



EVALUATION OF DRY EYE BEFORE AND AFTER MANUAL SICS

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ABSTRACT **AIM:** To evaluate the prevalence and severity pattern of dry eye after manual small incision cataract surgery. **METHODS:** This was a prospective observational study done in 100 patients over a period extending from May 2020-June 2021 in the Upgraded Department of Ophthalmology, Government Medical College Jammu. Various parameters of dry eye including TBUT, TMH, schirmer's test, fluorescein staining and OSDI scores are evaluated and compared pre and post-operatively. **RESULTS:** The study found statistically significant difference between all the parameters of dry eye which were altered maximal in 1st week after the surgery, less in 3rd week and least in 6th week. **CONCLUSION:** This study concludes that there is association of dry eye with cataract surgery and there is need of instillation of tear substitutes postoperatively so that patients will not have to suffer poor quality of life and vision due to dry eye discomfort.

KEYWORDS :

INTRODUCTION

DEWS II defines Dry Eye Disease as "A multifactorial disease of the ocular surface characterized by a loss of homeostasis of the tear film, and accompanied by ocular symptoms, in which tear film instability and hyperosmolarity, ocular surface inflammation and damage, and neurosensory abnormalities play etiologic roles."

Dry eye is a disorder of the tear film which occurs due to tear deficiency or excessive tear evaporation. Dry eye syndrome, also known as keratoconjunctivitis sicca (KCS), is a common condition characterized by inflammation of the ocular surface and lacrimal glands. The precorneal tear film is an essential component of the ocular surface and can be subdivided into an anterior lipid layer, a middle aqueous layer and an innermost mucin layer. These layers are produced by the meibomian glands, the lacrimal gland and goblet cells of the conjunctiva, respectively.

Symptoms associated with dry eye may include ocular burning, foreign body sensation, stinging sensation, pain, photophobia and blurred vision. Dry eye syndrome is associated with numerous causes which can be divided into primary and secondary.

Development of dry eye after the cataract operation can be a common and unsatisfying experience both for patients and surgeons. Cataract surgery can disrupt the tear film leading to dry eyes. Symptoms may include redness and irritation, the sensation of having grit in the eye, or mucus in or around the eye. Cataract surgery can lead to denervation of the cornea resulting in epithelial wound healing problem, raised epithelial permeability, low epithelial metabolic activity, and loss of cytoskeletal structures associated with cellular adhesion. Various factors like type of ophthalmic solution used, intraoperative medication, coexistent systemic disorders, operating microscope light exposure and time since surgery also affects the incidence of dry eye syndrome among the patients.

MATERIAL AND METHODS

This prospective observational study was conducted at a tertiary center during the period of May 2020 and June 2021. The study was approved by institutional ethics committee. All patients were above 50 years of age with diagnosed senile cataract. An informed consent was taken from all the patients. Inclusion criteria included- 1) Patients aged >50 years with senile cataract 2) No previous dry eye symptoms. Exclusion criteria included-1) Patients with pre-existing ocular diseases like disorders of lid or nasolacrimal pathway, uveitis, glaucoma, previous ocular surgery 2) Patients with Sjögren's syndrome, rheumatic arthritis or other autoimmune disorders 3) Patients with complicated cataract, traumatic cataract, or drug induced cataract 4) Patients who were on birth control pills, antidepressants, antihistamines, or decongestants.

An ocular surface disease index (OSDI) questionnaire was given to all patients before subjecting them to examination. OSDI questionnaire is

a 12-item questionnaire used worldwide to accurately assess symptoms of ocular irritation related to dry eye and vision. 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 eye. OSDI score was evaluated before surgery and at 1 week, 3 weeks, 6 weeks after surgery. A detailed history with ophthalmologic examination comprising assessment of best-corrected visual acuity (BCVA), ocular adnexal examination, tear meniscus height (TMH), tear film break-up time (TBUT), Schirmer's test I (ST1), grading of cataract and the fundus examination was done. All patients underwent manual SICS with superior scleral incision of 5.5-6 mm length with implantation of rigid PMMA (Poly Methyl Methacrylate) intra-ocular lens. A standard post operative regime was followed in all the patients. All patients received steroid antibiotic combination in tapering doses for 6 weeks. Post-operative evaluation was done at 1 week, 3 weeks and 6 weeks. At each visit TMH, TBUT, ST1 was done.

RESULTS

The study was comprised of 100 patients among whom 52% were females and 48% were males aged more than 50 years who underwent manual SICS with PCIOL implantation. Dry eye evaluation was done using various parameters and then compared among preoperative and postoperative values.

Table: 1-Distribution and Comparison of TBUT.

1(a) Distribution of TBUT						
TBUT	TBUT - Pre-Op (n)	TBUT 1WK (n)	TBUT 3WK (n)	TBUT -6WK (n)		
≤ 4	0	0	0	0		
5-9	0	4	16	22		
10-14	18	40	48	52		
15-19	54	41	21	26		
20-24	24	14	5	0		
≥25	4	2	0	0		
Total	100	100	100	100		
1(b) Repeated measures ANOVA for TBUT						
TBUT (Sec.)	N	Minimum	Maximum	Mean	Std. Deviation	Significance
TBUT Pre-Op	100	11.00	28.00	17.7900	3.53995	283.568 <0.001
TBUT 1wk	100	7.00	26.00	15.4700	3.58858	
TBUT 3wk	100	5.00	21.00	12.4000	3.68727	

TBUT 6wk	100	6.00	19.00	12.4300	3.06250		
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Table: 2- Distribution of TMH.

TMH	TMH -Pre-Op (n)	TMH -1WK (n)	TMH -3WK (n)	TMH -6WK (n)
Normal	100	93	95	97
Low	0	7	5	3
Total	100	100	100	100

Table: 3- Distribution and comparison of ST1 (mm).

3(a) Distribution of ST1 (mm).							
ST1	St1 - Pre-Op (n)	ST1 1WK (n)	ST1 - 3WK (n)	ST1 -6WK (n)			
≤ 4	0	2	0	0			
5-9	0	12	10	6			
10-14	43	49	49	62			
15-19	54	37	37	30			
20-24	3	0	4	2			
>25	0	0	0	0			
Total	100	100	100	100			
3(b) Repeated measures ANOVA for ST1							
ST1(m m)	N	Minimum	Maximum	Mean	Std. Deviation	Significance	
						F-value	p-value
ST1- pre-Op	100	10.00	21.00	15.3900	2.66627	78.703	<0.001
ST1- WK 1	100	4.00	19.00	13.2900	3.49977		
ST1- WK 3	100	7.00	20.00	14.2800	3.09800		
ST1- WK 6	100	8.00	21.00	13.7800	2.69897		

Table 4: Distribution FS (Grades)

FS(Grades)	FS-Pre-Op (n)	FS-1WK (n)	FS-3WK (n)	FS-6WK (n)
0	100	70	79	90
1	0	19	14	8
2	0	7	6	2
3	0	4	1	0
Total	100	100	100	100

Table 5: Distribution and Comparison of OSDI Score.

5(a): Distribution of OSDI Score.							
OSDI Score	OSDI Score - Pre-Op (n)	OSDI Score - 1WK (n)	OSDI Score - 3WK (n)	OSDI Score -6WK (n)			
0-12	100	76	83	89			
13-22	0	11	13	10			
23- 32	0	10	4	1			
33-100	0	3	0	0			
Total	100	100	100	100			
5(b): Repeated measures ANOVA for OSDI SCORE							
OSDI SCORE	N	Minimum	Maximum	Mean	Std. Deviation	Significance	
						F-value	p-value
OSDI SCORE Pre-Op	100	1.00	12.00	6.6500	2.89330	49.261	<0.001
OSDI SCORE -WK 1	100	3.00	36.00	11.540	7.22988		

OSDI SCORE -WK 3	100	1.00	30.00	8.2800	5.87768		
OSDI SCORE -WK 6	100	1.00	23.00	6.3100	4.38476		

Statistical Analysis: All the collected data was entered in Microsoft (MS) Excel work sheet and then analyzed using SPSS (Statistical Package for Social Sciences) software version 26.0. All qualitative variables were presented as frequency and percentages and mean & standard deviation were reported for quantitative variables. Repeated measures ANOVA- test was used to test the significance among score of dry eye obtained before and after cataract surgery at different point of times. P-values less than 0.05 were considered as statistically significant. All p-values were two tailed.

DISCUSSION

Dry eye is a multifactorial disease of the tear film and the ocular surface, that results in symptoms of discomfort, visual disturbance, and tear film instability, with potential damage to the ocular surface(1). Vigorous irrigation of the tear film and manipulation of the ocular surface intra operatively may reduce the goblet cell density and result in shortened TBUT postoperatively. Li et al in 2007 also found significant decrease in the STI and TBUT values at 3 months postoperatively after phacoemulsification(2). Gharraee et al in 2009 also found out a gradual decrease in the TMH values from preoperative 1.5mm to 1mm at 3 months following phacoemulsification (3). One study by Sinha et. al. is found in which SICS and phacoemulsification were compared for development of dry eye post surgery which were 43.5% and 56.5% respectively. A stronger association of SICS with development of dry eye is in consonance with study by Kavitha et. al. who showed a strong association of SICS having with development of dry eye.

There is no gold standard test for assessing dry eye so various diagnostic tools with different sensitivities and specificities are used to diagnose dry eye. The OSDI questionnaire was used in the current study as it reliably assesses the severity, natural history and effects of dry eye. This study found statistically significant difference between various parameters used for assessing dry eyes before and after cataract surgery viz tear meniscus height, tear film break-up time, schirmer’s test, fluorescein staining and OSDI score. In the present study, there was no dry eye preoperatively and it was found maximum in the first week postoperatively which further improved overtime and was found least in 6th week after the cataract surgery. The pattern of dry eye seen in this study suggests the recovery process of the corneal nerves which were disrupted postoperatively and led to decreased tear flow and blink rate causing instability of the tear hyperosmolarity and tear film(4).

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(5). Other factors associated with dry eye are older age, female gender, diabetes, and systemic hypertension(6).

Kasetsuwan n et al., in 2013 conducted a study among 91 patients to evaluate the incidence and pattern of dry eye after cataract surgery and reported that dry eye is significant on 7th day after surgery and there is rapid improvement after 30th day postoperatively, which is almost similar to our study(7).

Conclusion

This study found that the prevalence of dry eye was maximum in the 1st week after the cataract surgery, which further decreased in the 3rd week and was found least in the 6th week but it didn’t become normal which suggests the need for use of tear substitutes after the cataract surgery and also suggests the need to evaluate the patients: both before and after the surgery.

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