EVALUATION OF INCIDENCE OF DRY EYE AFTER CATARACT SURGERY

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ABSTRACT

Purpose: Evaluation of incidence of dry eye after cataract surgery.

Methods: A descriptive longitudinal study conducted in tertiary care hospital. Total 150 patients were included. tear meniscus height (TMH), tear film break up time (TBUT), Schirmer's test, ocular surface disease index (OSDI) parameters were studied.

Results: Out of 150, 81 (54%) males & 69 (46%) females with mean age of 63.58 ± 8.03 years, 88 (59%) subjects were operated for right eye cataract while 62 (41%) for left eye. Lower mean values of TMH, TBUT & Schirmer's test were observed in operated eye in comparison with non-operated eye after cataract surgery at regular interval. Difference in mean was statistically significant ($p<0.001$). 18 cases diagnosed as dry eye after cataract surgery.

Conclusions: Significant decreased value of TMH, TBUT & Schirmer's test occurs after phacoemulsification cataract surgery.

KEYWORD

Cataract surgery, tear meniscus height, tear film break up time, Schirmer's test.

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INTRODUCTION:

Cataract is a very important cause of blindness worldwide. Around 18 million people are blind due to bilateral cataract, accounting for 48% of all causes of blindness.[1] As per The World Health Organization (WHO) report, approximately 37 million people were blind in the world in 2002.[1] Cataract surgery is cost-effective and results in almost immediate visual rehabilitation.[2] Improvement in visual acuity after cataract surgery results in considerable gains in real life activities and emotional and social life components.[3] Though postoperative improvement in vision occurs, many patients are dissatis ed due to tear lm dysfunction, poor near vision and reduced contrast sensitivity. Studies suggested that cataract surgery could aggravate dry eye.[4,5]

Reports from North and Eastern India shows dry eye prevalence which varies between 18.4% and 40.8%.[6-9] One small study from high altitude showed a higher prevalence of 54%.[10] Manual small-incision cataract surgery (SICS) a straight or a curved incision is made on the superior sclera which penetrates the cornea at the level of the Schwalbe line, whereas phacoemulsi cation cataract surgery involves a clear corneal incision.[11] Corneal nerve bres are located in the stromal layer and originate from the temporal and nasal areas, then bifurcate through the entire cornea, with the most dense bres located in the central and paracentral areas. Incision at any site of the cornea may cause disruption of nerve fibres consequently reducing corneal sensitivity and reducing the tear production.[12] Dry eye symptoms range from mild transient irritation to persistent dryness, burning, itching, redness, pain, ocular fatigue and visual disturbance. Severe dry eye results in impairment in daily living, work productivity and affect mood and confidence.[13] The current study will evaluate the dry eye status in patients with senile cataract undergoing phacoemulsification cataract surgery.

MATERIAL & METHODS:

A descriptive longitudinal study was conducted on patients undergoing phacoemulsification surgery for age related cataract in tertiary care hospital in western Maharashtra during period of September 2016 to August 2018. Dr. D.Y. Patil Hospital & Research Centre, Pimpari, Pune ethical committee permission was taken prior to study. Total 150 patients were included in this study, after obtaining informed written consent from patients, each patient was assigned into two groups:Cases group A (Eye scheduled for phacoemulsi fication cataract surgery) & Control group B (Unoperated eye of the same patient). Vision acuity, tear meniscus height (TMH), tear film break up time (TBUT), Schirmer's test, Ocular surface disease index (OSDI) were performed pre-operatively and post operatively at regular interval.

Inclusion criteria:

1. Age of patient > 50 years.
2. Bilateral age-related cataract.

Exclusion criteria:

1. Opposite eye having pseudophakia.
2. Cataract caused by trauma, uveitis, drug induced etc.
3. Ocular diseases like glaucoma, disorders of lids,

conjunctiva, cornea, sclera or using medication for same.
4. History of corneal refractive surgery
5. History of chemical burns, radiation or using contact lens.

Statistical analysis:
The statistical analysis was done by using SPSS software 16 version. Quantitative data was analysed as mean ± standard deviation (SD) & Qualitative data as frequencies. Unpaired t-test was used to compare normally distributed continuous variable between groups.

RESULTS:
Out of 150, there were 81 (54%) males and 69 (46%) females in the study. Mean age of study sample was 63.58 ± 8.03 years, with the oldest individual being 85 years old and youngest being 51 years of age. 67 (44.67%) samples were from 61-70 years age group followed by 57 (38%) subjects in 51-60 years age group. 88 (59%) subjects were operated for right eye cataract while 62 (41%) subjects were operated for left eye cataract.

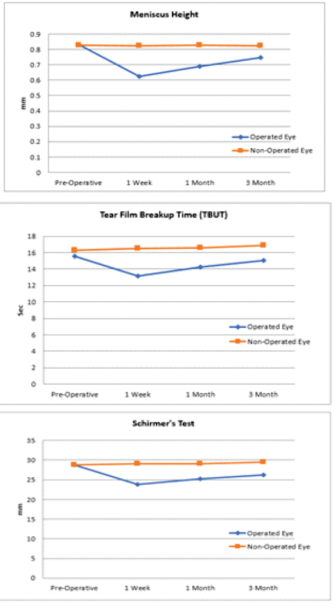

Figure 1: Line diagram mean values among study samples at different time interval

Lower mean values of meniscus height, tear film break up time and Schirmer's test were noted in operated eye for cataract surgery in comparison with non-operated eye after cataract surgery at 1 week, 1 month & 3 month follow up. The difference in values were gradually reduced after time interval but still lower in operated eyes at the end of one month. (Figure 1).

Table 1: Meniscus height (mm) comparison by unpaired t test (operated vs non-operated eye)

Unpaired t-test for Equality of Means							
Time	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% CI of the Difference	
						Lower	Upper
Pre-op	.121	298	**.904**	.0033333	.0275050	-.0507953	.0574620
1 Week	-7.586	294.873	**.000**	-.2000000	.0263658	-.2518889	-.1481111
1 Month	-4.908	298	**.000**	-.1366667	.0278445	-.1914635	-.0818699
3 Month	-2.706	297.401	**.007**	-.0766667	.0283330	-.1324252	-.0209081

Table 2: Tear film break up time (sec) comparison by unpaired t test (operated vs non-operated eye)

Unpaired t-test for Equality of Means							
Time	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% CI of the Difference	
						Lower	Upper
Pre-op	1.095	298	**.274**	.253333	.2312628	-.2017818	.7084484
1 Week	-13.108	285.983	**.000**	-3.35333	.2558319	-3.8568857	-2.8497810
1 Month	-8.982	266.165	**.000**	-2.35333	.2619977	-2.8691850	-1.8374816
3 Month	-7.272	275.228	**.000**	-1.87333	.2576119	-2.3804735	-1.3661932

Table 3: Schirmer's test (mm) comparison by unpaired t test (operated vs non-operated eye)

Unpaired t-test for Equality of Means							
Time	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% CI of the Difference	
						Lower	Upper
Pre-op	-.146	298	**.884**	-.086667	.5948777	-1.2573601	1.0840268
1 Week	-7.224	264.771	**.000**	-5.35333	.7410062	-6.8123480	-3.8943187
1 Month	-5.065	269.194	**.000**	-3.786667	.7476607	-5.2586727	-2.3146606
3 Month	-4.416	262.601	**.000**	-3.16000	.7155588	-4.5689631	-1.7510369

On application of unpaired t test meniscus height, tear film break up time and Schirmer's test mean values in operated & non-operated eyes having significant difference. (Table 1, 2 & 3).

There were 18 (12%) cases diagnosed as dry eye after cataract surgery, while 132 (88%) were normal eyes after surgery. In this study OSDI (sensitivity 100%, specificity 90.37%) was found more reliable than TBUT (sensitivity 100%, specificity 53.33%) for diagnosis of dry eye taking into consideration sensitivity and specificity followed by Schirmer's test.

DISCUSSION:
7 out of 18 patients develops dry eye at the end of 3 months post operatively in 61-70 age group & 6 were from 71-80 years age group. Kamla Dodia et al[14] in their study found that dry eye is associated with higher age (>65years). Ram J et al[4] showed that tear film stability was affected most commonly in older age group between 66-75 years.

Significant decrease in TMH observed in this study post-operatively similar observation was found in study done by Cho et al[15] and Gharaee et al.[16] In contrast to this, Sitompul et al[17] did not found any significant difference in TMH on follow up visit compared to preoperative values.

Li and colleagues[5] reported that misuse of topical eyedrops with preservatives is one of the important reasons for dry eye after cataract surgery. Surface irregularities at incision site may cause faster tear film break up. Kasetsuwan N et al[18] evaluated dry eye following cataract surgery in 92 patients. TBUT deteriorated 7 days post phacoemulsification cataract surgery. After 3 months, there was a gradual improvement in TBUT values. Sinha M et al[19] showed deterioration in TBUT at 1 week, 1 month and 3 months. However, Ram et al[4] in 23 patients reported no difference in TBUT pre and post phacoemul sification cataract surgery which contrasts with our study. This difference may be because of small sample size of their study.

Gradual improvement in Schirmer's test value after 3 months which decreased post-operatively was observed by Cetinkaya et al[20] and Kasetsuwan N et al[18] like this study findings. Cho et al[15], Gharaee et al[16] and Li et al[5] also observed that Schirmer's test values were reduced on post-operative day 30 and it was statistically significant.

This study shows deterioration of OSDI score following cataract surgery, similar observation was found in Kasetsuwan N et al[18], Bhattacharjee S et al[21] & Sinha M et al.[19] Study by Li et al[5] did not find statistically significant difference in OSDI score pre and post cataract surgery. Calvin W Roberts et al[22] showed that use of cyclosporine 0.05% emulsion twice daily for one month prior and one month following cataract surgery reduces dry eye occurrence post operatively.

CONCLUSION:
Phacoemulsification cataract surgery affects tear film adversely. Tear meniscus height, tear film break up time, Schirmer's test and OSDI score values showed deterioration following phacoemulsification cataract surgery. Deterioration peaked at 1 week post-operatively and showed gradual improvement towards end of 3 months postoperat ively. Incidence of dry eye after phacoemul sification cataract surgery in our study was 12% at 3 months postoperatively.

Evaluation of patients pre and post phacoemulsification cataract surgery should be done for identification of unhealthy ocular surface which will ensure promising results postoperatively.

RECOMMENDATION:

After phacoemulsification cataract surgery, dry eye symptoms can develop immediately, and the severity can peak on seventh day post-operatively. Phacoemulsification cataract surgery worsen dry eye symptoms post operatively in patients with pre-existing dry eye. It is of paramount importance that ophthalmologists assess dry eye before and after phacoemulsification cataract surgery to ensure good quality of vision and patient satisfaction. When dry eye is diagnosed pre or post operatively, surgeon should add topical preservative free lubricating drops and in exceptional circumstances topical cyclosporine drops. One should use ophthalmic viscosurgical devices (OVDs) on corneal surface during phacoemulsification cataract surgery to reduce the trauma induced by surgery and BSS irrigating solution flushing, especially in the patients who are diagnosed with dry eyes preoperatively.

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