



A COMPARATIVE STUDY OF ANTERIOR SEGMENT COMPLICATIONS IN MANUAL SMALL INCISION CATARACT SURGERY AND PHACOEMULSIFICATION AT A TERTIARY CARE HOSPITAL IN EASTERN INDIA.

Ophthalmology

Dr Khandkar Fariduddin*

Assistant Professor, Department of Ophthalmology, Institute of Postgraduate Medical Education and Research, Kolkata, West Bengal, India. *Corresponding Author

Dr Malay Mondal

Assistant Professor, Ophthalmology, Malda Medical College and Hospital, Malda, West Bengal, India.

Dr S. Banerjee

Professor and Head of The Department Ophthalmology, N.R.S. Medical College, Kolkata, West Bengal, India.

ABSTRACT

Purpose: This study was to find out the different anterior segment complications in manual small incision cataract surgery and in Phacoemulsification during operation, early postoperative period and late post operative period.

Materials And Method: 100 eyes of 100 patients were taken up who were of different age. Manual small incision cataract surgery was done in 50 eyes of 50 patients and Phacoemulsification was done in 50 eyes of 50 patients. Intra operative, early post operative and late post operative complications were noted in both the group accordingly. These complications in two different groups were depicted by different charts and diagram.

Result And Observations: Intra operative and post operative complications were noted more in manual small incision cataract surgery (SICS group) than in phacoemulsification (Phaco group). Surgically induced astigmatism was also more in SICS group than in Phaco group. Thermal corneal burn was noted in Phaco group but no question of such complication in SICS group.

Conclusions: Both manual small incision cataract surgery and phacoemulsification achieved excellent visual outcomes with relatively low complications. SICS is significantly faster, less expensive, and less technologically dependent than phacoemulsification. SICS may be the more appropriate surgical procedure for the treatment of advanced cataracts in the developing world. Phacoemulsification is a faster and safer method of cataract surgery with early ambulation of the patient. The smaller wound size required for phacoemulsification surgery lead to safer surgery and more rapid visual recovery for patients.

KEYWORDS

Cataract, Small incision cataract surgery, Phacoemulsification, Intra ocular lens, Capsulorrhexis, hyphaema, pseudophakic bullous keratopathy.

INTRODUCTION:

Cataract is the main cause of preventable blindness and visual impairments worldwide as well as in India. Current prevalence of cataract worldwide is more than 15 million. This number is expected to reach 40 million by the year 2025. In India approximately 3.5 million people become blind from cataract every year. 65 % of all blindness is due to cataract. Surgery is the only satisfactory method of treatment currently available for lens opacity. The surgery of cataract was practiced by Egyptians and by Susruta in India about 800 BC.

Jacques Daviell(1696-1762), a Frenchman performed cataract extraction by ECCE giving inferior incision. Von Graefe in 1865 introduced ECCE by superior incision.

In 1949 Harold Ridley² introduced ECCE with PCIOL implantation. In 1967 Charles Kelman³ introduced phacoemulsification. Early in 1982, Kraff and Sanders⁴ advocated small incision surgery which producing less induced astigmatism and less late-healing astigmatic shift.

Two most commonly performed surgical procedures nowadays are: Phacoemulsification and Manual small incision cataract surgery. The main aim of all the procedures is to give the patient a good quality of vision and early postoperative ambulation.

Manual small incision surgery has emerged as a popular technique which offers all the merits of phacoemulsification with added advantage of wider applicability, safety, easier learning curve, low cost and machine independence. Phacoemulsification has become a routine procedure in most parts of the world due to early postoperative ambulation and low induced astigmatism.

The study of was carried out in the Department of Ophthalmology, Malda Medical College and Hospital, Malda, West Bengal, India, from July 2018 to June 2019 with the following aim and objective:

Recording and follow up of intraoperative and postoperative (early & late) complications in the anterior segment of the eye in phacoemulsification and manual small incision cataract surgery.

MATERIALS AND METHOD:

The present study was conducted in the Department Of

Ophthalmology, Malda Medical College and Hospital, Malda, West Bengal, India during the period from July 2018 to June 2019. 100 eyes of 100 patients were taken up who were of different age. The cases were divided into two clinical subgroups for detailed study as follows:

Group-1: 50 eyes of 50 patients undergone manual small incision cataract surgery through scleral tunnel with implantation of intraocular lens (SICS+PCIOL) in the posterior chamber.

Group-2: 50 eyes of 50 cases under gone cataract surgery by Ultrasonic phacoemulsification with posterior chamber Acrylic foldable IOL implantation through clear corneal incision.

Inclusion Criteria:

Cataract with adult age group and both sexes, Patients with normal intraocular pressure and macular function of within normal limit. Cases who were diabetic and/or hypertensive but without retinal involvement. Patients who gave written consent to undergo surgery.

Exclusions Criteria:

Complicated cataract, metabolic cataract, traumatic cataract, radiation cataract. Cases with active or chronic uveitis, eyes with infection or inflammation, unhealthy cornea, diabetic or hypertensive retinopathy, glaucoma, rubeosis iridis, ectropion, entropion, dry eye diseases, chronic dacryocystitis and eyes with posterior segment pathology. Patients with other intraocular surgery (e.g., retinal reattachment, laser Procedures etc.). Intraocular with no perception of light and with defective projection of rays.

The measurement and calculations of Surgically Induced Astigmatism (SIA) was done by following methods:

Preoperative astigmatism (K1): This was measured on the day before surgery. The measure preoperative astigmatism is calculated by the difference between the horizontal and vertical readings. Postoperative corneal astigmatism (K3): This was calculated on 1st postoperative day, on 2nd week and on 6th week.

Surgically Induced Astigmatism (K2): $K2 = K3 - K1$. There are different methods to calculate Surgically Induced Astigmatism(SIA): Simple subtraction method, Jette's vector analysis, Cravy's vector

analysis, Maeser's polar values. In the present study simple subtraction method has been used to calculate Surgically Induced Astigmatism.

A-scan biometry was performed to measure the axial length (L) of each eye. IOL power (P) was calculated by SRK formula. which is as follows: $P = A - 2.5 L - 0.9 K$. Where, P= IOL power to be implanted. A= Specific constant for each lens type as per recommendation of manufacturers, which is between 114 and 119. L= Axial length of each eyeball in mm. K= Average keratometric readings (KV + KH)/2. The following tests and investigation were done routinely in every patient preoperatively: Routine examination of blood i.e Hb%, TLC, DLC and ESR. Post prandial blood sugar, blood urea & creatinin. HIV 1 & 2, HbsAg, HCV Ag, ECG in patients of age 35 years and above. Conjunctival swab for culture and sensitivity was done in selected patients. Following medication was given on the day of admission: Antibiotic eye drop (Moxifloxacin or Gatifloxacin) instilled 4 hourly in the eye to be operated. Nepafenac eye drop given 8 hourly. Topical Phenylephrine (5%) and Tropicamide (0.8%) were put in the eye to be operated at 15 minutes interval for 3 times prior to operation. Postoperatively systemic antibiotic was given. Tablet aceclofenac & paracetamol was given as necessary with antacid.

First postoperative dressing was done in the next morning and individual complain if any was noted. Visual acuity was recorded for distance with and without pinhole. Then every patient was examined carefully under slit lamp. Conjunctiva was examined for any discharge, chemosis and congestion. Cornea was examined for any endothelial trauma, Descemet's folds, striate keratopathy and corneal oedema. Wound was examined for any leakage and sietel test was performed in some cases. Depth of anterior chamber was measured roughly and aqueous flare, cells, hypopyon or hyphaema were looked for. The pupil and iris was examined for pupillary size, shape, mobility and iris pattern. The IOL was then examined to evaluate its position in the capsular bag and any surface deposit was looked for. The posterior capsule was examined for its integrity and transparency. Fundus was examined in all cases with direct, indirect ophthalmoscope.

Every patients was discharged with following medicines: Systemic antibiotics (Tablet Ciprofloxacin 500 mg 12 hourly) continued for 5 days. Topical antibiotic-steroid combination eye drop was given 4 hourly with tapering weekly for 6 weeks. Timolol Maleate (0.25%) eye drop given 12 hourly for 6weeks. Sodium chloride (1%) eye ointment 2 times daily in patients with corneal oedema.

Patients were instructed to attend ophthalmology out patient department at 2nd week and 6th week postoperative for review and check up. In each visit visual acuity was tested with and without pinhole, IOP was measured. Conjunctiva, cornea, anterior chamber, pupil, IOL position and its deposits were all carefully examined under slit lamp. Keratometry was done to record postoperative corneal curvature in vertical and horizontal meridian. Fundus was examined in every case by direct & indirect ophthalmoscope.

Statistical Analysis: Method used in present study for calculating of different values is mean.

MEAN: It is obtained by adding the individual value, which is then divide by the number of observations. The method of adding is called as summation, which is denoted by the sign Σ . The individual observation is denoted by the sign "x" and mean is denoted by $\bar{x}$ (called x bar).

$$\text{So, Mean } (\bar{X}) = \frac{\Sigma x}{n}$$

Statistical analysis was done using the unpaired 't' test.

RESULTS AND OBSERVATION:

In the present study total 100 eyes (54 right eyes and 46 left eyes) of 100 patients were taken for evaluation. Among which 50 eyes underwent Small incision cataract surgery with posterior chamber IOL implantation and 50 eyes were under went Phacoemulsification with Foldable PCIOL implantation during the period from July 2018 to June 2019. The cases were followed up for 6 weeks after surgery and the different facts those were noted during the follow up are documented below:

TYPE OF CATARACT: In the SICS group among 50 cases, there

were 24 cases of immature cortical cataract, 17 cases of mature cortical cataract, 2 cases of morgagnian cataract and 7 cases of nuclear cataract among which 1 case of NS I, 2 cases of NS II, 3 cases of NS III, 1 case of NS IV. In the phaco group there were 24 cases of immature cataract, 8 cases of mature cataract, 18 cases of nuclear cataract among which 4 cases in NS I, 9 cases in NSII, 5 cases in NS II, and no case of grade IV. No case of morgagnian type was seen.

Table-1: Shows Incidence Of Different Type Of Cataract Undergone SICS And Phacoemulsification.

TYPE OF CATARACT	NUMBER OF CASES	
	Sics Group (N=50)	Phaco Group(N=50)
Immature cortical	24 (48%)	24 (48%)
Mature cortical	17 (34%)	08 (16%)
Morgagnian type	02 (4%)	00 (0%)
NS I	1 (2%)	4 (8%)
NS II	2 (4%)	9 (18%)
NS III	3 (6%)	5 (10%)
NS IV	1 (2%)	0 (0%)

SURGICALLY INDUCED ASTIGMATISM CALCULATED FROM KERATOMETRIC READINGS IN SICS AND PHACO:

Surgically Induced Astigmatism (SIA) was calculated by the difference between preoperative and postoperative measured astigmatism at a specific time. In the SICS group mean preoperative measured astigmatism was 0.86 D, where as in the phaco group it was 0.84 D. The mean Surgically induced astigmatism was 1.37D on day 1, 1.18 on 2nd week and 0.92 on 6th week. In phaco group mean surgically induced astigmatism was 1.11D on 1st day, 0.80D on 2nd week, 0.59D on 6th week.

The Table-2: Shows Preoperative Measured Astigmatism And Postoperative Surgically Induced Astigmatism.

Periods	Astigmatism in SICS group	Astigmatism in Phaco group
Pre operative	0.86 D	0.84D
1 st Post Operative	1.37D	1.11D
2 nd Week	1.18D	0.80D
6 th Week	0.92D	0.59D

From the above analysis it is seen that surgically induced astigmatism is significantly higher in SICS group than Phacoemulsification group.

SURGICAL COMPLICATIONS:

INTRAOPERATIVE COMPLICATIONS: Intraoperative iris prolapse in SICS and phaco group was 1 case (2%) in each group. Iris trauma was found in 4 cases each in SICS and phaco group. Percentage of complication was 8% in each group. Intraoperative hyphaema was seen in 3 cases in SICS group and percentage was 6%. Where as in phacoemulsification this complication was only in 1 case i.e. 2%. Shallow anterior chamber was seen in 3 (6%) cases in SICS group intraoperatively. It was seen in 2 (4%) cases in phaco group. Incomplete rhexis was found in 2 (4%) cases in SICS group and in 1 (2%) case in Phaco group. Complete cortical could not be done in 4 cases in SICS group i.e. in 8 % cases. This entity was seen in 2 cases in Phaco group i.e. in 4% cases. Posterior capsular rent was noted intraoperatively in 3 cases in SICS group i.e. in 6% cases. Whereas it was seen in 2(4%) cases in Phaco group. Vitreous loss was seen in 1 (2%) case out of 3 cases of posterior capsular rent in SICS group. In Phaco group vitreous loss occurred in 2 (4%) cases out of 2 PC rent. No nucleus drop was seen in SICS group. It was found in 1(2%) case in Phaco group. Detached Descemet's membrane was found in 2 (4%) cases in SICS group and no cases was found in phaco group. Corneal thermal burn occurred in 1 (2%) case in Phaco group. After analysis of intraoperative complications it was seen that the incidence of complication was slightly in higher side in SICS group as compared to phaco group.

Table 3: Showing Intraoperative Complication In SICS And PHACO Group:

Intra Operative Complications	SICS Group (N=50)	PHACO Group
Iris prolapse	1 (2%)	1 (2%)
Iris trauma	4 (8%)	4 (8%)
Hyphaema	2 (4%)	1 (2%)
Shallow anterior chamber	3 (6%)	2 (4%)

Incomplete rhexis	2 (4%)	1 (2%)
Incomplete cortical clean	4 (8%)	2 (4%)
Posterior capsular rent	3 (6%)	2 (4%)
Vitreous prolapse	1 (2%)	2 (4%)
Nucleus drop	0 (0%)	1 (2%)
Detached Descemet's membrane	2 (4%)	0(0%)
Corneal thermal burn	0 (0%)	1 (2%)

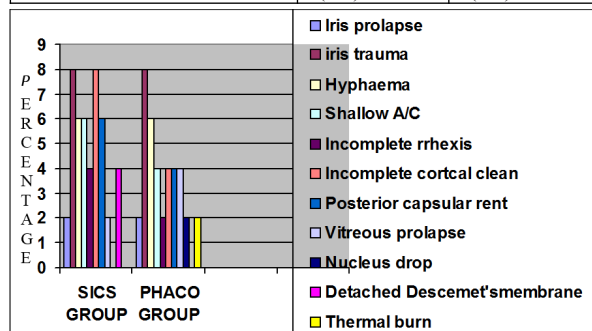


Chart 1: Bar Diagram Showing Intraoperative Complications In SICS And Phaco Group.

A) EARLY POSTOPERATIVE COMPLICATIONS IN SICS AND PHACO GROUP:

These comprises of complication which occurred from 1st postoperative day to 2nd week postoperatively. Corneal oedema was seen in 12 cases in 1st postoperative day in SICS group, out of which in 9 cases corneal oedema was disappeared. The incidence was 24% in SICS. In phaco group this complication was seen 6 (12%) cases. Iris prolapse was seen in 2 cases in SICS group on 1st postoperative day, which were treated accordingly. Incidence was 4% in SICS group. This complication was seen in 1(2%) case in phaco group. Early postoperative hyphaema was seen on 1st postoperative day in 4 (8%) cases in SICS group, which are cleared off subsequently. This complication occurred in 2 (4%) cases in phaco group. Residual cortical matter was seen in 4 (8%) cases in SICS group. Cortical matter was mostly found in the sub incisional area of the anterior chamber. In phaco group this complication was noted in 1(2%) case. Pigment dispersion was observed in 4(8%) cases in SICS group, 2 of which cleared off subsequently. In phaco group this was seen 3(6%) cases. Postoperative uveitis was mild to moderate, which was noted mostly on the first post op. day. This complication was noted in 4 (8%) cases in SICS group. In phaco group this was seen in 2 (4%) cases. In SICS group in early postoperative period no case of pupil capture was seen. In phaco group it was seen in 1(2%) case. Malposition of IOL was noted mostly after 1 week. Malposition mainly was slight tilting of the IOL. This was seen in 2 (4%) cases in each group. Early posterior synechiae was seen in 1(2%) case in SICS group and no case in phaco group. Shallow anterior chamber seen in 1(2%) case in SICS group due to slight leakage from wound due to wound gaping, which was treated by suturing. From the above observation it is seen that early postoperative complications were on the higher side in SICS group as compared to the phaco group.

Table 4: Showing Early Postoperative Complication In SICS And PHACO Group

EARLY POSTOP. COMPLICATIONS	SICS Group (N=50)	PHACO Group (N=50)
Corneal oedema	12 (24%)	6 (12%)
Iris prolapse	1 (2%)	1 (2%)
Hyphaema	4 (8%)	2 (4%)
Residual cortex	4 (8%)	1 (2%)
Pigment dispersion	4 (8%)	3 (6%)
Anterior uveitis	4 (8%)	2(4%)
Pupillary distortion	3 (6%)	1 (2%)
Malposition of IOL	2 (4%)	1 (2%)
Posterior synechiae	1 (2%)	0 (0%)
Shallow anterior chamber	1 (2%)	0 (0%)

B. LATE POSTOPERATIVE COMPLICATIONS IN SICS AND PHACO GROUP:

Late complications are those which were observed in between 2 weeks

and 6 weeks or beyond that postoperatively. Bullous keratopathy was due to persistent corneal oedema, which was not cleared off with treatment due to severe endothelial damage. This complication was seen only in SICS group, which was in 3(6%) cases. No case in phaco group. Pigment dispersion in late postoperative period was less in density. This complication was seen in 2 cases in both the SICS and phaco group. The incidence was 4%. Optic capture was seen in 1 case in both SICS and phaco group. The incidence was 2% in each group. Posterior synechiae was seen in 3 cases in SICS group where as in phaco group it was seen in 2 cases. The incidence was 6% in SICS group and 4% in phaco group. Posterior capsular opacification was seen in 3 cases in SICS group, incidence was 6%. It was found in 2 cases in phaco group, incidence was 4%. Postoperative secondary glaucoma was occurred in 1 case in SICS group. The incidence was 2%. No case of postoperative IOP rise was seen in phaco group.

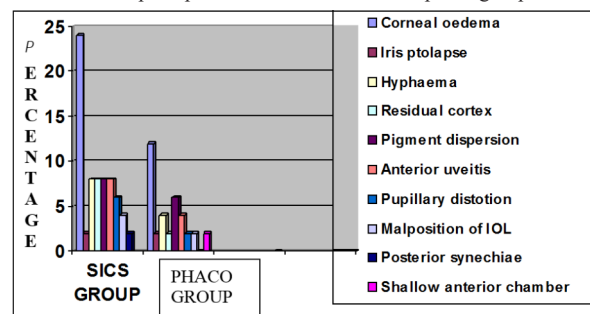


Chart 2: Early postoperative complications in SICS and PHACO group

Table 5: Showing Late Postoperative Complications In SICS And PHACO Group:

LATE POSTOPERATIVE COMPLICATIONS	SICS GRPOUP (N=50)	PHACO GROUP (N=50)
Bullous keratopathy	3 (6%)	0 (0%)
Pigment dispersion	2 (4%)	2 (4%)
Optic capture	1 (2%)	1 (2%)
Posterior synechiae	3 (6%)	2 (4%)
Posterior capsular opacification	3 (6%)	2 (4%)
Secondary glaucoma	1 (2%)	0 (0%)

Above values are shown in the following bar diagram:

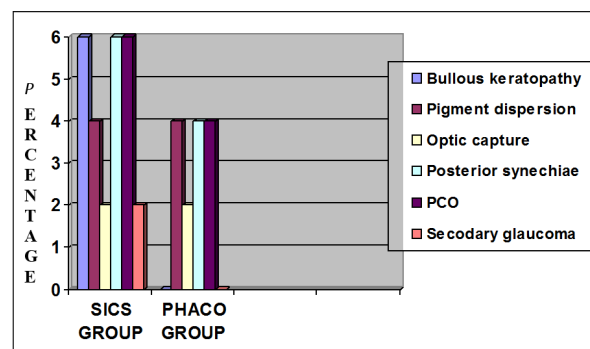


Chart 3: Bar Diagram Showing Late Postoperative Complication In SICS And PHACO Group.

DISCUSSION:

Present study was conducted by taking 100 eyes of 100 patients of which 50 eyes undergone SICS with posterior chamber IOL implantation and 50 eyes undergone Phacoemulsification with foldable IOL implantation. Among the 100 cases, 53 were male (25 SICS and 28 in phaco group) and 47 were female (25 in SICS and 22 in phaco group). Increase incidence of cataract male patients is mainly because; males are busier with out door activity than the females and come earlier for treatment than female. Most male people who came from remote area were farmer, doing their work whole the day in the sunlight and probably ultraviolet radiations play an important role in the pathogenesis of cataract. The incidence of cataract was mostly (63 out of 100 cases) in the age group of 50-70 years of age. Type of cataract in the SICS and phaco group was mostly immature cortical type (48% in both group), mature cortical cataract in the SICS group was 34% and in phaco group it was 16% only, nuclear type cataract was

12 % in SICS group and 36% in phaco group, morgagnian cataract was 4% in SICS group and none in phaco group. Preoperative vision in 74% cases in SICS group was <6/60 and in phaco group it was in 40% cases. Visual acuity in between 6/24-6/60 was in 24% cases in SICS group and in 58% cases in phacogroup, and in both the group in 2% cases vision was in between 6/6-6/18.

KERATOMETRIC ASTIGMATISM IN SICS AND PHACO GROUP.

Astigmatism mainly depends upon the length of external incision, distance from limbus and suture materials and suture techniques. In the present study SICS was done by sclero-coneal tunnel incision, where external incision length was 5.5-7.0 mm and tunnel length was 3.5-4mm and no suture has been used. And phaco was done with 2.8-3.2 mm clear corneal incision. Postoperative measured astigmatism (MA) and surgically induced astigmatism (SIA) in SICS and phaco group are shown in the following table:

Table: 6.1 Showing Surgically Induced Astigmatism In SICS And PHACO Group:

PERIODS	SICS Group		PHACO Group	
	MA	SIA	MA	SIA
Pre operative	0.86D		0.84D	
1 st post operative day	2.23D	1.37D	1.95D	1.11D
On 2 nd week	2.04D	1.18D	1.645D	0.80D
On 3 rd week	1.78D	0.92D	1.435D	0.59D

From the above table it is seen that mean surgically induced astigmatism in SICS group after 6 weeks was 0.92D and in phaco group it was 0.59D. Thus we can see that there is significantly less induced astigmatism in phaco group than in SICS group. P M Gogate⁹ et al (2004) reported that they studied with 69 cases in SICS group and they got mean SIA of 0.95D. In the present study we got mean SIA in SICS of 0.92D at the end of 6 weeks which correlate with this study. Cavalline G M²⁹ et al in 1996 in their study got mean SIA of 0.5D in Phaco group after 1 month. In the present study we got SIA of .59D in phaco group, which correlate with this study.

SURGICAL COMPLICATIONS:

I) Intraoperative Complications:

i) Iris Prolapse:

Intra operative iris prolapse was seen in 1 case (2%) in both SICS and phaco group. In the SICS group this complication was due to short sclero-corneal tunnel length and in phaco group it was due to suboptimal clear corneal incision. Lt Col. K N Jha⁶ (2006) et al in their study got 10.4% cases of iris prolapse during SICS, which is higher than the incidence in present study. No iris prolapse in phaco group. Alan L Rabin⁸ got intraoperative iris prolapse of 11 cases (3.7%) in phaco group due to suboptimal tunnel incision. Incidence in this study is slightly higher than the present study (2%).

ii) Iris trauma:

In the present study intraoperative iris trauma was seen in 4 cases (8%) in SICS group and 3 cases (6%) in phaco group. In the SICS group it was due to frequent iris prolapse in 3 cases and inadvertent A/C entry in 1 case. In the phaco group it was due to catching of iris tissue by phaco tip.

Incidence of iris trauma in SICS group in present study is higher than the different study and in the phaco group it is in between the incidences got by different authors.

iii) Hyphaema:

Intraoperative hyphaema in the present study was 4% (2 cases) in SICS and 2% (1 case) in phaco group. In the SICS group incidence is lower than the A Henning¹¹ et al study where incidence was 9.4% and H Bayramlar²⁰ et al study (incidence was 5%) and slightly higher than the Samar K Basak¹⁵ et al study (incidence was 3.22%). In phaco group incidence (2%) is higher than the Alan L Rabin⁸ et al study where incidence was 1%.

In the present study in SICS, 1 case of intraoperative hyphaema was due to iris trauma and 1 case was due to bleeding from scleral tunnel. In SICS all 2 cases hyphaema continued postoperatively. In phaco group it was due to iris trauma in 1 case, which was also seen, in the first postoperative day.

iv) Shallow Anterior Chamber:

In the present study intraoperative shallow anterior chamber was noted

in 3 cases (6%) in SICS group and in 2 cases (4%) in phaco group. Incidence in SICS group was higher than the P M Gogate⁹ et al study where incidence was 1.24% and lower than the incidence in Lt. Col. K N6 Jha et al study which was 10.4% in SICS. In phacoemulsification group the incidence was 3.7% in Alan L Rabin⁸ study, which correlate with the study.

v) Incomplete Rhexis:

In the present study CCC could not be completed in 2 (4%) cases in SICS group and in 1 (2%) case in phaco group. Incidence correlated well with R venkatesh¹⁰ et al study where they got this complication in 4% cases. The incidence is also correlated with Jacob S²⁶ et al study where incidence was 4.28% and with Vijay Mathur²⁷ et al study where incidence was 3.85%. In SICS group 1 case due to peripheral extension of the rrhexis margin, rrhexis could not be completed and in another 1 case it was due to obscuration of view of the anterior chamber by milky fluid in a hypermature cataract.

vi) Incomplete Cortical Clean:

Complete cortical clean was not possible in 4 (8%) cases in SICS and in 2 (4%) cases in phaco group in the present study. The incidence was higher than the incidence found in Risto J Uusitalo²⁵ et al study where they got it in 0.5% case.

vii) Posterior Capsular Rent:

In the present study this complication was found in 3 (6%) cases in SICS group and in 2 (4%) cases in phaco group. Incidence in SICS group correlate with the 6.22% incidence in P M Gogate⁹ et al study and slightly higher than 4% incidence in Dr A Neekhara²⁸ et al study. In phaco group correlate with the 4.4% incidence in Mc Kellar¹³ et al study and in Tabandeh H¹⁴ et al study. In the SICS group first case of PC rent was due to excessive pressure given during nucleus delivery, in second case it was due to repeated attempts to remove cortical matter in immature cataract and third case was during hydrodissection due to excessive fluid injection. Among the 3 cases, one was associated with slight vitreous prolapse and IOL was placed in the scleral sulcus and in another 2 cases IOL was placed in the bag because rent was small. In the phaco group in all 2 cases PC rent was occurred during emulsification of nuclear fragments by the phaco tip.

Viii) Vitreous Prolapse:

Vitreous prolapse occurred in 1 (2%) case in SICS group and in 2 (4%) cases in phaco group. In SICS group incidence of vitreous loss was lower than the most of the studies and in phaco group it almost correlate with the 3.8% incidence in Tabadeh H¹⁴ et al study. In the SICS group this incident occurred during when pressure was applied to deliver the nucleus through relatively small sclero-corneal tunnel and in phaco group it was occurred due to rupture of posterior capsule by phaco tip during emulsification.

ix) Nucleus Drop:

In the present study no nucleus drop was found in SICS group. (2%) case was found in phaco group. This incidence in phaco group is slightly lower than the Vijay Mathur²⁷ et al study where they got 2.8% cases of nucleus drop and higher than the 1% incidence in Alan L Robin study. This incident in the phaco group occurred as a result of posterior capsular rupture with vitreous prolapse.

x) Detached Descemet's membrane:

Detachment of Descemet's membrane occurred in 1 (2%) case in SICS group and none in the phaco group. This incidence is lower than the 3.9% incidence in P M Gogate et al study. The incident in SICS group in the present study was due to faulty anterior chamber entry by keratome.

xi) Corneal Thermal Burn:

In the present study this complication was noted in 1 (2%) case in phacoemulsification group. This study correlated with the 2% incidence in Dr B K Bala²² et al study and higher than the 0.3% incidence in Dr Anil P Patil¹⁷ et al (2003) study. Thermal burn in the present study was due to inadequate irrigation due to tight wound.

II) Postoperative Complications:

In the present study postoperative complication were noted on 1st postoperative day, 2nd week and 6th week. Complications were compared in between SICS and Phacoemulsification group.

I) Corneal Oedema:

Postoperative corneal oedema was seen on the first day in 12 (24%)

cases in SICS group and 6 (12%) cases in phaco group. Incidence in the SICS group almost correlate with the 25% incidence in R C Nagpal16 et al study and lower than the 35% incidence in H Bayramlar20 et al study & 54% incidence in Ibrahim F Hepsten21 et al study. In phaco group the incidence of present study correlate with the 11.39 % incidence of P Gogate9 et al study and lower than the 28.8% incidence in Alan L Robin8 et al study & 14.3% incidence in Vijay Mathur27 et al study. Except 3 cases, in all the cases corneal oedema was disappeared within 2 weeks with or without treatment. In the phaco group all cases disappeared within 2 weeks. In both SICS and phaco group corneal oedema was mainly due to endothelial injury due to excessive instrumentation.

ii) Iris Prolapse:

In the present study postoperative iris prolapse was noted in 1(2%) case in both SICS and phaco group. Iris prolapse in the SICS group was found on the 1st postoperative day due to wound gapping and was subsequently managed by applying suture. In the phaco group this complication was noted on the 1st postoperative day. Incidence of iris prolapse in phaco group correlated with the Vijay Mathur27 et al study where incidence was 1.4%.

iii) Postoperative Hyphaema:

Postoperative hyphaema was found in 4 (8%) cases in SICS group and in 2 (4%) cases in phaco group. In the present study incidence of postoperative hyphaema is higher than the previous studies. In phaco group incidence is correlated with 4% incidence of A K Shrivastava18 et al study. Postoperative hyphaema was continuation of intraoperative hyphaema, which was subsequently cleared off without any complication.

iv) Residual Cortical Matter:

In the present study residual cortical matter was found postoperatively in 4 (8%) cases in SICS group and in phaco group it was seen in 1 (2%) case. Incidence in SICS group was higher than the previous studies. In phaco group the incidence almost correlated with the 3% incidence of Bernd Schroeder et al study and lower than the incidence in Vijay Mathur et al study. In the present study both in SICS group and phaco group, residual cortex was due to inadequate cortical clean up intraoperatively from subincisional area at 12 O' clock position and most cases were immature cataract. Residual cortical matter was subsequently absorbed with appropriate treatment.

v) Pigment Dispersion:

Pigment dispersion in SICS group was found in 4 (8%) cases on first postoperative day, in 2 cases pigment disappeared within 2 weeks but another 2 cases take 4 weeks time to disappear. In the phaco group this incidence was in 3 (6%) cases of in 1 case pigment disappeared within 1 week but in another 2 cases pigment disappeared after 4 weeks. In both cases pigments were present mainly over anterior surface of IOL. Incidence in SICS group was lower than Joshi R S24 et al study where they got 42% cases of pigment dispersion. In phaco group incidence was higher than the 0.3% incidence in Anil P Patil17 et al study. Pigment dispersion in both the group was due to trauma to iris tissue and pigments were mainly iris pigments.

vi) Pupillary Distortion:

Incidence of this complication in present study was seen in 3(6%) cases in SICS group and in phaco group it was found in 1 (2%) case. Incidence in SICS group was slightly lower than 7.2% incidence in K N Jha6 et al study and in phaco group incidence was slightly lower than 3.3% incidence in Chakraborty A12 et al study. In the present study pupillary distortion was due to residual cortical matter or vitreous in the anterior chamber.

vii) Optic Capture:

Optic capture in the present study was found in 1(2%) case in both SICS and phaco group. In the phaco group incidence was slightly higher than 1.25% incidence in P Gogate et al study and 0.1% incidence of Dr Anil P Patil et al study. In both the group optic capture was due to improper positioning of posterior chamber IOL.

Viii) Malposition of IOL:

This was noted in 2 (4%) cases in SICS group and in 1 (2%) case in phaco group. In the SICS group incidence was higher than the previous study done by Dr P Mishra23 et al and R Venkatesh10 et al study where incidence were 2% and 0.5% respectively. In phaco group incidence was almost correlated with the Bernd Shroeder19 et al study where incidence was 1.3%.

ix) Anterior Uveitis:

Anterior uveitis was noted in 4 (8%) cases in SICS group and 2 (4%) case in phaco group. Incidence in the SICS group was correlated with 7.2% incidence in K N Jha6 et al study and slightly higher than S Chakraborty14 et al study where incidence was 6%. In Phaco group incidence was correlated with Dr B K Bala22 et al study where incidence was 4%. In both the group uveitis was found on the first postoperative day. In SICS group in 2 cases uveitis was mild, sign and symptoms reduced with topical steroids but in another 2 cases uveitis was severe, symptoms slightly reduced with topical and subconjunctival steroids. Among the last 2 cases, in 1 case there was complete posterior synechiae and in 1 case there was secondary glaucoma.

x) Posterior Synechiae:

Posterior synechiae was noted in 3 (6%) cases in SICS group and in 2 (4%) cases in phacoemulsification group. In the SICS group incidence is higher than the K N Jha6 et al study where incidence was 4.3%. In the present study in SICS group 2 cases of posterior synechiae was seen on 6th week postoperatively and 1 case developed at 2nd week. In phaco group 1 case was seen at 2nd week and 1 case at 6th week. Most of the cases were resulted from anterior uveitis.

xi) Posterior Capsular Opacification:

In the present study PCO was noted in 3 (6%) cases in SICS group and 2(4%) cases in phaco group. In the SICS group incidence was slightly higher than the K N Jha6 et al study where incidence was 4.3% and in the phaco group incidence was correlated with Dr B K Bala22 et al study where incidence was 4%. In the present study PCO was noted mostly after 6 weeks. PCO was noted mostly in younger patients (<40 yrs) Patients with central opacity were treated with YAG laser capsulotomy.

xii) Secondary Glaucoma:

Secondary glaucoma was seen in 1 (2%) case in SICS group and none in the phaco group. In the present study increased intraocular pressure was due to total posterior synechiae following anterior uveitis. Incidence was lower than Risto J Uusitalo et al where incidence was 8%. Rise of IOP was treated with topical antiglaucoma drugs and synechiolysis was done to facilitate aqueous out flow from posterior chamber to anterior chamber.

CONCLUSION:

Both manual small incision cataract surgery and phacoemulsification achieved excellent visual outcomes with relatively low complications. SICS is significantly faster, less expensive, and less technologically dependent than phacoemulsification. SICS may be the more appropriate surgical procedure for the treatment of advanced cataracts in the developing world. Phacoemulsification would take the extracapsular cataract surgery technique a gigantic step forward, by providing a more controlled, faster, and safer method of removing the nucleus and leaving behind an intact posterior capsule. The smaller wound size required for phacoemulsification surgery lead to safer surgery and more rapid visual recovery for patients. A more controlled operating environment was enjoyed by the surgeon, reducing intraoperative complications, such as expulsive haemorrhage. The smaller wound size reduces the risk of such postoperative complication as high astigmatism and traumatic wound rupture. Concurrent development of viscoelastic agents and IOL designs and materials allowed ophthalmologists to further realize the advantages of small incision surgery.

Small incision cataract surgery is the procedure of choice in developing country facing huge volumes of cataract patients because of the following advantage:

- i) It yields the excellent visual rehabilitation of pseudophakic vision.
- ii) It provides rapid visual rehabilitation of sutureless surgery and absence of suture-induced complications including astigmatism, irritation, infection, and necessity of removal.
- iii) Surgical time also very less.
- iv) Simple instrumentation is its key advantage over phacoemulsification.
- v) No special training of surgical personal is required.
- vi) This technique is most suitable for mature cataracts often seen in under-served populations.

From the present study following conclusion has been drawn in favor of phacoemulsification:

- i) Incision size is smaller than in small incision cataract surgery.
- ii) Due to small incision and clear corneal incision, there is less surgically induced astigmatism.
- iii) Most of the intraocular complications (such as suprachoroidal or expulsive haemorrhage is less due to more controlled anterior chamber maintenance because of tight sealed wound around the phaco tip.) are less in phaco group.
- iv) Postoperative complications are also less.
- v) Foldable IOL can be safely implanted in the posterior chamber by injector.
- vi) In clear corneal incision scarring is very less and faster healing and early postoperative ambulation.

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