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Study of the Incidence of Post-Operative Astigmatism in Small Incision Cataract Surgery (SICS) done by 3rd Year Residents

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Abstract: ***Cataract is an opacity of the lens or its capsule causing impairment of vision.The treatment of cataract is surgical. Two types of eye surgeries can be used to remove cataracts. 1. Intra-capsular cataract extraction (ICCE), 2. Extra-capsular cataract extraction (ECCE). In this study we had done the Study of the incidence of Post-operative Astigmatism in Small Incision Cataract Surgery (SICS) done by 3rd year residents. Aim of the study: Study of incidence of postoperative astigmatism in small incision cataract surgery (SICS) done by 3rd year residents. Objectives of the study: To study the incidence of postoperative astigmatism in small incision cataract surgery done by 3rd year residents.To study magnitude, type and course of astigmatism after SICS done by 3rd year residents. Material and Methods: A study of 230 cases of small incision cataract surgery between July.-2013 to May - 2015 at the G.T. Sheth Eye Hospital, Rajkot. There was a study the incidence of postoperative astigmatism in small incision cataract surgery done by 3rd year residents. Results: Surgically Induced Astigmatism (SIA) calculated by SIA calculator Version 1.1 available at http://www.aios.in SIA calculator Version 1.1. SIA was 0.5 - 1 D in maximum 68 patients, followed by 1.0 - 1.5 D in 50 patients. Least no. of patients (only 4) had SIA of 3.51-4.0 D. Mean Surgically Induced Astigmatism (SIA) is 1.27±0.84 D. Conclusion: As in our study mean SIA is 1.27 ± 0.84 D after SICS doe by 3rd year residentdoctors. It indicates better exposure of surgery, minimum astigmatism as compare to other studies and good quality of surgery of our 3rd year resident doctors.***

Keywords: Manual SICS, Phacoemulsification, Surgically induced astigmatism

1. Introduction

*1 Cataract is an opacity of the lens or its capsule causing impairment of vision. Age related cataract is responsible for about 51% of world blindness, which represents about 20 million people. In many countries, surgical services are inadequate, and cataract remains the leading cause of blindness. Cataract has been documented to be the most significant cause of bilateral blindness in India where vision < 20/200 in the better eye on presentation is defined as blindness. In India cataract has been reported to be responsible for 50-80% of the bilaterally blind in the country. Two types of eye surgeries can be used to remove cataracts. Intra-capsular cataract extraction (ICCE) & Extra-capsular cataract extraction (ECCE).ICCE has various types like SICS and Phacoemulsification. SICS is most popular method used in developing countries like india.it has many post-operative complications among which one of most important are post-operative astigmatism.

- The effect of incision placement in other than the superior meridians has received attention. Masket*2 noted that ATR astigmatism was reduced by a temporal incision for secondary IOL implantation. Anders and colleagues*3 noted significantly more astigmatism 8 months postoperatively with superior incisions than with temporal incisions.
- Minimizing incision length effectively decreases surgically induced astigmatism with both scleral and clear-corneal incisions. The incisional length of ECCE is generally 10–11 mm. Numerous studies have demonstrated that smaller incisions induce less astigmatism and achieve stability faster than do larger incisions.*4-15
- Radial sutures induce central steepening, or plus cylinder, in the meridian placed, and that longer and tighter sutures generally induce more astigmatism in that meridian.
- As a general rule, for superior incision ECCE or large superior incision phaco, selective suture cutting is recommended at ~2 months postoperatively if more than 2–3 D of WTR astigmatism is present. Early suture removal, especially in olderpatients, may result in progressive ATR.

This study was carried out on patients operated for small incision cataract surgery done by 3rd year resident doctors under strict supervision of faculty at Dept. of Ophthalmology, P.D.U. Govt. medical college, Rajkot.

2. Aim and Objectives of the Study

- To study the incidence of postoperative astigmatism in small incision cataract surgery done by 3rd year residents.
- To study magnitude and course of astigmatism after SICS done by 3rd year residents

3. Material and Methods

A study of 230 cases of small incision cataract surgery between July.-2013 to May - 2015 at Eye department, P.D.U. Govt. medical college, Rajkot.

Exclusion criteria

1) Intraocular surgery ex. Keratoplasty, Glaucoma.
2) Pre-existing astigmatism more than 2.0 D

3) Traumatic eye injury.
4) Corneal opacity
5) Pterygium
6) Prior Diabetic/Hypertensive retinopathy
7) Age Related Macular Degeneration

4. Surgical Technique

Patients operated under local or general anaesthesia. In case of local anaesthesia, peribulbar block with 50/50 mixture of 0.75% Bupivacaine & 2% Lignocaine with 250 units Hyaluronidase was given. The eye was cleaned with 10% Betadine and allowed to dry. Superior Rectus Bridle suture was taken to fix the globe in all cases.

Incision – SICS:-Conjunctival flap is made with scissors along the limbus from 12-2 O'clock. Exposure of sclera with dissection of tenon's capsule. Haemostasis is achieved with gentle and wet field cautery. Small incision tunnel is made with 15 number Bard Parker handle with blade and Crescent knife & anterior chamber entry done with 3.2 mm angled keratome. Side-port entry is made at 10 O'clock. Anterior capsulotomy is done either can-opener or continuous curvilinear capsulorrhexis (CCC), large 4-6 mm CCC is preferred. Anterior chamber is formed with viscoelastic substances. Completion of corneoscleral section with 5.2 mm blunt keratome. Hydrodissection done with number 26 BD cannula filled with Balanced Salt Solution to separate corticonuclear mass from the capsule. Nucleus delivery through the tunnel by visco-expulsion or with irrigating wire vectis technique. Manual irrigation-aspiration was done by Simcoe's 2 way irrigation-aspiration cannula. PMMA PCIOL was implanted in the bag in all the cases. Viscoelastic substances should be completely irrigated from anterior chamber. Closure of the incision with 10-0 nylon monofilament suture. Conjunctival flap is reposited and subconjunctival injection of dexamethasone 0.25 ml and amikacin 0.5 ml is given. Patching of eye done. The patients underwent detailed evaluation on the first post-operative day, 1st week post-op. & 6th week post-op for auto refraction and keratometry.I have calculated the Surgically Induced Astigmatism (SIA) through the All India Ophthalmological Society http://www.aios.in SIA calculator Version 1.1.*16 .It requires data formula of conventional preop, postop keratometry and preop, postop plus cylinder. After filling the boxes of keratometry and cylinder in the formula in SIA calculator version 1.1, we can get the Surgically Induced Astigmatism (SIA) in dioptre with corresponding axis.

5. Result and Analysis

We have done study of incidence of post-operative astigmatism in small incision cataract surgery (SICS) done by 3rd year residents in 230 patients from July 2013- May 2015 at Eye dept. and P. D. U. Govt. Medical College, Rajkot.

Distribution of patients according to 1st postoperative day astigmatism

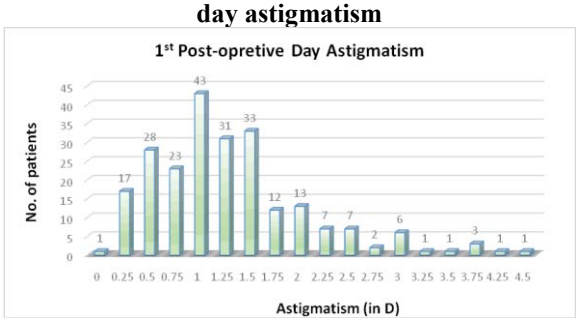

Figure 1

Figure 1 shows that 1st postop day astigmatism of 1 D were in maximum 43 patients, followed by of 1.5 D in 33 patients, followed by of 1.25 D in 31 patients. Mean 1st postop day astigmatism is 1.29±0.79 D.

Distribution of patients according to 7th postoperative day astigmatism

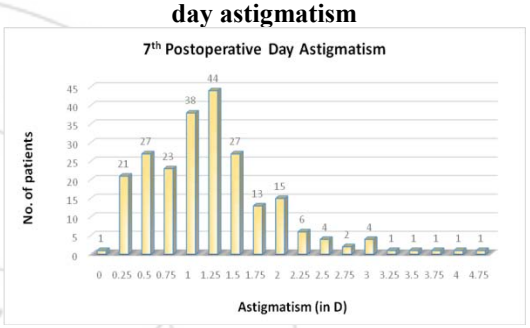

Figure 2

Figure 02 shows that on 7th postop day astigmatism was 1.25 D in maximum 44 patients followed by 1 D in 38 patients. Mean 7thpostop day astigmatism is 1.23±0.73 D.

Distribution of patients according to 45th postoperative day astigmatism

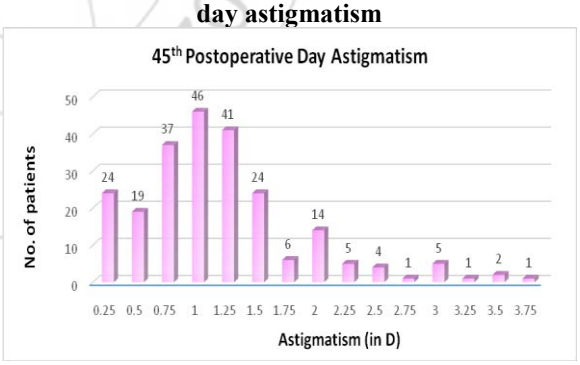

Figure 3

Figure 03 shows that on 45th postop day astigmatism was 1 D in maximum 46 patients, followed by 1.25 D in 41 patients followed by 0.75 D in 37 patients. Mean 45th postop day astigmatism is 1.17±0.68 D.

Difference in astigmatism after surgery(45th postop day astigmatism – Pre-op existing astigmatism)

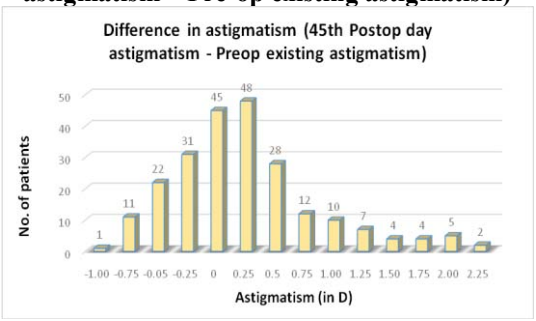

Figure 4

Figure 04 shows that maximum 48 patients had difference in astigmatism was 0.25 D, followed by 0 D in 45 patients, and least no. of patient (only 1)having difference in astigmatism-1.0 D.

Table 1: Comparison of Pre-op Astigmastim and 1st, 7th and 45th Post-op day astigmatism

	No. of patients			
Astigmatism (D)	Pre-op existing astigmatism	1st Postop day astigmatism	7th Postop day astigmatism	45th postop day astigmatism
0 - 0.5	75	46	49	43
0.51 - 1.0	73	66	61	83
1.01 - 1.5	59	64	71	65
1.51 - 2.0	23	25	28	20
2.01 - 2.5	0	14	10	9
2.51 - 3.0	0	8	6	6
3.01 - 3.5	0	2	2	3
3.51 - 4.0	0	3	2	1
4.01 - 4.5	0	2	0	0
4.51 - 5.0	0	0	1	0

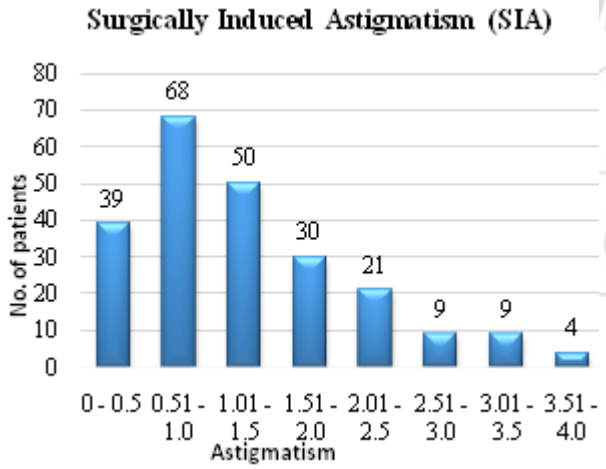

Figure 5

Figure 05 shows Surgically Induced Astigmatism (SIA) calculated by SIA calculator Version 1.1 available at http://www.aios.in SIA calculator Version 1.1. SIA was 0.5 - 1 D in maximum 68 patients, followed by 1.0 - 1.5 D in 50 patients. Least no. of patients (only 4) had SIA of 3.51-4.0 D. Mean Surgically Induced Astigmatism (SIA) is 1.27±0.84 D.

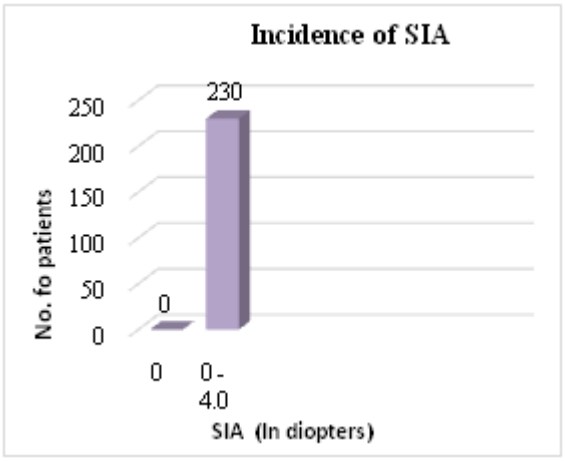

Figure 6

Figure 06 shows that in our study there are all 230 patients having induced astigmatism >0 D after the surgery, which is upto 4 D.

6. Discussion

Table 2: Comparison of Preoperative and Postoperative Astigmatism in different studies

Sr. no.	Name of study	Preoperative astigmatism (in dioptres)	Postoperative astigmatism (45th postop day) (in dioptres)
A	Nikhil S. Gokhale et al	1.5	1.28
B	Vaishali S. Pawar et al	1.44	1.57
C	Muhammad Tariq Khan et al	0.78	1.76
D	PavanChavan et al	0.726	1.761
E	Archana, Khurana A K et al	0.79	1.98
F	Vinay KV et al	0.85	1.58
G	Current study	0.93	1.16

Table 3: Comparison of Pre-op Astigmastim and 1st, 7th and 45th Post-op day astigmatism

	No. of patients			
Astigmatism (D)	Pre-op existing astigmatism	1st Postop day astigmatism	7th Postop day astigmatism	45th postop day astigmatism
0 - 0.5	75	46	49	43
0.51 - 1.0	73	66	61	83
1.01 - 1.5	59	64	71	65
1.51 - 2.0	23	25	28	20
2.01 - 2.5	0	14	10	9
2.51 - 3.0	0	8	6	6
3.01 - 3.5	0	2	2	3
3.51 - 4.0	0	3	2	1
4.01 - 4.5	0	2	0	0
4.51 - 5.0	0	0	1	0

Table 04: Comparison of Surgically Induced Astigmatism (SIA) in different studies

Sr. no.	Name of study	SIA (in dioptres)
A	Nikhil S. Gokhale et al	1.65
B	Vaishali S. Pawar et al	0.67
C	PallaviPatil et al	0.91
D	PavanChavan et al	0.38
E	Vinay KV et al	0.49
F	Renu M Magdum et al	1.09
G	Current study	1.27

Comparison of incidence of surgically induced astigmatism

In study of Nikhil S. Gokhale et al*42, the induced astigmatism was lower in the temporal and superotemporal groups compared to that in the superior group. The induced astigmatism with superior incision is about 1.28 D.VaishaliPawar et al*43 reported that SICS with the superotemporal and the temporal approaches provides a better quality of vision due to the significantly less SIA than the superior approach. PavanChavan et al*45 concluded that decreasing the size of incision induces less astigmatism.Vinay KV et al*47 explained that SIA in the superotemporal incision is significantly less as compared to superior incision in SICS. The superotemporal incision avoids 12 o'clock limbus , thus allows any filtering surgeries if required later at superior limbus site. Sushma A et al*48 reported screening camp followed by surgery in the base camp for SICS had good visual outcome in the majority of patients with the average astigmatism of 2.5 D.Muhammad Tariq Khan et al*49 conclude that MICS is safe and effective technique of extra-capsular cataract extraction. SIA and per-operative hyphema are the main complications. Early stabilization of the refractive status of the eye and no suture related problems are the advantages. Karad H T et al*51 reported that lower the size of incision induces low astigmatism. Induced astigmatism was lower in 5.5 mm size of incision as compared to 6.5 mm size.

Current study shows that mean surgically induced astigmatism (SIA) occurs after Small incision Cataract Surgery, in our study it is 1.27 ± 0.84*16.

7. Conclusion

In developing countries like India, where phacoemulsification is not affordable by all patients, SICS is better option. As it is cheap, safe, non-machine dependent and rewarding surgery, hence exposure to SICS to resident doctors is an effective tool to develop good surgical skills for combating cataract blindness at government eye institutions in our country. As in our study mean SIA is 1.27 ± 0.84 D after SICS doe by 3rd year resident doctors. It indicates better exposure of surgery, minimum astigmatism as compare to other studies and good quality of surgery of our 3rd year resident doctors.

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