



Clinical comparative study of Small Incision Cataract Surgery and Phacoemulsification.

KEYWORDS

Phacoemulsification; Manual small incision cataract surgery; net astigmatism; surgically induced astigmatism; best corrected visual acuity.

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ABSTRACT *Background: Cataract is a major cause of avoidable blindness in the developing countries, the key to success of Global Vision 2020: the right to sight initiative is a special effort to tackle cataract blindness. Cataract surgery has been viewed as one of the most cost-effective public health interventions.*

Aims and Objectives: This study was undertaken to evaluate SICS as a substitute to Phacoemulsification by comparing clinical parameters namely astigmatism, visual acuity and post-operative complications.

Materials and Methods: A cross sectional study which included 30 cases of superior straight incision of SICS, and 30 cases of phacoemulsification with 6.00mm rigid PCIOL Implantation. Period of study was from September 2014 to September 2015 who attended OPD at Katuri medical college & hospital.

Results: Mean Pre-operative Astigmatism in both SICS group and Phacoemulsification group is 0.68D, and Mean Post-operative Astigmatism in SICS group and Phacoemulsification group is 1.68D and 1.65D respectively. Statistically significant post-operative shift to ATR Astigmatism in 86.70% and 76.70% both in SICS and Phacoemulsification group respectively. Mean SIA in SICS group and Phacoemulsification group is 1.17D and 1.10D respectively.

Conclusion: The high cost, steep learning curve associated with of the phacoemulsification equipment, MSICS looks to have an advantage over phacoemulsification with a huge back log of cataract cases in a developing country like INDIA..

Introduction

The World health Report estimates that approximately 20 million people are bilaterally blind (less than 3/60 in the better eye) from age related cataract. However there are at least 100 million eyes with cataract causing a visual acuity less than 6/60 and this number is increasing due to population growth and increasing life expectancy^[1]. Some 90% of the blindness in the world occurs in developing countries^[11].

Since Cataract is a major cause of avoidable blindness in the developing countries, the key to success of Global Vision 2020: the right to sight initiative is a special effort to tackle cataract blindness^[9]. Cataract surgery has been viewed as one of the most cost-effective public health interventions Worldwide 10 million cataract surgery are done each year, but there is a need to do at least 30 million per year for the indefinite future^[1].

The only treatment option for cataract is the surgical removal of opaque lens and implantation of an artificial lens. The state-of-the-art technique is PHACOEMULSIFICATION with the insertion of foldable intraocular lens (IOL) through a self-sealing incision. The cost considerations and the steep learning curve associated with the phacoemulsification procedure make it an unsuitable procedure for high-volume surgery needed in developing countries. However, the Manual small incision cataract surgery (MSICS) is the surgery of choice in such circumstances^[14].

Materials and Methods

A total of 60 patients, admitted in Katuri Medical College

and Hospital, as inpatients during the period from September 2014 to September 2015 for cataract surgery were followed up for 6 weeks after surgery. They were divided into two groups based on the type of surgical procedure opted by the patients. Group A consisted of 30 patients who underwent Manual Small Incision Cataract Surgery with rigid Polymethyl Methacrylate IOL implantation and Group B consisted of 30 patients who underwent Phacoemulsification with foldable intraocular lens (IOL) implantation.

Visual acuity was assessed with Snellen's chart in all the 60 patients preoperatively and at regular intervals postoperatively. Detailed evaluation of anterior segment was done slit lamp biomicroscope. Intraocular pressure in both eyes was assessed by Goldman Applanation Tonometer. Power of the IOL (in diopters) was calculated by biometry (A-Scan). Keratometry readings were recorded by Bausch and Lomb Keratometer. Statistical analysis was done with ANOVA.

Inclusion criteria:

All the cataract patients of age more than 50 years with normal fundus and intraocular pressure were included in the study.

Exclusion criteria:

Patients with altered corneal topography, with macular or optic nerve diseases, Uveitis and with an eye disease other than cataract.

Results

Out of the 60 cases 34 patients were female and 26 were

male. Regarding the age group, 29 patients were aged between 51-60 years, 25 patients were aged between 61-70years and 6 patients were aged above 70 years.

Table 1: Comparison of 1st week post-operative vision in SICS and Phacoemulsification groups .

1 week vision	SICS	%	Phacoemulsification	%	Total
6/36.	4	13.33	1	3.33	5
6/24.	7	23.33	4	13.33	11
6/18.	14	46.67	9	30.00	23
6/12.	4	13.33	13	43.33	17
6/9.	0	0.00	3	10.00	3
CF1M	1	3.33	0	0.00	1
Total	30	100.00	30	100.00	60

Chi-square=9.0991 P = 0.0112*

1st week postoperative vision in SICS group showed that 4 patients(13.33%),1 patient (3.33%) had BCVA of 6/36 ,7 patients (23.33%) and 4 patients (13.33%) had 6/24 ,14 patients (46.67%) and 9(30.00%) patients had 6/18, 4 patients (13.33%) and 13 patients (43.33%) had 6/12, 0 patients and 3 patients (10.00%) in SICS and Phacoemulsification respectively , 1 patient had CF-1M vision due to intra-op complication in SICS group

Table 2: Comparison of 6th week post-operative vision in SICS and Phacoemulsification groups .

Phacoemulsification 6 week vision	SICS	%	Phacoemulsification	%	Total
6/36.	0	0.00	0	0.00	0
6/24.	0	0.00	0	0.00	0
6/18.	0	0.00	0	0.00	0
6/12.	12	40.00	4	13.33	16
6/9.	17	56.67	24	80.00	41
6/6.	0	0.00	2	6.67	2
CF1M	1	3.33	0	0.00	1
Total	30	100.00	30	100.00	60

Chi-square=5.5281 P = 0.0623

In this study, at the end of 6 weeks post -operative BCVA showed 6/12 vision in 12 patients (40.00%),and 4 patients (13.33%), 6/9 vision in 17 patients (56.67%) and 24 patients (80.00%), in SICS and phacoemulsification group respectively . 1 patient in SICS group had CF-1M vision due to posterior capsular rent as an intra - operative complication. 2 patients (6.67%) in phacoemulsification group had 6/6 vision.

Table 3: Comparison of SIA in SICS and Phacoemulsification groups.

SIA	SICS	%	Phacoemulsification	%	Total
0 – 0.5D	4	13.33	5	16.67	9
0.75-1.0D	11	36.67	9	30.00	20
1.25-1.5D	7	23.33	12	40.00	19
1.75-2.0D	8	26.67	4	13.33	12
2.25-2.5D	0	0.00	0	0.00	0
>2.5D	0	0.00	0	0.00	0
Total	30	100.00	30	100.00	60

Chi-square= 2.9604 P = 0.3983

SIA in SICS group , 4 patients (13.33%) had 0.5D of Astigmatism , 11 patients 36.67%) had 0.75D – 1.00 D ,7 patients (23.33%) had 1.25D- 1.50D of Astigmatism and 8 patients (26.67%) had 1.75D – 2.00D of astigmatism respectively. None of the patients had more than 2.00D of Astigmatism. SIA in Phacoemulsification group 5 patients (16.67%) patients had 0.5D of Astigmatism (86.67%) , 9 patients(30.00%) had 0.75D – 1.00 D (13.33%),12patients(40.00%) had 1.25D- 1.50D of Astigmatism, and 4 patients (13.33%) had 1.75D – 2.00D of astigmatism respectively. None of the patients had more than 2.00D of Astigmatism. Mean SIA in SICS group and Phacoemulsification group is 1.17D and 1.10D respectively.

Table 4: Comparison of SICS and Phacoemulsification groups with early post-operative complications .

Early post-operative complications	SICS	%	Phacoemulsification	%	Total
CE	3	10.00	5	16.67	8
SK	2	6.67	2	6.67	4
POAU	4	13.33	2	6.67	6

Chi-square = 1.1672 P = 0.5581

In this study , 3 patients(10.00%) and 5 patients (16.67%) had CE, 2 patient (6.67%) and patients (6.67%) had SK ,4 patients (13.33%) and 4 patients(13.33%) 2 patients (6.67%) had POAU as early post- operative complication in SICS and phacoemulsification group respectively. 1 patient had Persistent corneal edema as Late Post-operative complication.

Discussion

Our study compared the visual outcomes, surgically induced astigmatism and complications of Phacoemulsification and of Small Incision Cataract Surgery (SICS).

Gogate et al^[2] compared the efficacy, safety, and astigmatic change after cataract surgery by phacoemulsification and MSICS. The intraoperative and postoperative complications, UCVA, BCVA, and astigmatism were recorded at 1 and 6 weeks postoperatively. They found that 68.2% patients in the phacoemulsification group and 61.25% patients in the SICS group had UCVA better than or equal to 6/18 at 1 week. At 6 weeks follow up, 81.08% patients in the phacoemulsification group and 71.1% patients in the SICS group had UCVA of better than or equal to 6/18. They concluded that both phacoemulsification and SICS are safe and effective for visual rehabilitation of cataract patients, although phacoemulsification gives better UCVA in a larger proportion of patients at 6 weeks.

In a study conducted by Rohit Khanna et al^{[3],[22]} ,Comparative outcomes of manual small incision cataract surgery and phacoemulsification performed by ophthalmology trainees in a tertiary eye care hospital in India: a retrospective cohort design A total of 1029 surgeries were performed by 22 resident surgeons. In all, 522 (50.7%) were done using MSICS technique and 507 (49.2%) were done by phacoemulsification. Postoperatively, the number of patients having BCVA≥6/12 was similar in both the groups (84.3% vs 88%; p=0.09). The complication rates were higher in MSICS group (15.1% vs 7.1%, p<0.001). Conclusion of the study was although the complication rate was higher in the MSICS group, there was no difference in BCVA in both the groups. Our study is in correlation with the above study. 83.00% patients in the phacoemulsification group and 56.67% patients in the SICS group had better

than or equal to 6/18 at 1 week. At 6 weeks follow up, >90.00% patients in the phacoemulsification group as well in the SICS group had BCVA of better than or equal to 6/18.

Gokhale Nikhil and SaurabhSawhney^{[4],[17]} compared the astigmatism induced by superior, superotemporal and temporal incision in manual small incision cataract surgery and found that mean postoperative astigmatism at three months follow up for the superior incision group was 1.45±0.94 ATR and mean surgically induced astigmatism was 1.36±1.03D ATR. The results were comparable to this study.

George et al^{[5],[19]} compared Surgically Induced Astigmatism (SIA) following MSICS and phacoemulsification (PE) in 186 eyes with nuclear sclerosis of grade 3 or less. Mean SIA was 1.17D (0.95D) in the SICS group and 0.77D (0.65D) in the PE group ($P = 0.001$). PE induced less astigmatism than SICS(5) In our study Mean SIA was 1.069D (0.95D) in the SICS group and 0.758D (0.65D) in the PE group .PE induced less astigmatism than SICS.

George R et al^{[6],[21]} compared the surgically induced astigmatism (SIA) and endothelial cell loss following conventional extracapsular cataract surgery (ECCE), manual small-incision cataract surgery and phacoemulsification (PE) with non- foldable intraocular lens implantation. Mean SIA was 1.77D (1.61D) for the ECCE group, 1.17D (0.95D) for the SICS group and 0.77D (0.65D) for the phacoemulsification group at the end of 6 weeks. The results were comparable to this study. In our study Mean SIA was 1.17D in the SICS group and 1.10D in the Phacoemulsification group respectively at the end 6weeks .

A study done by Venkatesh et al^[7] shown that there was a less prevalence (10.2 %) of corneal edema on the first post operative day in the MSICS group when compared to the phacoemulsification group (18.7 %). Henning et al, in Nepal, complications included 47 (9.4 %) eyes with hyphaema, and (0.2 %) with posterior capsule rupture. 10.0 In this study , 3 patients(10.00%) and 5 patients (16.67%) had CE, 2 patient (6.67%) and patients (6.67%) had SK ,4 patients (13.33%) and 4 patients(13.33%) 2 patients (6.67%) had POAU as early post- operative complication in SICS and phacoemulsification group respectively. 1 patient had Persistent corneal edema as Late Post-operative complication

Limitations of our study:

- (1) a short postoperative follow up period (6 weeks).
- (2) small sample size.
- (3) endothelial cell counts were not recorded.

Conclusion

- 1) When the patient was operated by Phacoemulsification or MSICS with implantation of 6.0mm PMMA IOL, via a 6.0mm incision size there is no statistically significant difference in SIA between two groups.
- (2) No statistically significant difference in Post- operative BCVA in both SICS and Phacoemulsification with implantation of 6.00mm PMMA IOL via 6.00mm incision
- (3) MSICS looks to have an advantage over phacoemulsification, with a huge back log of cataract cases in a developing country like INDIA.

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