

COMPARATIVE STUDY OF CLEAR CORNEAL VERSUS SCLERAL TUNNEL INCISION IN PHACOEMULSIFICATIONTanushree V¹, K. Kanthamani²**HOW TO CITE THIS ARTICLE:**

Tanushree V, K. Kanthamani. "Comparative Study of Clear Corneal Versus Scleral Tunnel Incision in Phacoemulsification". Journal of Evolution of Medical and Dental Sciences 2014; Vol. 3, Issue 16, April 21; Page: 4349-4359, DOI: 10.14260/jemds/2014/2441

ABSTRACT: AIM: 1) To assess postoperative visual acuity in patients with clear corneal and scleral tunnel incision in phacoemulsification. 2) To compare the postoperative astigmatism (type and amount) in phacoemulsification with the two incisions. 3) To analyse intra and postoperative complications if any in both. **SETTINGS AND DESIGN:** Prospective study. **MATERIALS AND METHODS: SOURCE OF DATA:** Eighty senile cataract patients, source being routine ophthalmology out patients presenting to the R. L. Jalappa Hospital and Research Centre, Kolar between the period from December 2011 upto July 2013. Informed and written consent was taken from all the patients. After all necessary ocular and systemic examinations patients were divided into two groups of 40 each to undergo clear corneal incision and scleral tunnel incision followed by phacoemulsification with foldable IOL implantation respectively. Post-operative visual acuity and postoperative astigmatism was compared between two groups and complications if any was noted. **STATISTICAL ANALYSIS:** The data was analyzed by Chi-square tests and Mann Whitney u test. **RESULTS:** 33(82.5%) out of 40 patients with clear corneal incision had post-operative visual acuity ranging 6/6 -6/9 at the end of 1st week only compared to 29(72.5%) out of 40 patients with scleral tunnel. 33(82.5%) out of 40 patients with clear corneal incision had minimal postoperative astigmatism (0.25-0.50D) compared to 34(85%) out of 40 patients in scleral tunnel incision in three month keratometry follow up. **CONCLUSION:** We found that clear corneal incision induces faster vision recovery. No significant difference was found in post-operative astigmatism in between the two groups in keratometry three month post-operative in study conducted.

KEYWORDS: Phaco, Clear corneal incision, Scleral tunnel incision, WTA, ATA, BCVA, Scalar analysis.

INTRODUCTION: Senile cataract has consistently topped the WHO charts as a leading cause of blindness. Annual incidence of 3.8 million cataracts and over 9 million cataract blind people have been reported in India¹ and expecting to blind 40 million by 2025.²

With no medical treatment yet available, surgery forms the sole but easy way out providing utmost satisfaction to both patient as well as to a surgeon. Even with the government spending lakhs of rupees on mobile camps through DBCS and VISION 20/20 and evolution of techniques like SICS providing for good results with less complications, It still remains a major cause of correctable morbidity in our dependent geriatric population.

It has undergone a commendable revolution from 17th century practice of couching at the time of Sushruta to Intracapsular cataract extraction, extracapsular cataract extraction, small incision cataract surgery and phacoemulsification. Phacoemulsification is the recent technique of cataract surgery. The advent of this surgery by an ultrasonically activated probe inserted into the cataractous crystalline lens was pioneered by Kelman in 1967.³ It is a procedure where the nucleus is ultrasonically fragmented and aspirated by a small incision. It has been opted as the surgery of choice

ORIGINAL ARTICLE

due to better patient compliance, earlier stabilization of refraction, improved visual acuity, minimal post-operative astigmatism and minimal complications. It enabled ophthalmologists to extract cataracts through the smallest possible incision using an ultrasound probe or laser probe, to break the lens without damaging the lens capsule. Today it has become the preferred technique for cataract removal. No sutures are required as incision is self-sealing.⁴

The refractive aspect of cataract surgery has received considerable attention. The amount of surgical induced astigmatism can be controlled better and the faster wound stability reduces the time required for visual rehabilitation. Phacoemulsification surgery is characterized by a valvular incision which does not required to be sutured.

This leads to minimal corneal distortion and early visual rehabilitation and if planned preoperatively, it can help in reducing a pre-existing toricity in the cornea. A well-constructed wound can be closed by virtually any method with good results. A poorly constructed wound can be the source of astigmatism, irritation, hemorrhage, corneal trauma or wound leak and endophthalmitis.

There are two commonly used techniques-phacoemulsification by clear corneal incision and phacoemulsification by scleral tunnel incision. Recently preference has been shifted from scleral tunnel incision to clear corneal incision.

We are conducting this study to assess the merits and demerits of clear corneal with scleral tunnel incision in phacoemulsification.

AIMS AND OBJECTIVES:

1. To assess postoperative visual acuity in patients with clear corneal and scleral tunnel incision in phacoemulsification.
2. To compare the postoperative astigmatism (type and amount) in phacoemulsification with the two incisions.
3. To analyse intra and postoperative complications if any in both.

MATERIALS AND METHODS:

SOURCE OF DATA: Eighty patients attending to out-patient department of ophthalmology, R.L.JALAPPA HOSPITAL AND RESEARCH CENTRE attached to SRI DEVARAJ URS MEDICAL COLLEGE, TAMAKA, KOLAR with senile cataract fulfilling the inclusion criteria framed were selected for phacoemulsification under peribulbar anesthesia between December 2011 and July 2013.

INCLUSION CRITERIA: Senile Cataracts (Nuclear sclerosis grades 1, 2, 3) having astigmatism < 1.25D.

EXCLUSION CRITERIA:

1. Preexisting astigmatism > 1.25D and oblique astigmatism.
2. Previous ocular surgery.
3. Cases of cataracts with glaucoma.
4. Cases of cataract with pseudoexfoliation.
5. Coexisting ocular pathology.

ORIGINAL ARTICLE

METHOD OF COLLECTION OF DATA: Eighty patients, fulfilling the inclusion criteria framed from the Department of Ophthalmology, R.L.JALAPPA. HOSPITAL AND RESEARCH CENTRE, TAMAKA, KOLAR were included in the study. All the patients underwent the following pre-operative evaluation and complete eye examination including a full history of any previous ocular disease or surgery, examination by both direct and indirect ophthalmoscopy, visual acuity recording by Snellen's chart, Applanation tonometry, Keratometry, A scan with intraocular lens power calculation by SRK-2 formula and detailed slit lamp examination.

General physical and systemic examination including cardiovascular system and respiratory system examination, blood pressure recording and blood sugar estimation were done. All patients were put on oral Tab Ciprofloxacin 500mg twice daily, Tab Acetazolamide 250mg twice daily and Ciprofloxacin 0.3% eye drops hourly one day prior to surgery. Preoperatively pupils were dilated with Tropicamide 0.8% with Phenylephrine 0.5% or 1% drops along with Flurbiprofen 0.03% drops. Informed and written consent was taken from all patients. Sensitivity to local anesthetics was tested with lignocaine test dose. Ethical clearance obtained.

The patients were randomly divided into two groups:

Group A: Phacoemulsification with clear corneal incision - 40 patients

Group B: Phacoemulsification with scleral tunnel incision- 40 patients

All surgeries were done by a single operating surgeon. In group A- 2.8mm triplanar clear corneal incision was made in superior temporal quadrant 1mm anterior to anatomical limbus. In group B- 2.8 mm scleral triplanar incision was made in superior temporal quadrant 1to1.5mm posterior to limbus. The procedure in both the groups was followed by phacoemulsification with implantation of foldable intraocular lens. Postoperatively patients were put on topical steroids and antibiotics for 4 to 6 weeks with gradual tapering. Tablet ciprofloxacin 500mg were given for 5 days.

Following phacoemulsification with clear corneal/scleral tunnel, patients were evaluated postoperatively for visual acuity unaided and with pinhole vision, keratometry and complications if any was recorded in each patient postoperatively on first day, first week, first month and third month. Postoperative astigmatism was evaluated by Bausch and Lomb keratometry readings. Amount of astigmatism was calculated using only scalar analysis i.e. by subtracting the two K readings on that day.

RESULTS: A prospective, comparative study of clear corneal versus scleral tunnel incision in phacoemulsification was conducted at R. L. Jalappa hospital attached to Sri Devaraj URS Medical College. 80 cases were studied, of which 40 cases underwent clear corneal incision and remaining 40 cases underwent scleral tunnel incision. Majority of the patients were in the age range of 61-70 yrs. (Table 1). Preoperative visual acuity was recorded in both Group A i.e. Clear corneal incision and in group B i.e. scleral tunnel incision group (Table 3). Postoperative uncorrected visual acuity was documented in both the groups (Table 4 and 5).

We see that in clear corneal incision group (table 4) on first post-operative day 31(77.5%) patients had visual acuity in the range of 6/6-6/9, 6(15%) patients had visual acuity of 6/12, 3(7.5%) patients had visual acuity <6/12. On 1 week post-operative 33(82.5%) patients had visual acuity in the range of 6/6-6/9, 6 (15%) patients had visual acuity of 6/12, 1(2.5%) patient had vision <6/12. On 1 month post-operative 34(85%) patients had visual acuity in the range of 6/6-6/9 and 6 (15%) patients had visual acuity of 6/12. On 3rd month post-operative 36 (90%) patients had visual acuity

ORIGINAL ARTICLE

in the range of 6/6-6/9 and 4(10%) patients had visual acuity of 6/12. In scleral tunnel incision group (table 5) on first post-operative day 27(67.5%) patients had visual acuity in the range of 6/6-6/9, 10(25%) patients had visual acuity of 6/12, 3(7.5%) patients had visual acuity <6/12. On 1 week post-operative 29(72.5%) patients had visual acuity in the range of 6/6-6/9, 9 (22.5%) patients had visual acuity of 6/12, 2(5%) patient had vision <6/12. On 1 month post-operative 33(82.5%) patients had visual acuity in the range of 6/6-6/9, 4(10%) patients had visual acuity of 6/12, 3(7.5%) patients had visual acuity < 6/12. On 3rd month post-operative 33 (82.5%) patients had visual acuity in the range of 6/6-6/9 and 7(17.5%) patients had visual acuity of 6/12.

Visual acuity was converted into decibal fraction for statistical analysis. Median and range at each time interval was calculated. p value calculated by Mann Whitney U test (to compare visual acuity between 2 groups at each time interval) showed, post-operative 1 day as 0.1, 1 week as 0.6, 1 month as 0.5 and 3 month as 0.8. All these p values indicate there is no statistical difference in between the 2 groups.

Patients with preoperative astigmatism of <1.25D were included under study. Postoperative astigmatism was documented in Group A (Clear corneal incision group) (Table 6). We see that on first post-operative day 28 (70%) patients had post-operative astigmatism in the range of 0.25-0.50D, 8 (20%) patients in the range of 0.51-0.75D and 4 (10%) patients in the range of 0.76-1.00D. On 1 week post-operative 28 (70%) patients had postoperative astigmatism in the range of 0.25-0.50D, 8 (20%) patients in the range of 0.51-0.75D and 4 (10%) patients in the range of 0.76-1.00D. On 1 month post-operative 31 (77.5%) patients had postoperative astigmatism in the range of 0.25-0.50D, 7 (17.5%) patients in the range of 0.51-0.75D and 2 (5%) patients in the range of 0.76-1.00D.

On 3 month post-operative 33 (82.5%) patients had astigmatism in the range of 0.25-0.50D, 5 (12.5%) patients in the range of 0.51-0.75D and 2 (5%) patients in the range of 0.76D-1.00D. In clear corneal incision group (Table 7) 18 were WTR and 22 were ATR at all time periods. Postoperative astigmatism was documented in Group B (scleral tunnel incision group) (Table 8).

We see that on first post-operative day 29 (72.5%) patients had postoperative astigmatism in the range of 0.25-0.50D, 7 (17.5%) patients in the range of 0.51-0.75D and 4 (10%) patients in the range of 0.76-1.00D. On 1 week post-operative 31 (77.5%) patients had postoperative astigmatism in the range of 0.25-0.50D, 5 (12.5%) patients in the range of 0.51-0.75D and 4 (10%) patients in the range of 0.76-1.00D. On 1 month post-operative 33 (82.5%) patients had postoperative astigmatism in the range of 0.25-0.50D, 5 (12.5%) patients in the range of 0.51-0.75D and 2 (5%) patients in the range of 0.76-1.00D. On 3 month post-operative 34 (85%) patients had postoperative astigmatism in the range of 0.25-0.50D and 6 (15%) patients in the range of 0.51-0.75D. In scleral tunnel incision group (Table 9) on first postoperative day 14 were WTR and 26 were ATR, on 1 week postoperative 13 were WTR and 27 were ATR, on 1 month postoperative 15 were WTR and 25 were ATR and on third month postoperative 17 were WTR and 23 were ATR.

Comparison of amount of postoperative astigmatism in the two incisions of phacoemulsification was done. p value showed as 1.000 at all time periods indicating no statistical difference in between the two groups. Comparison of type (WTR and ATR) of postoperative astigmatism in the two incisions of phacoemulsification was done. p value showed, 1 day as 0.3613, 1 week as 0.252, 1 month as 0.4957 and 3 month as 0.8216. All these p values indicate there is no statistical difference in between the 2 groups. Complications of phacoemulsification (intraoperative and postoperative) in between Group A (Clear corneal incision) and Group B (Scleral tunnel incision)

ORIGINAL ARTICLE

were noted (Table 10). We see that in group A (Clear corneal incision) complications were seen in 10 (25%) patients out of 40 patients who got operated, among them 1(2.5%) patient had DM Detachment, 4(10%) patients had corneal edema, 3(7.5%) pts. had post-operative iritis and 2(5%) patients had PCO. In group B (Scleral tunnel incision) complications were seen in 11 (27.5%) patients out of 40 patients who got operated, among them 2(5%) patients had DM detachment, 3(7.5%) patients had corneal edema, 4(10%) patients had post-operative iritis, and 2(5%) patients had PCO.

DISCUSSION: Cornea contributes almost 2/3rd of the refractive power of the eye. The full thickness incision made in the cornea can differentially affect the curvature of the cornea to varying amount, in different meridians. The site, size and types of the incision are the major determinants for this change. The more corneal, and larger the incision, more is the induced astigmatism. The wound apposition of the inner lip of the incision determines the degree of alteration in the curvature of the cornea. Postoperative astigmatism depends primarily on the size, architecture and location of the incision. Self-sealing tunnel incisions do not induce corneal changes caused by sutures. Thus the incisions are more than a port of access to the anterior chamber.

It is the most important step during surgery affecting ocular integrity and corneal stability.

Sutureless clear corneal incision technique provides major advantages like less ocular tissue manipulation and surgical time. Also a corneal incision means we do not need to cauterize the sclera at the limbus. Cauterization can contribute to astigmatism by causing contraction of the adjacent scleral and corneal lamellae. The last two decades have seen a rapid advancement in cataract wound architecture. With advancements in technology of cataract surgery there has been a gradual trend toward smaller incisions, moving from superior sclera to temporal clear corneal incision, in an attempt to reduce intraoperative complications and postoperative astigmatism.⁵

ADVANTAGES OF CLEAR CORNEAL INCISION: Temporal clear corneal incisions have become popular because of several reasons:

- The horizontal meridian of the cornea is wider than the vertical meridian. Therefore, the distance from the visual axis to the periphery is longer, resulting in less flattening as the incision is transmitted to the visual axis. Hence there is lower incidence of surgically induced astigmatism at the temporal site.
- Less surgery time.
- Elimination of the need for cautery and the potential for subconjunctival hemorrhage and hyphaema.
- Promotes rapid visual recovery and visual restoration.
- Well tolerated by the patients.
- It can be performed under topical anaesthesia.
- It is mainly suitable for foldable IOLs.
- Visibility during the phacoemulsification procedure is better due to shorter tunnel.
- No obstruction from the brow as in deep set eyes and therefore no need of bridle suture.
- Good red reflex because of perpendicular iris location to the light of microscope.
- Irrigating fluids spontaneously drain from the eye without pooling.
- Leaves superior conjunctiva undisturbed for future trabeculectomy.
- Does not disturb the filtering bleb in an eye with a functional bleb.

ORIGINAL ARTICLE

DISADVANTAGES OF CLEAR CORNEAL INCISION:

- Not suitable for the trainee surgeon.
- Endothelial damage.
- Conversion into SICS is not possible.
- Increased risk of endophthalmitis as it is not covered by conjunctiva.

ADVANTAGES OF SCLERAL TUNNEL INCISION: Scleral tunnel incisions have some advantages like

- Less post-operative astigmatism.
- Better wound closure.
- Safest incisions to perform especially for the trainee surgeon.
- Decreased endothelial damage.
- Easy to convert to SICS.
- Since it is covered by conjunctive there are decreased chances of endophthalmitis.

DISADVANTAGES OF SCLERAL TUNNEL INCISION:

- More surgery time.
- Requires cautery and the potential for subconjunctival haemorrhage and hyphaema.
- It cannot be performed under topical anaesthesia.
- Visibility during the phacoemulsification procedure is not better due to longer tunnel.
- Leaves superior conjunctiva disturbed for future trabeculectomy.
- Disturbs the filtering bleb in an eye with a functional bleb.

This study was done to compare the effects of clear corneal versus scleral tunnel incision on vision recovery and post-operative astigmatism.

Eighty patients attending to out-patient department of ophthalmology, R.L.JALAPPA HOSPITAL AND RESEARCH CENTRE attached to SRI DEVARAJ URS MEDICAL COLLEGE, TAMAKA, KOLAR with senile cataract fulfilling the inclusion criteria framed were selected for phacoemulsification with foldable IOL implantation under peribulbar anesthesia between December 2011 and July 2013.

The patients were randomly divided into two groups of 40 patients each (group A-Clear corneal incision and group B -scleral tunnel incision). After detailed preoperative evaluation, phacoemulsification with foldable IOL implantation was performed.

Visual acuity unaided, with pinhole vision, best corrected visual acuity, keratometry and complications if any were recorded in each patient postoperatively on first day, first week, first month and third month. Pre and postoperative astigmatism was evaluated by Bausch and Lomb keratometry readings. Statistical analysis was applied to compare the effects of visual recovery and postoperative astigmatism. Complications if any in between the two groups were also studied.

In our study 33(82.5%) patients out of 40 patients with clear corneal incision had postoperative visual acuity ranging between 6/6 -6/9 at the end of 1st week compared to 29(72.5%) patients out of 40 patients with scleral tunnel.

In study done by Karpo KO, Albanis CV, Pearlman JB, Goins KM with clear corneal and scleral tunnel incision showed that Best corrected visual acuity of 20/40 or better was achieved in 82.5% of all eyes with temporal clear corneal incisions and in 75.3% of all eyes with superior scleral tunnel (P < 0.05).The difference in BCVA between the two groups was not statistically significant.⁶ This study is

ORIGINAL ARTICLE

in comparable with our study, though we found that clear corneal incision induces faster visual recovery compared to scleral tunnel, statistically there was no significant difference.

In a study done by Oshima Y, Tsujikawd K, Oh A, Harino S showed that eighty percent of the eyes in each group (clear corneal incision and scleral tunnel incision) achieved an uncorrected visual acuity of 20/40 or better from the second day postoperatively. No statistically significant difference in visual rehabilitation or other parameters was noted between the groups throughout the study.⁷

In our study 33(82.5%) patients out of 40 patients with clear corneal incision had minimal postoperative astigmatism(0.25-0.50D) compared to 34 (85%) patients out of 40 patients in scleral tunnel incision in 3 month keratometry follow up.

In a study done by Joshi MR, Shakya S showed that mean astigmatism in patients with corneal incision in first week was 1.43D and 1.24D in those with scleral incision. At the end of third week and eight week corneal incision had mean astigmatism of 0.97D and in scleral incision group the mean astigmatism was 0.91D.⁸ In our study mean astigmatism at first week postoperative was 0.50D in both the groups and at third month it was 0.46D in both the groups which showed no statistical difference in between them.

In a study done by He Y, Zhu S, Chen M, Li D showed that the changes of corneal astigmatic diopter in Groups A(clear corneal temporal incision) and B(Scleral tunnel temporal incision) after 3month postop from keratometric reading were $1.04 + 0.76$ and $0.94 + 0.27$, respectively ($P = .84 > .05$), which showed no statistical significant difference.⁹ In our study we reported postoperative astigmatism after 3 months in both the groups were $0.46 + 0.21D$ (p value-1.000) which showed no statistical difference.

In a study done by Oshima Y, Tsujikawd K, Oh A, Harino S showed that mean scalar shift of keratometric cylinder in the corneal incision group was 1.19 diopters (D) at 2 days postoperatively, 0.86 D at 1 week, and 0.56 D at 3 months and in the scleral incision group, 1.09 D at 2 days, 0.76 D at 1 week, and 0.65 D at 3 months.⁷ In our study we found that mean postoperative corneal astigmatism on 1st day postoperative was $0.50 + 0.25D$ (p value 1.000), at 1 week postoperative was $0.50 + 0.25D$ (p value 1.000), at 1 month postoperative was $0.47 + 0.22$ (p value 1.000), and at 3 month postoperative was $0.46 + 0.21D$ (p value 1.000), in both the groups which showed no statistical difference.

In a study done by Olsen T, Johansen MD, Bek T, Hjortdal J showed that postoperative astigmatism (vector analysis, keratometry) was $1.41 D \pm 0.66$ (SD) and $0.55 \pm 0.31 D$ in the corneal incision group and the scleral incision group, respectively ($P < .01$).¹⁰

A study performed by Bilinska et al evaluated the astigmatic effect of scleral tunnel incisions and clear corneal incisions in adults. The lowest mean postoperative corneal astigmatism was achieved in the group with the superotemporal clear corneal incision. This study demonstrated that clear corneal incisions induce less astigmatism than scleral tunnel incisions.¹¹ But in our study we found that there is no significant statistical change in postoperative astigmatism in between the two groups (p value 1.000)

In a study done by Einollahi B et al showed that scleral tunnel incision is better than clear corneal incision in minimizing postoperative astigmatism.¹²

Susie et al¹³ in their analysis of postoperative corneal astigmatism after phacoemulsification through a clear corneal incision, concluded that the mean postoperative corneal astigmatism was 0.23 D.

ORIGINAL ARTICLE

In our study complications like DM detachment, Post operativeiritis, corneal edema were noticed in both the groups which resolved after 1 month. PCO was seen in 4 cases which were treated with Nd YAG capsulotomy.

In a study done by Oshima Y, Tsujikawd K, Oh A, Harino S showed that complications including corneal endothelial cell loss and wound incompetence requiring suturing were observed in the temporal clear corneal incision group.⁷ In our study we reported 4(10%) cases of corneal edema in clear corneal group and 3(7.5%) cases in scleral tunnel group. We didn't report any case of wound incompetence.

In a study done by Karpo KO, Albanis CV, Pearlman JB, Goins K M showed that vitreous loss in 6.0% with temporal clear corneal incisions and in 11.8% of with superior scleral tunnel incisions (P < 0.02). Posterior capsule breaks occurred in 11.5% of the temporal clear corneal incisions group versus 17.7% in the superior scleral tunnel group (P < 0.0453).⁶ In our study we didn't report any posterior capsule breaks or vitreous loss.

In a study done by Michaeli A, Rootman DS, Slomonic AR showed that cumulative mean central endothelial cell loss for the scleral tunnel group was 1.8% +/- 21.5%, and for the clear corneal group 0.13% +/- 18.3% (p>0.05). Clear cornea and scleral tunnel incisions seem to result in no significant difference in endothelial cell loss and or central corneal thickness at 3 months post-op.¹⁴ In our study we reported 4(10%) cases of corneal edema in clear corneal group and 3(7.5%) cases in scleral tunnel group.

Cooper et al evaluated the incidence of postoperative endophthalmitis in clear corneal incisions with or without sutures vs. scleral tunnel incisions. In this study culture-positive acute post-cataract endophthalmitis were compared to randomly selected control patients who underwent uncomplicated cataract surgery. This study demonstrated that clear corneal incisions were associated with a threefold greater risk of endophthalmitis than scleral tunnel incisions.¹⁵ In our study we didn't report any case of endophthalmitis in both the groups.

CONCLUSIONS: We found that clear corneal incision induces faster visual recovery compared to scleral tunnel. No significant statistical difference was found in post-operative astigmatism after a 3 month follow up period in between the two groups.

AGE	GROUP A (CLEAR CORNEAL INCISION)		GROUP B (SCLERAL TUNNEL INCISION)	
	NO. OF PATIENTS	%	NO. OF PATIENTS	%
RANGE(YRS)				
51-60	8	20	10	25
61-70	22	55	21	52.5
71-80	10	25	9	22.5
>80	-		-	
TOTAL	40	100	40	100

TABLE 1: AGE DISTRIBUTION

ORIGINAL ARTICLE

	GROUP A (CLEAR CORNEAL INCISION)		GROUP B (SCLERAL TUNNEL INCISION)	
	NO. OF PATIENTS	%	NO. OF PATIENTS	%
SEX				
MALE	20	50	22	55
FEMALE	20	50	18	45
TOTAL	40	100	40	100

TABLE 2: SEX DISTRIBUTION

VISUAL ACUITY	GROUP A (CLEAR CORNEAL INCISION)		GROUP B (SCLERAL TUNNEL INCISION)	
	NO. OF PATIENTS	%	NO. OF PATIENTS	%
6/18-6/60	32	80	34	85
6/60-CF at 3M	7	17.5	4	10
CF at 2M -HM+	1	2.5	2	5
PL+, PR+	-	-	-	-
TOTAL	40	100	40	100

TABLE 3: PREOPERATIVE VISUAL ACUITY

UCVA	1 DAY		1 WEEK		1 MONTH		3 MONTH	
	NO. OF PATIENTS	%	NO. OF PATIENTS	%	NO. OF PATIENTS	%	NO. OF PATIENTS	%
6/6-6/9	31	77.5	33	82.5	34	85	36	90
6/12	6	15	6	15	6	15	4	10
<6/12	3	7.5	1	2.5	0	0	0	0
TOTAL	40	100	40	100	40	100	40	100

TABLE 4: POSTOPERATIVE UNCORRECTED VISUAL ACUITY IN GROUP A(CLEAR CORNEAL INCISION)

UCVA	1 DAY		1 WEEK		1 MONTH		3 MONTH	
	NO	%	NO	%	NO	%	NO	%
6/6-6/9	27	67.5	29	72.5	33	82.5	33	82.5
6/12	10	25	9	22.5	4	10	7	17.5
<6/12	3	7.5	2	5	3	7.5	0	0
TOTAL	40	100	40	100	40	100	40	100

TABLE 5: POSTOPERATIVE UNCORRECTED VISUAL ACUITY IN GROUP B(SCLERAL TUNNEL INCISION)

RANGE(D)	1 DAY		1 WEEK		1 MONTH		3MONTH	
	NO. OF PATIENTS	%	NO. OF PATIENTS	%	NO. OF PATIENTS	%	NO. OF PATIENTS	%
0.25-0.50	28	70	28	70	31	77.5	33	82.5
0.51-0.75	8	20	8	20	7	17.5	5	12.5
0.76-1.00	4	10	4	10	2	5	2	5
TOTAL	40	100	40	100	40	100	40	100

TABLE 6: POST OPERATIVE ASTIGMATISM IN GROUP A (CLEAR CORNEAL INCISION GROUP)

ORIGINAL ARTICLE

1 DAY		1 WEEK		1 MONTH		3 MONTH	
WTR	ATR	WTR	ATR	WTR	ATR	WTR	ATR
No. of patients	No. of patients	No. of patients	No. of patients	No. of patients	No. of patients	No. of patients	No. of patients
18	22	18	22	18	22	18	22

**TABLE 7: TYPE OF POST OPERATIVE ASTIGMATISM IN GROUP A
(CLEAR CORNEAL INCISION GROUP)**

RANGE(D)	1 DAY		1 WEEK		1 MONTH		3MONTH	
	NO. OF PATIENTS	%	NO. OF PATIENTS	%	NO. OF PATIENTS	%	NO. OF PATIENTS	%
0.25-0.50	29	72.5	31	77.5	33	82.5	34	85
0.51-0.75	7	17.5	5	12.5	5	12.5	6	15
0.76-1.00	4	10	4	10	2	5	0	0
TOTAL	40	100	40	100	40	100	40	100

**TABLE 8: POST-OPERATIVE ASTIGMATISM IN GROUP B
(SCLERAL TUNNEL INCISION GROUP)**

1 DAY		1 WEEK		1 MONTH		3 MONTH	
WTR	ATR	WTR	ATR	WTR	ATR	WTR	ATR
No. of patients	No. of patients	No. of patients	No. of patients	No. of patients	No. of patients	No. of patients	No. of patients
14	26	13	27	15	25	17	23

**TABLE 9: TYPE OF POSTOPERATIVE ASTIGMATISM IN GROUP B
(SCLERAL TUNNEL INCISION GROUP)**

COMPLICATIONS	GROUP A (CLEAR CORNEAL INCISION)		GROUP B (SCLERAL TUNNEL INCISION)	
	NO. OF PATIENTS	%	NO. OF PATIENTS	%
DM DETACHMENT	1	2.5	2	5
CORNEAL EDEMA	4	10	3	7.5
POSTOPERATIVE IRITIS	3	7.5	4	10
PCO	2	5.0	2	5.0
TOTAL	10	25	11	27.5

**TABLE 10: COMPLICATIONS (INTRAOPERATIVE+POSTOPERATIVE) SEEN
IN GROUP A(CLEAR CORNEAL INCISION) AND GROUP B(SCLERAL TUNNEL)**

REFERENCES:

1. Thomas R, Mulfil J. The incidence of cataract in India is an overestimate. Natl Med J India 1998; 11: 182-4.
2. Kupfer C, Bowman. Lecture: The conquest of cataract a global challenge. Trans Ophthalmol Soc UK 1984;1:104
3. Kelman C. Phacoemulsification and aspiration. Amer J Ophthalmol 1967; 64: 23-35.

ORIGINAL ARTICLE

4. Rizui Z, Rehman T, Malik S, Qureshi A, Paul L, Qureshi K, et al. An evaluation of topical and local anaesthesia in phacoemulsification. *J Pak Med Assoc* 2003; 53:167-70.
5. Dada T, Dada VK, Sethi HS, Dhawan M. Mastering the nucleotomy techniques in phaco. 1st edition. Jaypee publication; 2007 .p.1-8.
6. Karpo KO, Albanis CV, Pearlman JB, Goins KM. Outcomes of temporal clear cornea versus sclera tunnel phacoemulsification incisions in a university training programme. *Ophthalmic Surg Lasers* 2001;32(3):228-32.
7. Oshima Y, Tsujikawd K, Oh A, HarinoS. Comparative study of intraocular lens implantation through 3 mm temporal clear corneal and superior sclera tunnel self-sealing incisions. *J Cat & Ref Surg* 1997;23 (3):347-53.
8. Joshi MR, Shakya S. Change in refractive status of the patients undergoing phacoemulsification surgery. *Nepal Med Coll J* 2009; 11:19-22.
9. He Y, Zhu S, Chen M, Li D. Comparison of the keratometric corneal astigmatism power after phacoemulsification: Clear temporal corneal incision versus superior scleral tunnel incision. *Journal of Ophthalmology* 2009; 20:1-3.
10. Olsen T, Johansen MD, Bek T, Hjortdal J. Corneal versus scleral tunnel incision in cataract surgery: A randomised study. *J Cat & Ref Surg* 1997;23(3):337-41.
11. Bilinska E, Wesolek-Czernik A, Synder A, Omulecki W. Surgically induced astigmatism after cataract phacoemulsification. *Klin Oczna* 2004; 106: 756-9.
12. Einollahi B, Joshaghan Mi Z, Jamaki H. outcomes of clear cornea and scleral tunnel incisions for phacoemulsification. *Bna J Ophthalmol* 2005; 11 (1):68-74.
13. Susie N., Brajkovie J., Kalauz-Surae I. Analysis of post- operative corneal astigmatism after phacoemulsification through a clear corneal incision. *Aera Clin Croat* 2007; 46:37-40.
14. Michaeli A, Rootman DS, Slomonic A R. Corneal changes after phacoemulsification with a corneal versus sclera tunnel incision. *Harefuah* 2006;145(3):191-3
15. Cooper MA, Holekamp NM, Bohigian G, Thompson PA. Case-control study of endophthalmitis after cataract surgery comparing scleral tunnel and clear corneal wounds. *Am J Ophthalmol* 2003;136: 300-5.

AUTHORS:

1. Tanushree V.
2. K. Kanthamani

PARTICULARS OF CONTRIBUTORS:

1. Post Graduate, Department of Ophthalmology, R. L. Jalappa Hospital, SDUAHER, Kolar.
2. Professor, Department of Ophthalmology, R. L. Jalappa Hospital, SDUAHER, Kolar.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Tanushree. V,
Post Graduate in MS,
Department of Ophthalmology,
R. L. Jalappa Hospital,
SDUAHER, Kolar.
E-mail:tanushree19686@gmail.com

Date of Submission: 22/03/2014.

Date of Peer Review: 23/03/2014.

Date of Acceptance: 27/03/2014.

Date of Publishing: 21/04/2014.