Results: Most of our patients belonged to the age group of 51–70 years. Among the patients in SIG, 36 % while in FIG 40% patients had preoperative vision ranging between 6/24 and 6/60. Significant difference in the postoperative visual acuity was seen in two groups on week 6 (p=0.003)

Conclusion: Frown incision is a better incision than the straight incision in MSICS to create a better post operative visual acuity.

Keywords: Frown incision, manual small-incision cataract surgery, straight incision

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Introduction

One of the most prevalent causes of vision loss worldwide is cataract. The globe Health Organization (WHO) reports that cataracts are the primary cause of blindness in the globe, accounting for 47.8% of cases of blindness and 17.7 million blind individuals. [1] The latest estimate from the WHO indicates that cataract caused by aging accounts for 51% of blindness worldwide. [2]

The development of phacoemulsification has made cataract surgery a day operation. Phacoemulsification, however, is only used in large cities & universities due to financial considerations. Because of its self-sealing, suture-free incision,

non-phaco or manual small incision cataract surgery (SICS) offers some hope for reducing the prevalence of cataracts in underdeveloped nations [3,4]. An additional benefit of manual SICS is the lower cost of the instruments and disposables [5,6]. Additionally, it works better for the advanced and mature cataracts that are more common in developing nations [7].

In MSICS, wound construction is crucial, maybe even more so than in phacoemulsification, where the size, shape, and type of the wound are often maintained. In MSICS, every aspect of the wound must be carefully prepared depending on the type

of method, the nucleus' hardness, the degree of astigmatism, and the endothelium's health. [8]

In 1990, Pallin [9] described a Chevron-shaped incision, and Michael McFarland [10] created a sutureless incision. Haldipurkar SS [11] popularized the frown incision at the same time. Patients now expect more from cataract surgery due to recent advancements, and having decent postoperative uncorrected vision is now accepted as the standard. The key to fulfilling these objectives is lowering postoperative astigmatism. With the emphasis currently being primarily on the refractive element of surgery, the idea of surgically induced astigmatism (SIA) has given cataract surgery a new dimension.

Hence, the need is to study better incision among the straight and frown to maximize visual acuity postoperatively. Hence, the present study was done to compare post-operative visual acuity in frown and straight incision in manual small incision cataract surgery with posterior chamber intra ocular lens implantation.

Material & Methods

The retrospective study was conducted among 100 patients who underwent manual SICS with superiorly based frown and straight incision with PCIOL implantation in Department of ophthalmology at Terna Medical college during the period of June 2016 till June 2018. The approval of study plan was taken from ethical review board of allied institution.

The patients were randomly selected and divided into two groups of 50 each. The inclusion and exclusion criteria are as follows-

Inclusion Criteria:

1. All patients between 40 to 85 years with cataract.
2. Patients with no other cause for defective vision other than cataract.
3. Patients with no history of previous ocular surgery.

Exclusion Criteria:

1. Patients with other ocular pathology like complicated cataract co-existing uveitis, traumatic cataract.
2. Patients having intra-operative complications like nucleus drop, posterior capsular rent, vitreous loss.

3. Cases with pre-mature entry.
4. Cases with superficial/ deep entry leading to ineffective valvular action of the section.
5. Cases where suture was applied.

Patients were enrolled for the study after noting their history and obtaining informed consent. Pre operative assessment was done which included routine investigation, intraocular pressure recording with schiotz tonometer, pre operative keratometry and A scan. Routine systemic investigations including CBC, blood sugar, urine routine and microscopic, ECG, chest X ray, HIV, Australia antigen, HCV were carried out prior to surgery.

Postoperative evaluation was done on the 1st postoperative day, at the end of the 1st week and 6th week. On each follow-up, visual acuity readings were done.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics for Windows, Version 25.0. Analyzed data were presented in suitable tabular and graphical forms. Data were expressed as percentages for qualitative data. The mean and standard deviation (SD) were used for quantitative data. The Chi-square test was used as a test of significance for comparing qualitative data. An unpaired t-test was used as a test of significance for comparing quantitative data. $P < 0.05$ was considered statistically significant.

Results

The straight incision group (SIG) had patients with a mean age group of 65.14 ± 8.12 years (mean \pm SD). The FIG had patients with mean age group was 63.15 ± 5.01 years (mean $+$ SD). Most of our patients belonged to the age group of 51–70 years. Out of all the patients in SIG, 48 % were female patients and 52 % were male patients whereas in FIG, female and male patients were equal in number (50%). Cataractous changes do not have sexual predilections. In the SIG, 4% had posterior polar cataract, 20% had posterior subcapsular cataract, 50% had senile immature cataract, and 26% had senile mature cataract. Whereas in the FIG, 2% had posterior polar cataract, 18% had posterior subcapsular cataracts, 56% had senile immature cataracts, and 24% had senile mature cataracts. In the SIG, 54% patients were operated on the left eye and 46% patients were operated on the right eye whereas in FIG, 52% were operated on the left eye and 48% patients were operated on the right eye as shown in table 1.

Table 1 distribution of patients according to baseline characteristics

Variable		Straight incision group	Frown incision group
Age (in years)	41-50	7 (14)	8 (16)
	51-60	12 (24)	13 (26)
	61-70	17 (34)	15 (30)
	71-80	9 (18)	8 (16)
	81 above	5 (10)	6 (12)
Gender	Female	24 (48)	25 (50)
	Male	26 (52)	25 (50)
Side of eye	Left	27 (54)	26 (52)
	Right	23 (46)	24 (48)
Diagnosis	Posterior polar cataract	2 (4)	1 (2)
	Posterior subcapsular cataract	10 (20)	9 (18)
	Senile immature cataract	25 (50)	28 (56)
	Senile mature cataract	13 (26)	12 (24)

Among the patients in SIG, 36 % patients had preoperative vision ranging between 6/24 and 6/60. 43% patients had preoperative vision between counting fingers ½ m–counting fingers 3 m. 12% patients had a vision of hand movements with accurate projection of rays. 6% patients had vision of light perception with accurate projection of rays. Among the patients in the FIG, 40% patients had

preoperative vision ranging between 6/24 and 6/60. 40% patients had preoperative vision between counting fingers ½ m–counting fingers 3m. 10% patient had a vision of hand movements with accurate projection of rays. 6% patients had vision of light perception with accurate projection of rays as shown in table 2.

Table 2 Comparison of two groups on the basis of preoperative visual acuity

Preoperative Visual acuity	Straight incision group	Frown incision group
6/24	4 (8)	3 (6)
6/36	6 (12)	7 (14)
6/60	8 (16)	10 (20)
C/F1/2 m	2 (1)	3 (6)
CF 1 m	3 (6)	4 (8)
CF 2 m	8 (16)	7 (14)
CF 3 m	10 (20)	8 (16)
HM+ PR accurate	6 (12)	5 (10)
PL & PR accurate	3 (6)	3 (6)

There was no significant differences related to postoperative visual acuity (6/9) in straight incision group and frown incision group on day 1 and week 1, while significant difference was seen in two groups on week 6 (p=0.003) [Table 3]

Table 3 Comparison of postoperative visual acuity (6/9) in both groups

Visual acuity	Postoperative period	Straight incision group	Frown incision group	P value
6/9	Day 1	9 (18)	10 (20)	0.512
6/9	Week 1	10 (20)	5 (10)	0.513
6/9	Week 6	31 (62)	35 (70)	0.003

Discussion

The present study was conducted retrospectively among 100 patients who were divided into two groups on the basis of incision given during surgery i.e., straight versus frown with 50 patients in each group to compare the postoperative visual acuity.

All the patients underwent MSICS under peribulbar anesthesia, with straight & frown incision. Posterior chamber intraocular lens was implanted in all patients, the power of which was calculated

preoperatively with the help of Bausch and Lomb keratometer.

In the present study there was no age difference between the two groups that was statistically significant. Gender did not significantly differ between the two groups, demonstrating that cataract does not exhibit a preference for either gender. Laterality was inconsequential. No statistically significant difference in diagnosis existed between the two groups. Most of the patients belong to 50 -70 years of age group which

was similar to research done by Seethalakshmi et al in. [12]

There were no significant differences related to postoperative visual acuity (6/9) in straight incision group and frown incision group on day 1 and week 1, while significant difference was seen in two groups on week 6. The FIG had better immediate and late postoperative uncorrected visual acuity compared to the SIG, which is beneficial for the patient. 75 patients aged 40 and older with uncomplicated senile cataracts up to Grade 4 nuclear sclerosis were operated on and studied as part of a prospective study by Jauhari et al [13] at the Vivekananda Polyclinic and Institute of Medical Sciences, Lucknow. According to the study, 95.7% of patients in the inverted V group, 94.2% of patients in the FIG, and 89.5% of patients in the SIG achieved BCVA postoperatively in the range of 6/6 to 18 points. With an inverted V incision, the mean SIA was at a minimum ($-0.88 \pm 0.61^*D$ 90°), which was statistically significant. 11 According to a study by Bhumbla et al, the straight group's mean SIA was 1.14 ± 0.33 D at 1 week, 1.26 ± 0.44 D at 1 month, and 1.29 ± 0.36 D at 3 months, compared to 0.94 ± 0.33 D at 1 week, 0.97 ± 0.333 D at 1 month, and 0.95 ± 0.41 D at 3 months for the frown group. SIA was substantially lower in the frown group than in the straight group. [14]

In a study by Sarvarian et al. [15], a frown incision was used to accomplish cataract surgery, visual acuity increases in the follow up periods. According to Bhumbla et al. [14], the end of the incision in a frown is put even more superiorly in the sclera, which increases the stability of the incision. The ends support the inferior edge and guard against astigmatism that goes against the rules. The corneal topography alterations in the straight and FIG eyes were compared by Vass et al [16]. The upper peripheral corneal flattening was 0.7, 0.7, and 0.7 D in the straight-incision group and 0.7, 0.4, and 0.3 D in the FIG at 1 week, 1 month, and 3 months postoperatively. According to a study by Reddy et al. [17], a straight incision corneoscleral tunnel causes a considerable shift to against-the-rule astigmatism.

In a study by Amedo et al [18] comparing postoperative visual acuity in straight versus frown incisions, it was found that the FIG had values that were roughly twice as high as those recorded for the SIG.

This study has certain limitations due to its small sample size and lack of long-term follow-up. At the moment, frown incision is a preferred technique among ophthalmic surgeons since it is simple to learn and perform and has a low SIA.

Conclusion

It depends on the operating surgeon to provide adequate postoperative vision with little or no SIA. Maximizing visual acuity depends significantly on where, how big, and how the straight incision is placed. Our study demonstrates that the FIG has greater visual rehabilitation and uncorrected visual acuity than the SIG. Therefore, if the operating surgeon uses the frown incision without using sutures and makes only minor adjustments to the placement of the straight incision, the patient will have good postoperative uncorrected visual acuity.

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