Scholars Journal of Applied Medical Sciences (SJAMS)
Abbreviated Key Title: Sch. J. App. Med. Sci.
ISSN 2320-6691 (Online)
ISSN 2347-954X (Print)

A Unit of Scholars Academic and Scientific Society, India
www.saspublishers.com

Ophthalmology

A Clinical Study on Manual Small Incision Cataract Surgery in a Tertiary Care Hospital

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Original Research Article

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Article History
Received: 01.10.2018
Accepted: 14.10.2018
Published: 30.10.2018

DOI:
10.36347/sjams.2018.v06i10.049

Abstract: Present study was conducted among 300 cataract patients of both the genders between 40-89 years to evaluate the visual outcome and complications' following manual small incision cataract surgery (MSICS). Demographic pattern of the study population with distribution of cataract was also assessed. After obtaining informed consent, patients were enrolled for study. After assessing the visual acuity and on finding the routine ocular examinations and investigations for cataract surgery to be normal, patients were admitted. After keratometry and biometry, and with preoperative measures, SICS was performed. Intraoperative complications were recorded at the end of surgery. The visual acuity and post-operative complications are evaluated on first post-operative day, at 2 weeks and at 6 weeks follow up period. Pre and post-operative corneal astigmatisms were recorded. Male patients were slightly more than females and cortical cataracts were maximally prevalent. Preoperative visual acuity ranged from perception of light to 6/24 whereas best corrected post-operative vision of 6/6 was attained in 90% patients. Astigmatism against the rule prevailed more both in pre and postoperative status of operated eyes. Both operative and postoperative complications were minimal and visual recovery was fast and excellent. MSICS is simple and is widely practised all over world particularly in developing nations to eliminate cataract blindness on mass scale.
Keywords: Small incision cataract surgery, Cataract blindness, Visual acuity, corneal astigmatism, Keratometry, Biometry, operative complications.

INTRODUCTION

Cataract is the leading cause of avoidable blindness worldwide, accounting for nearly half (47.8%) of all cases of blindness worldwide. According to world health organization (WHO), an estimated 20millon people worldwide are blind from bilateral cataracts and poses one of the greatest public health challenges for 21st century. In a review on cataract surgery in the developing countries, it was found that cataract accounts for almost 75% of cases of avoidable blindness [1]. In India, Cataract has been reported to be responsible for 50-80% of bilaterally blind people in the country [2]. To overcome the burden of cataract blindness, there must be sufficient coverage and good surgical outcomes [3] viz safety, early visual rehabilitation and post-operative emmetropa [4].

Small incision cataract surgery (SICS) was developed in US and Israel and later popularized in India. As it was found to be safer, more effective and cheaper than extra capsular cataract surgery (ECCE) it became popular in India and forms the major proportion of the cataract surgeries done in South Asia [5]. Although both Phaco and SICS achieve excellent visual outcomes with low complication rates, SICS is less expensive and requires less technology, hence preferred many surgeons in developing countries [6].

PURPOSE OF THE STUDY

The present study was undertaken to evaluate the visual outcome of manual small incision cataract surgery and also to detect the common complications encountered during and of after surgery. We also aimed to determine the demographic pattern of cataracts population and the distribution of various types of cataract.

MATERIALS AND METHODS

The present study comprised of 300 cataract patients who attended the outpatient department of Regional Institute of Ophthalmology, Gauhati Medical College. Patients with senile cataract above the age of 40 years belonging to both genders were included in the

study. Cataract with other ocular diseases and traumatic cataract were excluded from this study.

After recording the preoperative visual acuity of cataract patients, all routine investigations for cataract surgery were performed including assessment of blood pressure (BP), intraocular pressure (IOP) and testing the patency of nasolacrimal duct. On finding all investigations and assessment to be normal, they were admitted in the Eye Ward. Keratometry and Biometry were done to calculate the intraocular lens (IOL) power to be implanted. Keratometry was also performed to evaluate the preoperative astigmatism.

All preoperative measures were taken with strict asepsis. The selected eye with cataract in each patient was operated under local anaesthesia (peribulbar block) adapting manual small incision cataract surgery (MSICS). Pad and bandage was applied after surgery. During the surgery, intraoperative complications were noted and recorded and also managed at the same time.

On the first postoperative day, after dressing of the operated eyes, visual acuity was assessed and we also looked for any post-operative complication Patients were then discharged with advice on the same day except those with post-operative complication. They came for first post-operative check-up after 2 weeks. During this visit, visual acuity was recorded and examined for any complication. After 6 weeks, they again came for follow-up. This time visual acuity and postoperative corneal astigmatism was measured with searching for any delayed postoperative complication. All postoperative complications were managed accordingly. Finally all patients were subjected to autorefractometry and required spectacles were prescribed with recording of Best Corrected Visual Acuity (BCVA).

RESULTS AND OBSERVATIONS

The study population consisted of 300 cases of cataract patients between 40-89 years of age. The results obtained and calculated are shown in tables and figures below:-

Gender distribution

Out of 300 cases, male consisted of 56% and female consisted of 44% having higher incidence of male than females.

Table-1: Gender Distribution

Gender	Number of cases	Percentage (%)
Male	168	56%
Female	132	44%
Total	300	100%

Age distribution

The table below shows that maximum number of patients (32.00%) belonged to the age group of 60-69 years and minimum number of patients (3.33%) was in the age group of 80-89 years.

Type of cataract

Highest number of cataract were cortical cataract (48%) followed by nuclear cataract (28%) and total cataract (24%) (Table-3).

Table-2: Age distribution

Age group (years)	Number of cases	Percentage (%)
40-49	56	18.67
50-59	80	26.67
60-69	96	32.00
70-79	58	19.33
80-89	10	3.33
Total	300	100

Table-3: Type of cataract

Type	Number of cases	Percentage (%)
Nuclear	84	28%
Cortical	144	48%
Total cataract	72	24%
Total	300	100%

Preoperative Visual Acuity

Maximum number of patients had visual acuity of hand movement (30%) in the operating eye before surgery and least number of patients (4.67%) had 6/24 vision.

Table-4: Preoperative vision

Vision	Number of cases	Percentage (%)
Perception of Light (PL)	30	10%
Hand Movement (HM)	90	30%
Finger counting (FC) at < 3metrs	66	22%
Finger counting acuity (FC) at 3 meters to 6/60	70	23.33%
6/36	30	10%
6/24	14	4.67%

Uncorrected postoperative visual acuity

The above table shows that 16.67% of patients had uncorrected visual acuity of 6/6 (maximum vision) at 6 week after surgery whereas 1.33% had less than 6/18 uncorrected vision (minimum vision) at that time

Table-5: uncorrected vision

Visual acuity	Number of cases					
	On 1st post-operative day		At 2 weeks after surgery		At 6 weeks after surgery	
	Number	%	Number	%	Number	%
6/6	24	8	40	13.33	50	16.67
6/9	150	50	160	53.33	172	57.33
6/12	90	30	77	25.67	60	20
6/18	26	8.67	18	6	14	4.67
<6/18	10	3.33	5	1.67	4	1.33
Total	300	100	300	100	300	100

Best corrected visual acuity (BCVA)

After refraction being done, 90% of the patients achieved 6/6 vision (BCVA) whereas any 0.67% (2 cases) had vision less than 6/18 at the end of 6 weeks.

Preoperative keratometric readings and corneal astigmatism

The table no 7 shows that the range of astigmatism was 0.50 D (Astigmatism against the rule = ATR) before surgery.

In the present series, the astigmatism against the rule (ATR) was in 46.67% cases, with rule (WTR) was 35.33% and 18% had no astigmatism (Table-8).

Table-6: Corrected visual acuity

Visual acuity	Number of cases	Percentage (%)
6/6	270	90%
6/9	20	6.67%
6/12	4	1.33%
6/18	4	1.33%
<6/18	2	0.67%

Table-7: Keratometric readings

	Vertical		Horizontal	
	Range	Average	Range	Average
Dioptre (D)	41.50 -47.50	44.50	42.00-48.00	45.00

Table-8: Preoperative corneal astigmatism

Type of astigmatism	Number of cases	Percentage (%)
Zero	54	18%
With the rule (WTR)	106	35.33%
Against the rule (ATR)	140	46.67%
Total	300	100%

Postoperative keratometric readings and corneal astigmatism

It can be seen from above table that the range of post-operative astigmatism was 1.50 D (ATR) (Table-9).

Our study shows that in the postoperative period the astigmatism against the rule (ATR) accounted for 60.67% followed by 29.33% astigmatism with the rule (WTR) and 10% had no astigmatism (Table-10).

Intraoperative complications

Table 11 presents the different intraoperative complications encountered during our study in detail.

Postoperative complications

All the postoperative complications detected during our present study are displayed in table 12.

Table-9: Keratometric readings

	Vertical		Horizontal	
	Range	Average	Range	Average
Dioptre (D)	41.00-47.00	44.00	43.00-4800	45.50

Table-10: Postoperative corneal astigmatism

Type of astigmatism	No of cases	Percentage (%)
Zero	30	10%
With the rule (WTR)	88	29.33%
Against the rule (ATR)	182	60.67%
Total	300	100%

Table-11: Intraoperative complication

Intra operative complications	Number of cases	Percentage (%)
1. Button hole of scleral tunnel roof	0	0.00
2. Premature entry	1	0.33
3. Intra operative Hard Eye	1	0.33
4. Iris prolapse	1	0.33
5. Descemet's membrane detachment	2	0.66
6. Posterior capsule rupture	3	1.00
7. Vitreous loss	1	0.33
8. Hyphaema	3	1.00
9. Nucleus drop	0	0.00
10. Miosis	9	3.00
11. Iridodialysis	2	0.66
12. Expulsive Haemorrhage	0	000

Table-12: Postoperative Complications

Post-Operative complications	Number of cases	Percentage (%)
1. Striate Keratopathy	14	4.67
2. Uveitis	16	5.33
3. Hyphaema	5	1.67
4. Retained cortical matter	2	0.67
5. Raised IOP (Intra ocular pressure)	2	0.67
6. IOL (intraocular lens) related complication	1	0.33
7. Wound leak	0	0.00
8. Iris prolapse	0	0.00
9. Posterior capsular opacification (PCO)	0	0.00
10. Band shaped keratopathy	0	0.00
11. Endophthalmitis	0	0.00
12. Vitreous Haemorrhage	0	0.00
13. Cystoid macular oedema	0	0.00
14. Retinal detachment	0	0.00

Photographs showing some postoperative

Complications encountered during our study

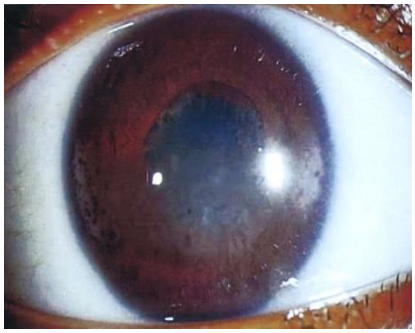

Photo-1: Striate Keratopathy

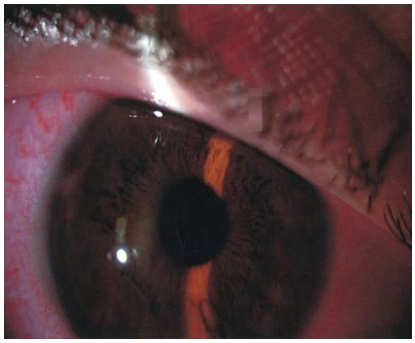

Photo-2: Anterior Uveitis

Photo-3: Hyphaema

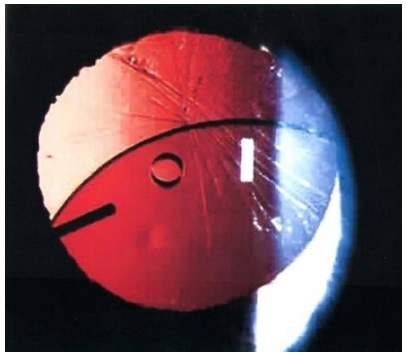

Photo-4: Decentered posterior chamber IOL (PCIOL)

DISCUSSION

Cataract continues to remain as the leading cause of avoidable blindness all throughout the globe. In the last two decades, the modern cataract surgery has contributed a commendable service in reducing blindness from cataract in all age group which is based on the parameters of quality vision and early recovery.

Manual small incision cataract surgery is one of such modern surgical procedure.

Our prospective study comprised of 300 cataract cases belonging to both male and female gender. The number of male patients (56%) was slightly higher than the females (44%). This may probably be due to more outdoor activities of the males. The age of the study population ranged from 40-89 yrs. Majority of the patients (32%) belonged to age group of 60-69 years whereas minimum numbers were recorded in the age group 80-89 years. Among the different types of cataract, cortical cataract were highest (48%) followed by nuclear cataract (28%) and total cataracts were least (24%).

Majority of the patients in our study had preoperative visual acuity of hand movement (30%) and only 14 cases (4.67%) had visual acuity of 6/24. Uncorrected postoperative visual acuity of 6/6 was achieved in 16.67% of patients at the end of 6weeks. After refractive correction of the operated patients at this time, 6/6 visual acuity was attained in as high as 90% cases which is termed as best corrected visual acuity (BCVA). Sudhakar *et al*. [7] in 1989 reported a visual acuity of 6/12 or better in 80.7%, Venkatesh *et al*. [8] in 2002 achieved BCVA of 6/18 or better is 94.4%, Rabindra *et al*. [9] attained a BCVA of 6/18 or better in 80.7% and Das *et al*. [10] in their study observed a BCVA of 6/18 or better in 96.2% which are comparable with our present study.

As regards astigmatism, the distribution of preoperative corneal astigmatism in our study as compared to Jaffe N.S. *et al*. study [11] is documented below:-

Table-13: Comparision of preoperative corneal astigmatism with Jaffe's series

Type of astigmatism	Jaffe's series (%0)	Present study (%)
Zero	25.81	18.00
WTR	30.00	35.33
ATR	42.50	46.67
45^0axis	1.00	0.00
135^0axis	0.70	0.00

In both the above series, more number of cases had ATR (astigmatism against the rule). It has been reported that young eyes have WTR astigmatism and as the age advances, there is shift towards ATR [12, 13].

The findings of our study on post- operative corneal astigmatism also corroborates with the study of Bidaye S *et al*. [14] is shown below:-

Table-14: Comparision of postoperative corneal astigmatism with Bidaye's series

Types of astigmatism	Bidaye's Series	Present study (%)
Zero	11.00	10.00
WTR	29.00	29.33%
ATR	60.00	60.67

The intraoperative complications in the present study account for 7.67 %(23 cases) which were all managed. Venkatesh *et al*. in 2003 [8] reported an incidence of 1.90% of intraoperative complications which was less than our series. In our study, 1 case (0.33%) had iris prolapsed during nucleus delivery whereas Bhattacharjee *et al*. [15] encountered prolapse of Iris in 10% of cases. Descemet's membrane detachment occurred in 2 cases (0.66%) whereas Bhattacharjee H *et al.* [15] and Khetrapal A *et al*. [16] reported its incidence to be 2% and 1.4% respectively which are slightly higher than over series. We encountered 3 cases with posterior capsule rupture (PCR) without vitreous loss which were small in nature. Osher and Cionni [17] reported similar incidence of 1% of PCR in their series. Vitreous loss was seen in 1 case only (0.33%) whereas Venkatesh *et al*. [8] and Hennig *et al*. [18] encountered vitreous loss in 0.70% and 0.20% of cases respectively. Incidence on intraoperative hyphaema in the present series was 1% (3 cases). But Khetrapal *et al*. [16] with 7.60% and Gutierez Carmona FJ (2002) [19] with 4.00% showed higher incidence of hyphaema. 2 cases (0.66%) had iridodialysis in our study which is comparable to incidence of iridodialysis as encountered by Singh K *et al*. [20] with 1.20% and Dabral T *et al*. [21] with 0.33%.

The incidence of postoperative complications in our study was 13.33% (40 cases). Among them, uveitis ranked on the top with 5.33%. This finding is almost matched with the findings of Sudhakar *et al*. [7] with 4.8% and Kratz *et al*. [22] with 3.3% of uveitis. The present study observed striate keratopathy in 14 cases (4.67%) which is lower than Sudhakar *et al*. (7.3%) [7] and Kapoor *et al*. (8.4%) findings Hyphaema occurred in 5 cases (1.67%) in our study whereas Das *et al*. [10] found its incidence to be 1.06% and Dabral *et al*. [21] reported it to be 0.67%. 2 cases (0.67%)of retained cortical matter and 2 cases (0.67%) of raised IOP were noticed in our study. Higher incidence of raised IOP was detected in series of Hepsen IF *et al.*

with 1.70% [23] and Md. Naquish Sadiq *et al*. with 5.68% [24]. Intraocular lens (IOL) related complication occurred in only 1 case (0.33%) with decentration of IOL which was repositioned immediately. Mishra P *et al*. in [25] found 0.50% incidence of IOL related complications in their series and is comparable to our present study.

CONCLUSION

Blindness and visual impairment due to cataract presents an enormous problem throughout the globe and results in decrease human activity and has caused economic loss and social burden. On the other side, world community has witnessed a rapid, revolutionary and phenomenal development of wonderful modern cataract surgical techniques of which MSICS is one of them. From our study it can be inferred that MSICS offers better wound stability with a small scleral incision and accelerated wound healing. Early and excellent visual rehabilitation is established with comfort and ease. Postoperative corneal astigmatism is also less. Operative and postoperative complications are very minimal which can be managed easily Inspite of advent of various technologies in modern cataract surgery, MSICS continues to take the lead in eliminating cataract blindness particularly in developing nations. It lands the cataract population on safe and satisfactory visual status with rapid recovery and minimum surgical expense. When the entire world is heading for the goal of vision 2020, Ophthalmologist are committed to eliminate or reduce the burden of cataract from society by adopting MSICS along with other techniques on mass scale. For this, well participation and co-operation among ophthalmic surgeons, government and nongovernmental organisations is the need of the hour.

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