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Dry eye syndrome in the postoperative period after laser vision correction

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HIGHLIGHTS
Treatment of dry eye syndrome after laser vision correction.

ABSTRACT
The paper presents the results of research on the occurrence, severity and persistence of the dry eye syndrome in patients after laser vision correction. The patients were treated with preservative-free lubricating eye drops, with a specific percentage of sodium hyaluronate.
The research was carried out on a group of 70 patients who underwent laser vision correction.

Key words: laser vision correction, postoperative period, dry eye syndrome

INTRODUCTION

Laser vision correction is performed with an excimer or femtosecond lasers. Excimer laser treatments can be lamellar (LASEK, EBK) or involve the formation of a corneal flap (LASIK, SBK LASIK, femtoLASIK).

In procedures with an excimer laser, the vision is corrected by changing the corneal shape by laser ablation. Procedures using only a femtosecond laser (SmartSight, SMILE), involve forming lenticules within the cornea and removing them through a minimally invasive incision. SmartSight and SMILE methods eliminate excimer laser ablation. Since excimer laser procedures change the corneal structure, they may cause temporary dry eye syndrome (DES) symptoms. Depending on the laser correction method and on the individual characteristics of the healing process, the intensity of DES symptoms may vary.

OBJECTIVES

The study aimed to assess the severity and duration DES symptoms after laser vision correction and using preservative-free moisturizing drops with a specific concentration of sodium hyaluronate.

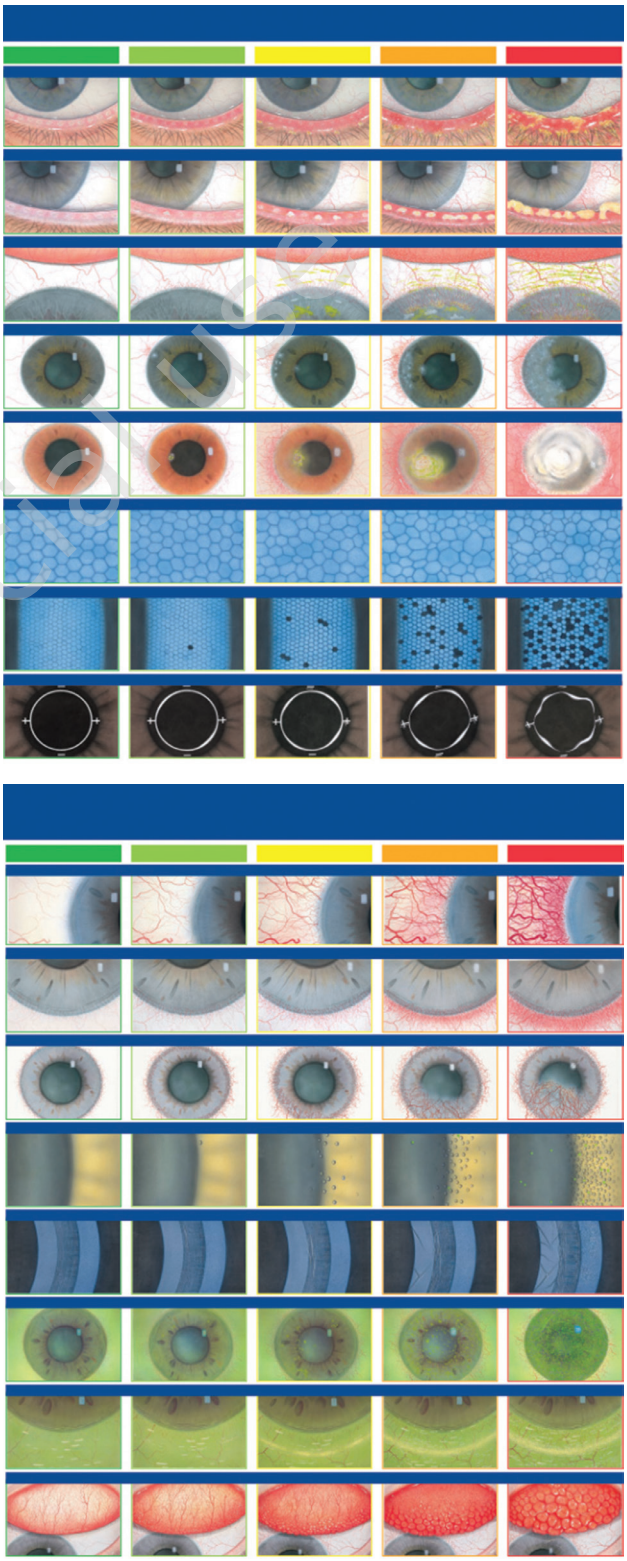
MATERIALS AND METHODS

The study involved 70 patients (140 eyes) who underwent SBK LASIK laser vision correction: 31 women and 39 men aged 21–45 years. Patients who did not show symptoms or subjective DES symptoms were qualified for the procedure. The presence of symptoms associated with DES was verified with the TBUT test and after assessing the anterior section of the eye in a slit lamp according to Efron Grading System (fig. 1). The subjective symptoms of DES were identified by OSDI questionnaire (tab. 2).

In the postoperative period, from the first day following the procedure, 35 patients used in both eyes Vigamox® (moxifloxacin) 4 times a day for a week, Lotemax® (loteprednol) 3 times a day for a month, and moisturizing eye drops containing 1 mg/ml of sodium hyaluronate for a month. One month after the procedure, patients were recommended, if necessary, to reduce the dosage of moisturizing eye drops, i.e., only if they experienced subjective DES symptoms such as dry eyes, stinging, burning, or photophobia. The second group of 35 patients used Vigamox® (moxifloxacin) 4 times a day for a week, Lotemax® (loteprednol) 3 times a day for a month, and HYLO-GEL® (sodium hyaluronate) every hour for a month. After this period of time, HYLO-GEL® was used only in case of subjective symptoms. Before the procedure, as well as 1 week and 2 months following the procedure, the tear film was assessed by slit lamp examination according to the Efron Grading Scale and the TBUT test.

FIGURE 1

Efron Grading System.



RESULTS

Table 1 presents the results of postoperative follow-ups after SBK LASIK procedures performed in a group of 70 patients (140 eyes).

On the 1st day after SBK LASIK procedure, all patients reported moderate subjective DES symptoms, such as burning sensation, photophobia, or dry eyes. One week after the procedure, during the follow-up examination, instability of the tear film detected by the TBUT test (< 10 s) was reported in all examined patients. Mild subjective symptoms (burning, dry eye, photophobia) occurred in 82% of the patients who used eye drops containing 1 mg/ml of sodium hyaluronate and in 63% of patients who used HYLO-GEL® eye drops (sodium hyaluronate).

Table 2 presents the results collected during postoperative follow-up visits 2 months after SBK LASIK procedures.

Two months after the procedure, 25 patients using eye drops containing 1 mg/ml of sodium hyaluronate had normal TBUT results (> 10 s), but in the group using HYLO-GEL® eye drops (sodium hyaluronate) 33% of the patients had normal TBUT results (94%). In the group of patients using eye drops containing 1 mg/ml of sodium hyaluronate, subjective DES symptoms were more frequent (reported by nine patients), which was associated with more frequent administration.

TABLE 1

Results of postoperative follow-up visits 2 weeks after SBK LASIK procedures.

		One day after surgery		One week after surgery	
	Ailments	**yes**	**no**	**yes**	**no**
Sodium hyaluronate 1 mg/ml	**burning sensation**	100%	0	82%	18%
	photophobia	100%	0	82%	18%
	dry eyes	100%	0	82%	18%
	T-BUT < 10 s	-	-	100%	0
	T-BUT > 10 s	-	-	-	-
HYLO-GEL® (sodium hyaluronate)	**burning sensation**	100%	0	63%	27%
	photophobia	100%	0	63%	27%
	dry eyes	100%	0	63%	27%
	TBUT < 10 s	-	-	100%	0
	TBUT > 10 s	-	-	-	-

TABLE 2

OSDI questionnaire. Own study based on [4].

Name and surname					
Age					
Sex					
Date of qualification for the LVC					
A. Have you experienced any of the following problems during the last week?	all the time	most of the time	half the time	sometimes	never
1. Hypersensitivity to light	4	3	2	1	0
2. The feeling of sand under the eyelids	4	3	2	1	0
3. Eye pain/discomfort	4	3	2	1	0
4. Blurred vision	4	3	2	1	0
5. Vision deterioration	4	3	2	1	0
B. During the last week have you reduced the following activities due to your eye problems?	all the time	most of the time	half the time	sometimes	not applicable

6. Reading	4	3	2	1	
7. Driving at night	4	3	2	1	
8. Working on a computer or using an ATM	4	3	2	1	
9. Watching TV					
C. Have you experienced eye discomfort during the last week under conditions listed below?	all the time	most of the time	half the time	sometimes	not applicable
10. Wind	4	3	2	1	
11. Low air humidity	4	3	2	1	
12. Air-condition	4	3	2	1	
D. A + B + C					
E. The number of provided responses (except for "not applicable")					
The OSDI rating – D×25/E					
Interpretation	0–12 correct result 13–22 mild DES 23–32 moderate DES 33–100 severe DES				

Patients with DES symptoms used eye drops 4–5 times a day between the 1st and the 2nd month after the procedure. One patient, who reported worsening of DES subjective symptoms, took for 2 weeks longer glucocorticosteroids 3 times a day and Corneregel® ointment (dexpanthenol) before going to bed. Only 4 patients in the group using HYLO-GEL® eye drops (sodium hyaluronate) experienced subjective DES symptoms between the 1st and the 2nd month following the procedure and reported the need to use eye drops twice a day.

DISCUSSION

SBK LASIK laser vision correction involves cutting the cornea to create a thin corneal flap of about 100 μm, which leads to the superficial corneal nerve plexus damage. In the early postoperative period, this may lead to reduced tear production and postoperative DSE. No additional complications or chronic inflammation caused by DSE were reported in the examined patients up to 2 months after the procedure. One patient with severe symptoms of dryness, apart from severe burning and photophobia, reported fluctuations in visual acuity, which stabilized 2 months after the prolonged use of glucocorticosteroids. There was no correlation between DSE symptoms and the type and degree of refractive error. The subjective DSE symptoms were more pronounced in women over 40 years of age and in patients working for more than 4 hours a day on a computer. All patients remain monitored.

CONCLUSIONS

1. Laser vision correction SBK LASIK leads to moderate DSE in 90% of cases. After 2 months of using moisturizing eye drops, the tear film stabilizes and the subjective DES symptoms disappear.
2. Due to the regeneration of the tear film on the corneal surface after SBK LASIK laser vision correction the subjective ailments resolve faster and patients can use eye drops with a higher concentration of hyaluronic acid (HYLO-GEL® [2 mg/ml of sodium hyaluronate]) less frequently than eye drops with a lower concentration of hyaluronic acid (1 mg/ml of sodium hyaluronate).

Figures: from the author's own materials.

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Piśmiennictwo

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The content presented in the article complies with the principles of the Helsinki Declaration, EU directives and harmonized requirements for biomedical journals.