Original Article

EFFECT OF TRANS PRK ON TEAR FILM STABILITY

Syeda Iqra Iqbal[a], Zahid Siddiq[b], Bassam Mubarik[c]
[a] Doctor of Optometry, M. Phil Clinical Optometry, The University of Faisalabad.
[b] Professor, Department of ophthalmology, Madinah Teaching Hospital, Faisalabad.
[c] Assistant Professor, Department of ophthalmology, Madinah Teaching Hospital, Faisalabad.

ABSTRACT:

OBJECTIVE: To determine the effect of Trans PRK on tear film stability.
STUDY DESIGN: Pre and post test design.
SETTING: The study was conducted in Madinah Teaching Hospital, Faisalabad.
PERIOD: From October 2017 to May 2018.
MATERIALS AND METHODS: Thirty patients having refractive errors with age from 18-44 years were selected in this study on the basis of inclusion and exclusion criteria by using Schirmer II test and Tear Break up Time Test (TBUT). After informed consent, demographic data, including name, age, sex and address for all the cases was obtained. Trans PRK refractive surgery was done. The patients were then followed up at one week, three month and six months after Trans PRK to determine the tear film stability. The data was analyzed by using SPSS version 23. Categorical variables presented as frequency and percentages and numerical variables presented as mean ± standard deviation.
RESULTS: All the pre-operative Schirmer II test values were more than 10mm/5sec and tear breakup time were more than 10 seconds. The schirmerII test value was nearly stable after surgery, but the mean TBUT was 12 seconds at pre operation, 7 seconds at post operative one week and 9 seconds at three month, and 10 seconds at six months post operatively. A comparison between three pairs of Schirmer test in mm was, Pair 1 between one week pre Trans PRK 13 ± 1.531 mm and one week post Trans PRK 9.00 ± 3.553 mm, the mean difference 4.000 mm shows that p-value <0.00. Pair 2 between one week pre Trans PRK 13 ± 1.531 mm and three months post Trans PRK 11.07 ± 2.753 mm the mean difference 1.933 mm shows that p-value <0.00. Pair 3 between one week pre Trans PRK 13 ± 1.531 mm and six month post Trans PRK 12.07 ± 1.311 mm, the mean difference 0.933 mm shows that p-value <0.02 statistically significant indicates that Schirmer test gradually reached nearly to the normal values with time as after 6 months. Similarly, a comparison between three pairs of Tear break up test (TBUT) in seconds was, Pair 1 between one week pre Trans PRK12.00 ± 1.365 sec and one week post Trans PRK7.05 ± 1.147 sec the mean difference 4.950 sec shows that p-value <0.00. Pair 2 between one week pre Trans PRK12.00 ± 1.365 sec and three month post Trans PRK9.00 ± 1.722 sec the mean difference 3.000 sec shows that p-value <0.00. Pair 3 between one week pre Trans PRK12.00 ± 1.365 sec and six month post Trans PRK10.06 ± 2.642 sec the mean difference 1.943 sec shows that p-value<0.002 indicates that Tear break up test values fluctuated with time.
The relationship between TBUT and dry eye symptoms in which 25 (41.67%) eyes out of 60 showed a decreased TBUT and 23 (38.33%) eyes out of 60 complained dry eye symptoms and 18 (78.26 %) among the 23 eyes with dry eye symptoms had decreased TBUT (p-value <0.05).
CONCLUSION: This study concluded that the Trans PRK had altered tear film stability. In comparison of tear film stability before and after Trans PRK there was significant change in TBUT test values of post Trans PRK than Pre-Trans PRK values.
KEY WORDS: Trans PRK, Schirmer II Test, Tear Break up Time test, Refractive errors, Tear Film

INTRODUCTION:

The tear film is a microscopic layer that moistures and prevents the eyes. Tear film consists of the three layers the outermost is lipid layer, middle is aqueous layer and the innermost is mucous layer. Mucous layer is a scaffold-like structure that helps in cell adhesion. They're also considering as defending component against ocular surface damage. Dry eye is a disease with some specific ocular symptoms which arise from damage to the ocular surface, instability of the tear film content.[1,2,3,4,5]

A refractive error requires detection and treatment as glasses, contact lens or refractive surgical procedure. These clinical administrations are promptly accessible in most European nations, in spite of the fact that they accompany huge money related ramifications to both national social insurance frameworks and to people. [6,7,8]

Many techniques have been used for correction of refractive errors but Trans-epithelial Photorefractive keratectomy(Trans PRK) is most commonly used technique for correction of vision. Trans PRK is a one-step treatment that avoids the eye from touches any instrument. The epithelial layer and the stroma are removed during this type of surgery, however, as the name suggest, they are removed in a single, swift step with a laser and no other instruments are used during the entire operation. With the benefit of this technique also have some side effect such as dry eye. Dry eyes can be evaluated on basis of TBUT (tear break up time) and Schirmer II test.[9,10,11,12]

So the purpose of study was to assess the tear film stability Pre and Post Trans PRK and to detect the dry eye condition after Trans PRK. To create awareness about dry eyes determined after 6 months of refractive surgery to provide some instructions and recommendations after assessing the tear film stability by diagnostic tests. For prevention of the dry eye after refractive surgery using lubricating drops properly guided by an ophthalmologist.

RATIONALE:

- This study was conducted to evaluate the tear film stability before and after Trans PRK.

Corresponding Author:
Syeda Iqra Iqbal
Doctor of Optometry, M. Phil Clinical Optometry,
The University of Faisalabad.
Email: abeehafatima91@gmail.com

- To detect the dry eye condition after Trans PRK.
- To create awareness about dry eyes determined after refractive surgery to provide some instructions and recommendations after assessing the tear film stability by diagnostic test, tear breakup time and tear secretion rate by Schirmer II test.

MATERIALS AND METHODS:

This study was conducted at department of Ophthalmology, Madina Teaching Hospital Faisalabad, Pakistan for the duration of October 2017 to May 2018. Convenient sampling was used for selection of patients. 30 Patients with different refractive errors coming for Trans PRK aged between 18-44 years were included in this study while Patients having dry eye before Trans PRK were excluded. Visual acuity was taken with glasses, and refractive error of both eyes was found out through auto-refractometer. Tear film stability and tear secretion rate was checked by TBUT using fluorescence strips in cobalt blue light of the slit lamp and SchirmerII test by schirmer strips in 1 week pre Trans PRK and 1 week, 3 months and 6 months post Trans PRK patients. Data was analyzed by using SPSS version 23. Statistical analysis Paired samplest-test was used for comparison of results. The P-value less than or equal to the 0.05 was considered as statistically significant.

RESULTS:

A total of 30 patients fulfilling the inclusion/exclusion criteria were enrolled in this study to compare the frequency of pre and post-operative scores of Schirmer II test and TBUT for check the tear film stability and tear secretion rates after Trans PRK refractive surgical procedure. The age distribution of the patients was shown that 40% (n=12) in 18-26 years of age group, 33.33% (n=10) in 27-35

years of age group and 26.67% (n=8) in 36-44 years of age group. The mean and standard deviation of age groups was calculated as 29.8 ± 7.24. There was a significant difference in demographic variables (Table-1). Patients were distributed according to gender showing that 50% (n=15) were male while remaining 50% (n=15) were females (Table-2).

Tear film stability and tear secretions outcome variables were observed by using tear break up time (TBUT)and Schirmer II test values which was compared from pre-operatively and at followed up of 1 week, 3 month and 6 months after Trans PRK surgical procedure. P-value was calculated as <0.05 showing a significant difference. The table shows a comparison between three pairs of SCHIRMER TEST in mm, pair 1 shows a comparison between one week pre Trans PRK 13 ± 1.531 mm and one week post Trans PRK 9.00 ± 3.553 mm, the mean difference 4.000 mm shows that p-value <0.00. Pair 2 shows a comparison between one week pre Trans PRK 13 ± 1.531 mm and three month post Trans PRK 11.07 ± 2.753 mm the mean difference 1.933 mm shows that p-value <0.00. Pair 3 shows a comparison between one weekpre Trans PRK 13 ± 1.531 mm and six month post Trans PRK 12.07 ± 1.311 mm the mean difference 0.933 mm shows that p-value <0.02.The result statistically significant (p<0.05) indicates that schirmer test gradually reached nearly to the normal values with time as after 6 months. The table shows a comparison between three pairs of Tear break up test (TBUT) in seconds, Pair 1 shows a comparison between one week pre Trans PRK12.00 ± 1.365 sec and one week post Trans PRK7.05 ± 1.147 sec,the mean difference 4.950 sec shows that p-value <0.00. Pair 2 shows a comparison between one week pre Trans PRK12.00 ± 1.365 sec and three month post Trans PRK9.00 ± 1.722, the mean difference 3.000 sec shows that p-value <0.00. Pair 3 shows a comparison between one week pre Trans PRK12.00 ± 1.365 secand six months post Trans PRK10.06 ± 2.642 sec,the mean difference 1.943 sec shows that p-value<0.002. The result statistically significant (p<0.05) indicates that Tear break up test values fluctuated with time. All the pre-operative schirmer test values were more than 10mm/5sec and tear break up time were more than 10 seconds.

The relationship between TBUT and dry eye symptoms are shown in (Table-5)in which 25 (41.67%) eyes out of 60 showed a decreased TBUT and 23 (38.33%) eyes out of 60 complained dry eye symptoms and 18 (78.26 %) among the 23 eyes with dry eye symptoms had decreased TBUT and showed a statistical significance (p < 0.05).

Table-1: AGE DISTRIBUTION

Age	No. of patients	Percentage %
18-26 years	12	40 %
27-35 years	10	33.33 %
36-44 years	8	26.67 %
Total	**30**	**100 %**

Table-2: GENDER DISTRIBUTION

Gender	No. of patients	Percentage %
Male	15	50 %
Female	15	50 %
Total	**30**	**100 %**

Table-3: COMPARISION BETWEEN 3 PAIRS OF SCHIRMER II TEST VALUES IN MM

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	One.week.Pre.Trans.PRK.in.mm - One.week.Post.Trans.PRK.in.mm	4.000	2.865	.523	2.930	5.070	7.648	29	.000
Pair 2	One.week.Pre.Trans.PRK.in.mm - Three.month.Post.Trans.PRK.in.mm	1.933	2.463	.450	1.014	2.853	4.300	29	.000
Pair 3	One.week.Pre.Trans.PRK.in.mm - Six.month.Post.Trans.PRK.in.mm	.933	2.132	.389	.137	1.730	2.397	29	.023

Table-4:COMPARISION BETWEEN 3 PAIRS OF TEAR BREAK UP TEST(TBUT) VALUES IN SEC

Paired samples test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	One.week.Pre.Trans.PRK.in.sec - One.week.Post.Trans.PRK.in.sec	4.950	1.821	.332	4.270	5.630	14.888	29	.000
Pair 2	One.week.Pre.Trans.PRK.in.sec - Three.month.Post.Trans.PRK.in.sec	3.000	2.378	.434	2.112	3.888	6.910	29	.000
Pair 3	One.week.Pre.Trans.PRK.in.sec - Six.month.Post.Trans.PRK.in.sec	1.943	3.164	.578	.762	3.125	3.364	29	.002

Table-5: POST-OPERATIVE TEAR BREAK UP TIME AND DRY EYE SYMPTOMS (NO. OF EYES (%))

Dry Eye Symptoms	Tear Break Up Time (Seconds) >10	Tear Break Up Time (Seconds) < 10	Total
Positive	5 (8.3%)	18 (30%)	23 (38.3%)
Negative	30 (50%)	7 (11.67%)	37 (61.67%)
Total	35 (58.3%)	25 (41.67%)	60 (100%)

DISCUSSION:

The purpose of this study was to investigate the effect of the Trans PRK on tear film stability. Although the TBUT and schirmer II test is less accurate than more specific tests in tear fluid flows, these tests are inexpensive and easily available. We performed Schirmer II test and tear break up time (TBUT) to check tear film stability in our patients. Our study reported that Schirmer II score was fluctuated post operatively at one week, one month and six months after Trans PRK, as compared to one week pre Trans PRK score. But the post operative Schirmer II test values were near to stable. According to Holly[13] the accuracy of the Schirmer test can be improved by measures such as topical anesthesia, eye closure, and proper position of the strips. Tomas et al[14] and Luger et al[15] both were noticed a fluctuation in Schirmer values post operatively Trans PRK after one week, one month and six month. Both were concluded that the Schirmer test values were near to stable values. Similarly Leiteet al[16] reported that Schirmer score were nearly stable post-operatively after 6 months Trans PRK. Kallarckal et al[17] also noticed that Schirmer II values fluctuated at one month and then gradually came back to normal in period of three to six months that shows decrease in tear secretions and tear film stability is due to its poor sensitivity and reproducibility. Siganose et al[18] conducted same study, he reported a decrease in basal tear secretions test values at one week post operatively, but gradually become near to stable after 6 months post operatively Trans PRK.

Lemp[19] reported that TBUT is a reliable and reproducible test in normal subjects and suggested that value less than 10 seconds were abnormal. A reduced tear breakup time indicative of the tear film instability, and the refractive Trans PRK may cause a persistent break up of the tear film. Our study results noticed that Trans PRK may change the tear film stability and values of TBUT test decreases at one week postoperatively after Trans PRK although none of our cases had pre operative dry eyes. Lee et al[20], Hong et al[21] and Beheshtnejad et al[22] also observed that reduced TBUT test values significantly lower after one week post operatively.

Symptoms suggestive of relative tear deficiency, such as, poor sensitivity, visual fluctuation, foreign body sensation, reproducibility and absence of reflex tearing, have been described during the first one week and one month after Trans PRK while after 6 months Trans PRK symptoms are nearly too stable.[23] In conclusion, we think that Trans PRK may change the tear flow dynamics on flattened corneal surfaces and decrease the tear break up time. Proper treatment of dry eye was required after refractive surgery Trans PRK.[24,25]

CONCLUSION:

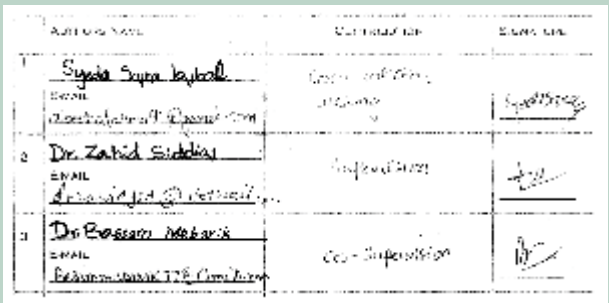
Trans-epithelial Photorefractive keratectomy

(Trans PRK) significantly changes tear film stability and tear secretion for at least six months post operatively.

REFERENCES:

1. Sweeney DF, Millar TJ, Raju SR. Tear film stability: a review. Experimental eye research. 2013;117:28-38.
2. Mark, R. Computer vision syndrome (a.k.a digital eye strain).Optometry in practice. 2016; 17 (1): 1-10.
3. Mark, A., Kate, H. & Darlene, D.: Mucin. Review of ophthalmology. 2013: 1347-25786
4. Mohamed M, Abu-Steit M, Shalaby A, Sherif A. Evaluation of dry eye syndrome after LASIK and surface ablation: a comparative study. Journal of the Egyptian Ophthalmological Society. 2015;108(4):221.
5. Downie LE, Keller PR. A pragmatic approach to the management of dry eye disease: evidence into practice. Optometry and Vision Science. 2015;92(9):957-66.
6. Chen X, Stojanovic A, Liu Y, Chen Y, Zhou Y, Utheim TP. Postoperative changes in corneal epithelial and stromal thickness profiles after photorefractive keratectomy in treatment of myopia. Journal of Refractive Surgery. 2015;31(7):446-53.
7. Li S-M, Zhan S, Li S-Y, Peng X-X, Hu J, Law HA, et al. Laser-assisted subepithelial keratectomy (LASEK) versus photorefractive keratectomy (PRK) for correction of myopia. The Cochrane database of systematic reviews. 2016;2:CD009799.
8. Spadea L, Verboschi F, De Rosa V, Salomone M, Vingolo EM. Long term results of no-alcohol laser epithelial keratomileusis and photorefractive keratectomy for myopia. International journal of ophthalmology. 2015;8(3):574.
9. Harada VYS, Rangel FLB, Lopes SSdS, Barbosa DVBF, Hino FN, RibeiroLGdIR, et al. Influence of the change in the shape of the corneal epithelium removal in postoperative PRK visual acuity. RevistaBrasileira de Oftalmologia. 2016;75(4):269-73.
10. Sugahara Harada VY, Beraldi Rangel FL, da Silva Lopes SS, Boas DV, Hino FN, de Imparato Rodrigues Ribeiro LG, et al. Influence of the change in the shape of the corneal epithelium removal in postoperative PRK visual acuity. RevistaBrasileira de Oftalmologia. 2016;75(4).
11. Pande C, Mahatme V, Borkar A, Sutaria S, Wairagade N. PRK–Photo Refractive Keratectomy In Correction of Myopia: How Useful Is It? Journal of evolution of medical and dental sciences-jemds. 2015;4(22):3890-6.
12. Adib-Moghaddam S, Soleyman-Jahi S, Moghaddam AS, Hoorshad N, Tefagh G, Haydar AA, et al. Efficacy and safety of transepithelial photorefractive keratectomy. Journal of Cataract & Refractive Surgery. 2018.
13. Holly, F. J. Lacrimation kinetics as determined by a Schirmer-type technique. Adv. Exp. Med, Boil. 350:543, 1994.
14. Tomás-Juan J, Larranaga AM-G, Hanneken L. Corneal regeneration after photorefractive keratectomy: a review. Journal of optometry. 2015;8(3):149-69.
15. Luger MH, Ewering T, Arba-Mosquera S. Myopia correction with transepithelial photorefractive keratectomy versus femtosecond– assisted laser in situ keratomileusis: One-year case-matched analysis. Journal of Cataract & Refractive Surgery. 2016;42(11):1579-87.
16. Leite RA, Nosé RM, Daga FB, Lui TAF, Lui GAF, Lui-Netto A. Analysis quantitative and qualitative of the tear film in patients undergoing PRK and LASIK with femtosecond. Revista Brasileira de Oftalmologia. 2014;73(5):273-8.
17. Kallarackal GU, Ansari EA, Amos N, Martin JC, Lane C, Camilleri JP. A comparative study to assess the clinical use of Flurosceine time with Tear Break Up Time and Schimer test in the diagnosis of dry

eye. 2002;16(5):594-600.
18. Siganose DS, Cornea NP, Charalanbos SS, Georgia P. The secretion following Excimer laser in situ keratomileusis. Journal of Cataract & Refractive Surgery. 2002;18(2):124-26.
19. Lemp, M. A.:Dry eye secondary to mucus deficiency.Trans. Am. Acad. Ophthalmol. Otolaryngol. 75: 1223, 1971.
20. Lee JB, Ryu CH, Kim J-H, Kim EK, Kim HB. Comparison of tear secretion and tear film instability after photorefractive keratectomy and laser in situ keratomileusis1. Journal of Cataract & Refractive Surgery. 2000;26(9):1326-31.
21. Hong JW, Kim HM. The changes of tear break up time after myopic excimer laser photorefractive keratectomy. Korean Journal of Ophthalmology. 1997;11(2):89-93.
22. Beheshtnejad AH, Hashemian H, Kermanshahani AM, Mahmoudi A, Johari MK. Evaluation of tear osmolarity changes after photorefractive keratectomy. Cornea. 2015;34(12):1541-4.
23. Tervo, T. M. T., Virtanen, T., Honkanen, N. Harkonen, M., and Tarkkanen, A.: Tear fluid plasmin activity after excimer laser photorefractive keratectomy. Invest. Ophthalmol. Vis. Sci. 35: 3045, 1994.
24. DoughettyWellish, K, L., Maloney, R, K.: Excimer laser ablation rate and cornea hydration. Am. J. Ophthalmol. 118: 169, 1994.
25. Tuft, S. J., Gattry, D. S., Rawe, I. M, and Meek, K. M.: Photorefractive keratectomy implications of corneal wound healing. Br. J. Ophthalmol. 77: 243, 1993.



Submitted for publication: 31.10.2018

Accepted for publication: 19.02.2019
After Revision

Failures are often the results of timidity and fears; disappointments are the results of bashfulness; hours of leisure pass away like summer-clouds, therefore, do not waste opportunity of doing good

Hazrat Ali (Karmulha Wajhay)