

Changes in tear film indices following manual small incision cataract surgery for age-related cataract in Northern Nigeria

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Introduction: The tear film is the interface between the ocular surface epithelium and the environment.¹ Mucin, aqueous, and lipid make up its three layers.¹ Cataract is the leading cause of blindness in the world, and Manual small incision cataract surgery (MSICS) is efficient in developing countries such as Nigeria due to its cost-effectiveness.²

There is a high prevalence of OSD in the ageing population in Nigeria, with a high proportion of cataract patients suffering from the disease, some of whom will eventually undergo a cataract surgical procedure.³ Cataract surgeries have widely been seen to adversely affect the tear film status in the early postoperative period, leading to the development of dry eye.

^{4, 5}

Studies showed that it could exacerbate or induce symptoms of dry eye disease postoperatively, at least for the first two months.⁴⁻⁷ Increased inflammatory mediators, surface irregularity at the site of the incision and/or light from the operating microscope can play a role in the initiation or exacerbation of OSD postoperatively.^{4,8-11}

This study seeks to evaluate changes in tear film indices using Tear break up time, Schirmer's test I, and Tear meniscus height before and after MSICS in patients with age-related cataract.

Methods: A hospital-based prospective observational study. Consenting patients with age-related cataract aged 40 years and above attending ECWA Eye Hospital, Kano, during the study duration and who met the inclusion criteria were recruited.

Tear break-up time, Schirmer's test-1, Tear meniscus height were measured preoperatively, on day 1, at week 4 and at week 12 postoperatively. Ocular surface index score was assessed preoperatively, at 4 weeks and at 12 weeks.

All patients underwent MSICS under peribulbar anaesthesia by experienced surgeons using a standard technique. IBM-SPSS version 26 was used for data analysis. Ethical approval was obtained from the institution, and informed consent was obtained from the patients. P-value <0.05 was considered statistically significant.

Results: A total of 124 patients were recruited, 6 were lost to follow-up while 118 completed the study. There were more males (78%) than 26 females (22%) with a Male: Female ratio of 3.5:1. The mean age was 63±8.39 years. Tear break up time (TBUT) reduced significantly on day 1, with a gradual improvement observed by 12 weeks (Table 1).

Schirmer's test-1 and TMH declined significantly at 1 month, with gradual recovery observed by 12 weeks (Table 2).

Table 1: Comparison of the frequency of preoperative and postoperative dry eye at Day 1, Week 4, and Week 12 using Ocular Surface Disease Index and Tear Break-Up Time

OSDI	Normal	Mild/Mod	Severe	Mean	P-value	T-test
Pre-op (N/%)	5(4.2)	93(78.8)	20(17.0)	26.01±2.81		
4 Weeks (N/%)	72(61)	46(39.0)	0(0)	12.22±6.29	<0.001	12.66
12 Weeks (N/%)	100(84.7)	18(15.3)	0(0)	7.09±4.77	<0.001	17.48
TBUT (sec)	Normal	Mild/Mod	Severe	Mean	P-value	T-test
Preop (N/%)	101(85.6)	17(14.4)	0(0)	10.67±1.55		
Day 1 (N/%)	7(5.9)	83(70.4)	28(23.7)	6.52±1.78	<0.001	27.22
4 Weeks (N/%)	40(33.9)	71(60.2)	7(5.9)	8.00±2.02	<0.001	17.11
12 Weeks (N/%)	86(72.9)	32(27.1)	0(0)	9.49±1.42	<0.001	8.80

OSDI- Ocular surface disease index; TBUT-Tear break-up time

Table 2: Comparison of the frequency of preoperative and postoperative dry eye at Day 1, Week 4, and Week 12 using Schirmer's test-1 and Tear meniscus height

Schirmer's test-1 (mm)	Normal	Mild	Severe	Mean	P-value	T-test
Preop (%)	107(90.7)	11(9.3)	0(0)	19.42±7.68		
Day 1 (N/%)	112(94.9)	6(5.1)	0(0)	23.67±6.65	<0.001	6.403
4 Weeks (N/%)	45(38.1)	71(60.2)	2(1.7)	12.83±5.32	<0.001	7.95
12 Weeks (N/%)	87(73.7)	31(26.3)	0(0)	12.96±6.33	<0.001	9.12
TMH	>0.25 mm	<0.25 mm	Mean	P-value	T-test	
Preop(%)	114(96.6)	4(3.4)	0.28±0.4			
Day 1 (N/%)	101(85.6)	17(14.4)	0.27±0.06	0.037	2.12	
4 Weeks (N/%)	72(61.0)	46(39.0)	0.24±0.05	<0.001	-8.51	
12 Weeks (N/%)	96(81.4)	22(18.6)	0.26±0.05	<0.001	5.35	

Discussion: The study observed short term variations in tear film indices following MSICS with the most pronounced effects at day 1 and 4 weeks after surgery. Gradual recovery occurred by 12 weeks but was yet to reach baseline, this is consistent with previous studies.^{6,13} The reduction in TBUT and TMH is likely due to surgical trauma, conjunctiva manipulation and postoperative use of preserved topical medications. This is comparable to the findings of earlier authors.^{6,13-17}

At 12 weeks postoperatively, TBUT detected dry eye in 27.1% of the patients, OSDI score found 15.3% to have dry eye. This study observed high prevalence of dry eye disease (DED) using OSDI score in participants preoperatively (95.8%). The presence of blurred and poor vision as

scoring points in OSDI questionnaire may be contributory to higher prevalence in this study since they are also the major symptoms of cataract. However, the mean OSDI score significantly reduced over time post-operatively, because after surgery vision got improved and this might have contributed to improved OSDI score. Even though the blurring of vision was transient preoperatively, it was significant enough to affect the overall OSDI score.

Schirmer's test -1 detected dry eye in 26.3% of the participants and TMH observed 18.6% at 12 weeks postoperatively. A statistically significant reduction in the mean values of all assessed tear film indices was observed at postoperative period with p- values of < 0.001. The clinical implication is that patients may

experience early postoperative dry eye symptoms, which can be mitigated by artificial tears, adequate preoperative assessment and counselling.

Conclusion: The study showed statistically significant reduction in tear film indices assessed postoperatively when compared with preoperative values and demonstrates the need for counselling and evaluation for DED to improve postoperative satisfaction and care.

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