

Dry Eye Evaluation Before and After Small Incision Cataract Surgery

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Abstract:

Background: Dry eye is a clinical condition characterized by deficient tear production or excessive tear evaporation resulting in ocular discomfort. It is characterized by ocular irritation resulting from an alteration of tear film. Dry eye syndrome following cataract surgery was concerned recently. In developing countries like ours, the most efficient and the economical means of doing a cataract surgery is manual small incision cataract surgery. Now-a-days even the base camp surgeries which are done under the National programme for control of blindness (NPCB) are manual small incision cataract surgeries. Dry eye can develop or deteriorate after cataract surgery if not treated in time.

Materials and Methods: An institution based prospective study was conducted to find out if manual small incision cataract surgery (MSICS) causes dry eye. 200 patients were evaluated for dry eye pre and post-operatively. A detailed questionnaire was given and OSDI score was calculated from the given score. Schirmer's test I, tear break up time, Fluorescein staining of cornea, tear meniscus height were tested for dry eye evaluation preoperatively and postoperatively after 1 week, 3 weeks and 6 weeks. Statistical analysis was done using SPSS 20.0 and paired-t test. **Results:** In present study there was no dry eye before cataract surgery, one week after SICS there was no dry eye in 89%, mild dry eye in 2%, moderate dry eye in 8%, severe dry eye in 1% of patients. 3 weeks after SICS there was no dry eye in 91%, mild dry eye in 2%, moderate dry eye in 7% of patients and no severe dry eye patients. 6 weeks after SICS there was no dry eye in 94%, mild dry eye in 1% of patients, moderate in 5% of patients and no severe dry eye patients. **Conclusion:** In the present study prevalence of dry eye at 7 days, 3 weeks and at the end of 6 weeks was 11%, 9% and 6% which shows the dry eye did not turn up to be normal even after 6 weeks of cataract surgery conclude the need for tear substitutes after cataract surgery.

Key Word: Dry eye, Small incision cataract surgery, Schirmers test I, Tear film break up time, OSDI score.

Date of Submission: 06-15-2020

Date of Acceptance: 21-12-2020

I. Introduction

Dry eye is a clinical condition characterized by deficient tear production or excessive tear evaporation resulting in ocular discomfort. It is characterized by ocular irritation resulting from an alteration of tear film.¹ Dry eye syndrome following cataract surgery was concerned recently. Two kinds of dry eye were clinically observed after cataract surgery, early dry eye and chronic dry eye. Most cases of early dry eye, who usually had the normal lacrimal secretion before surgery, were reversible and involved in some of factors associated with surgery and post-surgery medication. But most cases of chronic dry eye, who have abnormal lacrimal secretion or "borderline state" of lacrimal secretion test before surgery, may suffer from the ocular surface diseases related to irreversible dry eye disease. It is significantly important for maintaining the ocular surface stability and recovery of visual acuity after cataract surgery and to promptly manage the dry eye syndrome.² Dry eye can develop or deteriorate after cataract surgery if not treated in time. Misuse of eye drops is one of the major pathogenic factors. Indiscriminate use of topical antibiotics causes histological and ultrastructural changes in conjunctiva leading to decreased tear break-up time and dry eye state.³ In developing countries like ours, the most efficient and the economical means of doing a cataract surgery is manual small incision cataract surgery. Now-a-days even the base camp surgeries which are done under the National programme for control of blindness (NPCB) are manual small incision cataract surgery.⁴

The aim of the present study was 1. To know the influence of cataract surgery on tear film. 2. To measure dryness symptoms using Ocular surface disease index (OSDI) Score. 3. To quantify changes in tear film using Tear meniscus height, Schirmer's test I, Tear film break up time.

II. Material And Methods

The present study was conducted in the Department of Ophthalmology RIMS, Kadapa.

Study Design: Prospective study

Study Location: Department of ophthalmology, RIMS, Kadapa.

Study Duration: September 2016-february 2017.

Sample size: A total of 200 patients were studied

Selection Criteria

Inclusion Criteria.

Patient who have given written informed consent in their language. (consent form).

Random selection of patients planning for manual small incision cataract surgery.

Should receive same brand of ciprofloxacin & Dexamethasone combination eye drops post surgery.

Patient above 45 years.

Exclusion Criteria.

1. Pre existing ocular diseases like: Dry eye, Complicated cataract , Glaucoma, Uveitis, Disorders of lids and nasolacrimal duct pathway, Ocular allergies, Disorders of the conjunctiva like pterygium, Disorders of sclera like scleritis, episcleritis
2. Previous ocular surgery
3. Current smoker
4. Any intra operative complications during the surgery
5. Insertion of Anterior chamber intraocular lens.

Ethical clearance

The study was approved by the Institutional Ethical Committee.

Informed Consent

All the participants fulfilling selection criteria were explained about the nature of the study. A written informed consent was obtained from all the participants before enrollment.

Method of collection of data

After being investigated for HIV, HBsAG, RBS and Routine eye examination with slit lamp, lacrimal syringing, tonometry, keratometry and A-scan they were posted for small incision cataract surgery. Patients were selected after fitting inclusion and exclusion criteria. After cataract surgery, patients were started with ciprofloxacin & dexamethasone combination eye drops of same brand.

Evaluation of the OSDI Score

The OSDI is assessed on a scale of 0 to 100, with higher scores representing greater disability. Normal score (0-12), Mild (12-22), Moderate (23-32), Severe (33-100) dry eye⁵. OSDI score was evaluated before surgery and at 1 week, 3 weeks, 6 weeks after surgery.

Ocular examination:

Ocular examination included recording visual acuity with snellen's chart. Detailed anterior segment examination was done under slit lamp. Condition of lids, meibomian glands, conjunctival surface were evaluated. Cornea was evaluated in detail for its sheen, surface (superficial punctate keratitis/mucous plaques/filamentary keratitis), sensations. Following this, two diagnostic tests namely, Schirmer's test 1, Tear film break up time were done. Ocular examination was done preoperatively and at 1 week, 3 weeks, 6 weeks after surgery.

Interpretation:

Dry eye was defined as having one or more symptoms(often or all the time present) along with one or more positive clinical findings (based on slit lamp examination) and one or more positive clinical tests(tear break up time of <10 seconds, schirmer's test 1 score <10mm, fluorescein score of >1. Asymptomatic patients with positive signs or positive tests were also considered in the diagnosis. Dry eye was graded into three types- mild, moderate, and severe. Mild dry eye can be defined in patients who have a Schirmer's test 1 of less than 10 mm in 5 minutes, TBUT less than 10 seconds and less than one quadrant of staining of the cornea. Moderate dry eye can be defined in a Schirmer's test 1 of 5 to 10 mm in 5 minutes, TBUT of 5 to 10 seconds with punctate staining of more than one quadrant of the corneal epithelium. Severe dry eye can be defined as diffuse punctate or confluent staining (with fluorescein) of the corneal epithelium, often with filaments and diffuse punctate or

confluent staining of the conjunctival epithelium. The Schirmer’s test 1 values in these patients are less than 5 mm in 5 minutes and TBUT less than 5 seconds.

Statistical Analysis

The data was compiled in Microsoft (MS) Excel work sheet and analyzed using SPSS (Statistical Package for Social Sciences) software version 20.0. The descriptive statistics- All qualitative variables are presented as frequency and percentages. Paired-t test of significance was used to test the association between dry eye before and after cataract surgery. p values of less than 0.05 were considered statistically significant.

Statistical software:

The Statistical software namely SPSS 20.0 was used for the analysis of the data and Microsoft Word and Excel have been used to generate graphs, tables etc.

III. Result

In the present study regarding age distribution majority of patients(42%) are in the age group of 51-60. Out of 200 patients 46% of patients were males and females were 54%. Right eye was operated in 52% and left eye in 48% of patients.

Table no. 1: OSDI Score

OSDI SCORE	BEFORE SICS	1WEEK AFTER SICS	3WEEKS AFTER SICS	6WEEKS AFTER SICS
0-12	200	178	180	186
13-22	0	05	07	04
23-32	0	15	13	10
33-100	0	02	0	0
TOTAL	200	200	200	200

Table no. 2: Clinical test results of 2% Fluorescein stain

2% FLUORESCENIN STAIN	BEFORE SICS	1WEEK AFTER SICS	3 WEEKS AFTER SICS	6WEEKS AFTER SICS
No staining	200	184	190	194
Grade 1 staining	0	6	6	6
Grade 2 staining	0	6	2	0
Grade 3 staining	0	4	2	0
TOTAL	200	200	200	200

Table 2 shows 2% fluorescein stain was negative before cataract surgery, one week after SICS fluorescein stain was negative in 92%, grade 1 staining in 3%, grade 2 staining in 3% and grade 3 staining in 2% of patients, three weeks after SICS 2% fluorescein stain was negative in 95%, grade 1 staining in 3%, grade 2 staining in 1% and grade 3 staining in 1% of patients, six weeks after SICS 2% fluorescein stain was negative in 97% and had grade 1 staining in 3% of patients.

Table no.3 : Clinical test results of Tear Meniscus

TEAR MENISCUS	BEFORE SICS	1 WEEK AFTER SICS	3WEEKS AFTER SICS	6 WEEKS AFTER SICS
Normal	200	192	194	196
Low	0	8	6	4
TOTAL	200	200	200	200

Table 3 shows tear meniscus was normal before cataract surgery, one week after SICS tear meniscus was normal in 98% and was low in 4%, three weeks after SICS tear meniscus was normal in 97% and was low in 3%, six weeks after SICS tear meniscus was normal in 98% and was low in 2% of patients.

Table no.4: Clinical test results of TBUT

TBUT	BEFORE SICS	1 WEEK AFTER SICS	3 WEEKS AFTER SICS	6 WEEKS AFTER SICS
≤4mm	0	2	0	0
5-9mm	0	18	14	12

Dry Eye Evaluation Before and After Small Incision Cataract Surgery

10-14mm	79	96	99	95
15-19mm	93	72	74	75
20-24mm	28	12	13	18
≥25mm	0	0	0	0
TOTAL	200	200	200	200
t value compared to before SICS	-	1.0524	1.944	2.298
P value compared to before SICS	-	> 0.001	>0.001	>0.001

P value was statistically significant. In the present study TBUT was ≥10mm in 100% of patients before cataract surgery, one week after SICS TBUT was <10mm in 10% and ≥10mm in 90% of patients, three weeks after SICS TBUT was <10mm in 7% and ≥ 10mm in 93% of patients, six weeks after SICS TBUT was <10mm in 6% and ≥ 10mm in 94% of patients.

Table no. 5: Clinical test results of Schirmer’s Test 1

SCHIMER’S TEST	BEFORE SICS	1 WEEK AFTER SICS	3 WEEKS AFTER SICS	6 WEEKS AFTER SICS
≤4sec	0	0	0	0
5-9sec	0	12	6	4
10-14sec	68	87	82	85
15-19sec	80	77	78	79
20-24sec	44	24	30	26
≥25sec	8	0	4	6
TOTAL	200	200	200	200
t-value compared to before SICS	-	2.1281	2.3029	1.0262
P value compared to before SICS	-	> 0.001	>0.001	>0.001

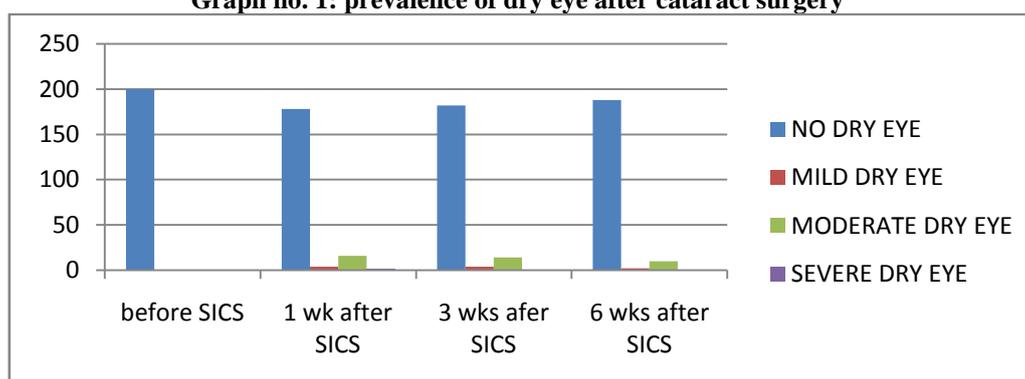
P value was statistically significant. In the present study schirmer’s test was ≥ 10sec in 100% of patients before cataract surgery, one week after SICS schirmer’s test was < 10sec in 6% and ≥ in 94% of patients, three weeks after SICS schirmer’s test was < 10sec in 3% and ≥ 10sec in 97% of patients, six weeks after SICS schirmer’s test was < 10sec in 2% and ≥10 in 98% of patients.

Table no. 6: Prevalence of dry eye after cataract surgery

DRY EYE GRADE	BEFORE SICS	1 WEEK AFTER SICS	3 WEEKS AFTER SICS	6 WEEKS AFTER SICS
No dry eye	200	178	182	188
Mild dry eye	0	4	4	2
Moderate dry eye	0	16	14	10
Severe dry eye	0	2	0	0
TOTAL	200	200	200	200

In the present study there was no dry eye before cataract surgery, one week after SICS there was no dry eye in 89%, mild dry eye in 2%, moderate dry eye in 8% and severe dry eye in 1% of patients, three weeks after SICS there was no dry eye in 91%, mild dry eye in 2% and moderate dry eye in 7% of patients, six weeks after SICS there was no dry eye in 94%, mild dry eye in 1% and moderate dry eye in 5% of patients

Graph no. 1: prevalence of dry eye after cataract surgery



IV. Discussion

There is no doubt that in recent years, dry eye disease is an extremely common condition that causes varying degrees of ocular discomfort and disability. Intact corneal innervation is mandatory for normal blinking and tearing reflexes, which in turn is essential for maintaining the integrity of the ocular surface⁶. Damage to this neural circuit interrupts the normal regulation of lacrimal gland secretion and influences both basal and stimulated tear production. This is one of the major pathogenic pathways in induction of postoperative dry eye in patients undergoing ophthalmic surgeries⁶. The chronic use of eye drops after cataract surgeries can lead to toxic changes in the cornea and the conjunctiva due to the presence of preservatives in them, especially benzalkonium chloride⁷. Vigorous irrigation of the tear film and manipulation of the ocular surface intraoperatively may reduce the goblet cell density and result in shortened TBUT postoperatively. We believe that the use of light filters, decreased exposure time, appropriate irrigation and gentle handling of the ocular surface tissue may decrease the postoperative complications.

Moreover, benzalkonium chloride, one of the most commonly used preservatives in topical eye drops, can induce tear instability and decrease the number of mucin expressing cells.^{8,9} Other factors associated with dry eye are older age, female gender, diabetes, and systemic hypertension¹⁰.

In the present study there was no dry eye before surgery. Dry eye was maximum in the 1st week 11% which improved over time to 6% after 6 weeks. Explanation for the dry eye pattern observed in the current study was the recovery process of corneal nerves. Disruption of the normal corneal innervation can reduce the tear flow and blink rate and cause instability of the tear hyperosmolarity and tear film. With corneal healing postoperatively, new neurite cells emerge and after 25 days, neural growth factor is released to regenerate the subepithelial corneal axon¹¹. Thus, the recovery of the corneal nerves may explain why the dry eye was seen early after surgery and improved thereafter.

There are several studies conducted to evaluate dry eye after cataract surgery. Li et al⁸ in 2007 also found significant decrease in the STI and TBUT values at 3 months postoperatively after phacoemulsification¹¹. Gharaee et al¹² in 2009 also found out a gradual decrease in the TMH values from preoperative 1.5mm to 1mm at 3 months following phacoemulsification.

In Shankar S Ganvit et al¹³ study prevalence of dry eye was 8%; Chandana et al¹⁴ study 59%; Kavitha et al⁴ study 66.2% and in our study prevalence was 6%. The causes for variation of results may be due to difference in the duration of follow up of patients and variation in the post operative medication and their regimens.

V. Conclusion

In the present study, prevalence of dry eye at 7 days, 3 weeks and the end of 6 weeks was 11%, 9% and 6% which shows the dry eye did not turn up to be normal even after 6 weeks of cataract surgery concluding the need for use of tear substitutes after cataract surgery and recommend that ophthalmologists should evaluate patients both before and after SICS to prevent further damage to the ocular surface and able to manage the patient promptly and effectively so the patient will not have a poor quality of life and vision due to dry eye syndrome.

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Dr.B.Keerthi, et. al. "Dry Eye Evaluation Before and After Small Incision Cataract Surgery." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 19(12), 2020, pp. 06-11.