# Comparative study of the complications during small incision cataract surgery and phacoemulsification

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***Abstract—*** *Cataract poses a substantial economic and public health burden and is the leading cause of blindness worldwide. There are many modalities for treatment of cataract. This present study was conducted on 200 cataract cases to compare Small Incision Cataract Surgery (SICS) and Phacoemulsification (Phaco). Hundred cases of cataract were operated by SICS and 100 by Phaco. It can be concluded from this study that both intra-operative and postoperative complications were lesser in Phaco than SICS but there no significant difference in distribution of type of complications in both the groups. Among complications, the intra-operative most common complications in SICS was sutures at tunnel site in 19% of cases followed by premature entry in 11%, iris prolapse in 7%, incomplete capsulorrhexis in 5, need of enlargement of tunnel in 5%, Descemet's membrane detachment in 4% cases, posterior capsule tear in 2%, hyphema, zonular dialysis & vitreous loss in 1% of cases in each category. Surgery was prolonged in 29% of cases. Whereas in phaco the most common complications was needed enlargement of tunnel in 4% of cases followed by premature entry in 3%, capsulorrhexis in 2%, DM detachment & iris prolapse each in 1%. Conversion to SICS was 2% and in 7% of cases sutures were applied at tunnel site and surgery took long time in 7 cases. In phaco group only two type of postopeartive complication i.e. corneal oedema and previously undiagnosed ARMD was found whereas in SICS group eight postoperative complications were found.*

***Keywords: Intraoperative Complications, Small Incision Cataract Surgery (SICS), Phacoemulsification (Phaco).***

## I. INTRODUCTION

Cataract is clouding of the natural lens, one of the parts of the eye responsible for focusing light and producing clear sharp images.

Cataract poses a substantial economic and public health burden and is the leading cause of blindness worldwide, accounting for nearly 48% of all blindness.[1]

The World Health Organization estimates the current global prevalence of blindness is 0.57% (range 0.2%-1%), with more than 82% of all blindness occurring in individual aged 50 and older. Cataract accounts for 47.8% of the world's roughly 37 million blind individual[2] of note approximately 90% of the contribution in this study was seen in developing countries.

The only cure for cataract is removal. The art of cataract extraction has been known to our ancient forefathers at the beginning of civilization. Sushruta (1000 BC), early Egyptian, Greeks and Romans practiced this art in the form of either reclination, depression or 'couching', as it has been called.

Dr. Gerald T. Keener introduced the technique of phaco-fracture with a wire loop in 1983. He designed a nuclear snare using an 18-19 gauge blunt tipped needle and a 32 gauge stainless steel wire. Cataract surgery has undergone significant changes beginning with the abandonment of intracapsular surgery and continuing with the advent of IOL and continuing' variation in extra-capsular lens removal. Extra-capsular cataract surgery employing a 10 mm incision at the limbus and requiring wound closure with sutures is considered a "fall back" technique that is easier to perform but has limitations.

Phacoemulsification is used by most surgeons in developed countries and enables the most elegant surgery but at a high cost.

This study is to compare the Intraoperative Complications in Small Incision Cataract Surgery and Phacoemulsification.

## II. METHODOLOGY

This prospective study was conducted on 200 cataract cases at department of Opthalmology, RNT Medical College and MBGH, Udaipur from 1st June 2007 to 31st May 2008.

Patients 40 years or less suffering from senile cataract admitted in Ophthalmology ward were included in this study. Patients having other eye and or systemic disease were excluded from the study. Patient having traumatic cataract, congenital cataract or lens induced glaucoma were also excluded from study.

After obtaining detailed history meticulous clinical examination both systemic and ocular were carried out. Especially history of allergy to Sulpha drugs, broncho-pulmonary disease, cardiac disease and DM was taken. Clinical examination was taken to rule out preexisting glaucoma, veitis and trauma to eye.

Thorough clinical examinations of both eyes were done. Patients were prescribed e/d Ofloxacin 0.3% and e/d prednisolone acetate 1% every 2 hrly for 1" 7 days and then tapered till 45 days. Keratometry was done pre-operative, 1 week after discharge and at time of giving refractive correction.

Patients were divided in two group via chit box method. After that procedures were done in respective groups i.e. in one group cataract surgery with small incision and in other group Phacoemulsification. After that these cases were followed to observe for any complication. Complication rate of both group was compared and type of complications in both groups were compared.

**Statistical analysis**: Categorical data was expressed as proportion and difference in proportion was analyzed using Chi square test. Statistical significance was kept at $p<0.05$.

## III. RESULTS

This study was conducted on 200 cataract cases, out of that in 100 small incision cataract surgery was done and in other 100 phacoemulsification was done.

Maximum number of patients in SICS group belonged to the age group 60-70 years while in phaco it was in 50-60 years age group. The number of males in SICS were 51% and 55% in phaco and number of females in SICS were 49% and 45% in phaco group. Maximum number of cases in SICS and phaco had BM]I within normal range (20-25 kg/rn2). In SICS rural patients were 28% and in phaco 21% while

urban patients were 72% and 79% respectively. Among 100 patients who underwent SICS 55 patients had DM and HTN while in phaco among 100 patients, 25 had these systemic diseases. Only 7 patients in SICS and 3 in phaco had pseudoexfoliation. Both groups were comparable in age, sex, and residence. These groups were also comparable to have other diseases. (Table 1)

**Table 1**
**Comparison of characteristics of SICS and Phaco group**

| Characteristics | | SICS group (N=100) | Phaco group (N=100) | *P Value |
|---|---|---|---|---|
| **Age (in years)** | **40-50** | 12 | 17 | p=0.060 NS |
| | **50-60** | 25 | 40 | |
| | **60-70** | 40 | 28 | |
| | **70-80** | 15 | 12 | |
| | **>80** | 8 | 3 | |
| **Sex** | **Male** | 51 | 55 | p=0.671 NS |
| | **Female** | 49 | 45 | |
| **BMI (kg/M2)** | **<20** | 9 | 0 | p=0.002 S |
| | **20-25** | 78 | 96 | |
| | **25-29.9** | 12 | 4 | |
| | **30 and above** | 1 | 0 | |
| **Economics status** | **Lower Class** | 35 | 11 | p<0.001 S |
| | **Middle Class** | 34 | 37 | |
| | **Upper Class** | 41 | 52 | |
| **Educational status** | **Illiterate** | 38 | 29 | p=0.231 NS |
| | **Literate** | 62 | 71 | |
| **Residence** | **Rural** | 28 | 21 | p=0.324 NS |
| | **Urban** | 72 | 79 | |
| **Systemic disease** | **Only DM** | 20 | 15 | p=0.649 NS |
| | **Only HTN** | 23 | 12 | |
| | **Both above** | 12 | 10 | |
| **Pseudoexfoliation** | **Present** | 7 | 3 | p=0.330 NS |
| | **Absent** | 93 | 97 | |

***Chi square Test***

The intra-operative complications in SICS were, premature entry in 11 cases, Descemet's membrane detachment in 4 cases, hyphema in 1 case, incomplete capsulorrhexis in 5 cases, iris prolapse in 7 cases, zonular dialysis in 1 case, posterior capsule tear in 2 cases, vitreous loss in 1 case, need of enlargement of tunnel in 5 cases and sutures at tunnel site in 19 cases. Surgery was prolonged in 29 cases.

Whereas in phaco the complications were premature entry in 3 cases, DM detachment in 1 case, capsulorrhexis in 2 cases, iris prolapse in 1 case. 4 cases needed enlargement of tunnel and 2 cases were converted into SICS. In 7 cases sutures were applied at tunnel site and surgery took long time in 7 cases. Although complications were more in SICS group than phaco group but the distribution of type of intra-operative complications was without significant difference. (Table 2)

**Table 2**
**Comparison of Intra-operative complications in both groups**

| S. No. | Type of Intra-operative complications | SICS group (N=100) | Phaco group (N=100) |
|---|---|---|---|
| 1 | Premature entry | 11 | 3 |
| 2 | Descemet membrane detachment | 4 | 1 |
| 3 | Hyphaema | 1 | 0 |
| 4 | Incomplete capsulorrhexis | 5 | 2 |
| 5 | Iris prolapse | 7 | 1 |
| 6 | Zonular dialysis | 1 | 0 |
| 7 | PC Rent | 2 | 0 |
| 8 | Vitreous loss | 1 | 0 |
| 9 | Enlargement of tunnel | 5 | 4 |
| 10 | Conversion to ECCE/SICS | 0 | 2 |
| 11 | Sutures at tunnel site | 19 | 7 |
| 12 | Prolonged surgery | 29 | 7 |

***Note: No case of** IOL related complication and wound site thermal injury in any of group*
***Chi-square = 11.226 with 11 degrees of freedom; P = 0.427 LS= Not Significant***

When postoperative complications were observed it was found that in SICS groups complications were more that phaco group. In phaco group only two type of complication i.e. corneal oedema and previously undiagnosed ARMD was found whereas in SICS group eight postoperative complications were found. In SICS group, 10% had corneal oedema followed by pupillary peaking etc. However this distribution of type of complications was not found significant. (Table 3)

**Table 3**
**Comparison of Post-operative complications in both groups**

| S. No. | Type of Post-operative complications | SICS group (N=100) | Phaco group (N=100) |
|---|---|---|---|
| 1 | Corneal oedema | 10 | 2 |
| 2 | Hyphaema | 1 | 0 |
| 3 | Aq. cells flare/Iritis | 1 | 0 |
| 4 | Aq. cells flare/Iritis | 1 | 0 |
| 5 | Pupillary peaking | 3 | 0 |
| 6 | Vitreous in AC | 1 | 0 |
| 7 | IOL decentration | 2 | 0 |
| 8 | Previously undiagnosed ARMD | 3 | 2 |

***Note:** No case of Iris prolapse, CME and Endophthalmitis in any of group*
***Chi-square = 3.979 with 7 degrees of freedom; P = 0.873 LS= Not Significant***

## IV. DISCUSSION

In the present was conducted on 200 cataract cases, out of that SICS was done on 100 cases whereas Phaco was done on another 100 cases. Both groups were comparable.

Observations of this present study were compared with findings of other studies in table no. 4&5. Comparison of Observations of Intra-operative and postoperative complications with SICS is as follows:-

**Table 4**

**Comparison of Observations of Intra-operative and postoperative complications with SICS**

| S. No. | Type of Intra-operative complications | Present Study N=100 | Mishra P. (2002)[3] 970 cases | Venkatesh Rangraj (2005)[4] 100 cases | Lt Cot Tha KN (2006)[5] 169 cases | P Mishra et al. (2006)[6] 200 cases |
|---|---|---|---|---|---|---|
| 1 | Enlargement of Tunnel | 5% | - | - | - | - |
| 2 | DM Detachment | 4 | - | - | - | - |
| 3 | Premature entry | 11 | - | - | - | - |
| 4 | Buttonholing | - | - | - | - | - |
| 5 | Iris prolapse | 7 | - | - | - | - |
| 6 | Incomplete Rrhexis | 5 | - | - | - | - |
| 7 | Hyphema | 1 | 0.4% | - | - | 1% |
| 8 | PC rent | 2% | 1.23% | - | - | 2% |
| 9 | Zonule dialysis | - | - | - | - | - |
| 10 | Vitreous | 1% | 0.8% | - | - | 2% |
| 11 | IOL decentration | 1% | 0.8% | - | - | 0.5% |
| | **Type of Postoperative complications** | | | | | |
| 1 | Corneal edema | 10% | 4.12% | - | 13% | 3% |
| 2 | Corneal decompensation | - | 0.61% | - | - | 2% |
| 3 | Iritis | 1% | 8.24% | - | 6% | - |
| 4 | Iridodialysis | 1% | 0.2% | - | 1% | 1% |
| 5 | Hyphema | 1% | - | - | - | 1% |
| 6 | Iris prolapse | 7% | - | - | - | - |
| 7 | Vitreous in A/C | 1% | - | - | - | - |
| 8 | Endophthalmitis | - | 0.1% | - | - | - |
| 9 | CME | - | - | - | 0.1% | - |
| 10 | Rate of conversion to ECCE | - | - | - | - | - |
| 11 | Early PCO | - | 8.45% | - | - | - |
| 12 | Others | Undiagnosed ARMD3% | - | - | - | - |

Comparison of Observations of Intra-operative and postoperative complications with Phaco is as follows:-

**Table 5**

**Comparison of Observations of Intra-operative and postoperative complications with Phaco**

| S. No. | Type of Intra-operative complications | Present Study N=100 | P.K. Malik (2002)[7] 750 cases | M Muhtased (2004)[8] 1441 cases | Sheena et al (2004)[9] 165 cases | Tohian Gogi et al (2004)[10] 1000 cases | Maj. Vijay Mathur (2004)[11] 100 cases |
|---|---|---|---|---|---|---|---|
| 1 | Enlargement of Tunnel | 4% | - | - | - | - | - |
| 2 | Difficulty in doing rhexis | 2% | - | - | - | - | - |
| 3 | Descemet's membrane detachment | 1% | - | - | - | - | - |
| 4 | Iris prolapse | 1% | - | - | - | - | - |
| 5 | Nucleus drop | - | - | 0.17% | - | 0.8% | 2.8% |
| 6 | PC rent | 0 | - | 1.55% | - | 2.1% | 11.4% |
| 7 | Vitreous loss | - | - | 1.04% | - | 1.6% | 11.4% |
| 8 | IOL related | - | - | - | - | - | |
| | **Type of Postoperative complications** | | | | | | |
| 1 | Corneal edema | 2 | - | - | - | 0.24% | 14.3% |
| 2 | Corneal decompensation | - | - | - | 4.7% | - | - |
| 3 | Iris prolapse | - | 0.5% | - | 0.6% | - | 5.6% |
| 4 | Unplanned ECCE | - | 0.3% | - | - | - | - |
| 5 | CME | -. | - | - | 0% | - | 1% |
| 6 | Others undiagnosed ARMD | 2% | - | - | Early PCO 0% central and 0.12% Mid Peripheral | - | - |
| 7 | Conversion to SICS | 2 | - | - | - | - | - |

## V. CONCLUSION

It can be concluded from this study that both intra-operative and postoperative complications were lesser in Phaco than SICS but there no significant difference in distribution of type of complications in both the groups.

The intraoperative most common complications in SICS was sutures at tunnel site in 19% of cases followed by premature entry in 11%, iris prolapse in 7%, incomplete capsulorrhexis in 5, need of enlargement of tunnel in 5%, Descemet's membrane detachment in 4% cases, posterior capsule tear in 2%, hyphema, zonular dialysis & vitreous loss in 1% of cases in each category. Surgery was prolonged in 29% of cases. Whereas in phaco the most common complications was needed enlargement of tunnel in 4% of cases followed by premature entry in 3%, capsulorrhexis in 2%, DM detachment & iris prolapse each in 1%. Conversion to SICS was 2% and in 7% of cases sutures were applied at tunnel site and surgery took long time in 7 cases. In phaco group only two type of postopeartive complication i.e. corneal oedema and previously undiagnosed ARMD was found whereas in SICS group eight postoperative complications were found.

## CONFLICT OF INTEREST

None declared till now.

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