Comparison of LASIK Preoperative and Postoperative Blink Rate

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Abstract
This is an observational study comparing the blink rate before LASIK and after LASIK. Observations took place during the preoperative and one day postoperative LASIK visits at two primary eye care clinics. The LASIK patients were observed while doing an oral survey titled ***LASIK Preoperative and Postoperative Patient Expectations****, masking the studies true title,* ***LASIK Preoperative and Postoperative Blink Rate****. The preoperative blink rate was counted for 15 seconds and compared to the postoperative blink rate. In seven out of ten patients there was a decrease in blink rate postoperatively. This study was done to increase the awareness of dry eye symptoms for both doctors and future LASIK patients.*

Introduction
Are those really tears of joy? LASIK, the popular refractive procedure, has made many people ecstatic about not having to use glasses and/or contact lenses, but at what consequence? It has long been documented that dry eyes are a side effect to the LASIK, but why? We know that nerves are severed in the cornea when the flap is created in the LASIK procedure, but what else? There still seems to be missing pieces to this unsolved puzzle, so what happens to the blink rate after LASIK and what are its implications?

Methods
This is an observational study comparing the blink rate before LASIK and after LASIK. The observations took place during the preoperative and one day postoperative LASIK visits. The authors recruited patients from two primary eye care centers during clinic time. Patients were informed of the study and asked to participate. All participants read and signed a consent form. Once the consent was signed, the collection of data began.
To increase the validity of the study, a masked title (**LASIK Preoperative and Postoperative Patient Expectations)** was used until after the postoperative assessment. At that time, the patients were informed of the actual title (**LASIK Preoperative and Postoperative Blink Rate)** and that the actual purpose of the study was not the survey, but the observation of there blink rate.
For patients of the primary eye care clinics, data collection was at the time of the patient's scheduled exam and follow-up. No separate visit to the clinic, or follow-up visits, was necessary. The LASIK patients were observed while doing an oral survey conducted by the authors. The preoperative blink rate was counted for 15 seconds and compared to the postoperative blink rate. During the survey, the patients were asked preoperatively how they chose this facility and what their expectations were for the surgery. Postoperatively, the patients were asked if they felt the procedure went as planned and if there expectations were met.

Results

Our statistical analysis is based on a paired Student's t-test developed by W.S. Gossett (1876-1937). This type of analysis is designed for small sample sizes to decrease the chance that the calculated mean and standard deviation vary from the "real" mean and standard deviation (what would be measured if the sample had many more data items). This is accomplished by incorporating small sample corrections into the 95% confidence interval (1). For a paired sample, like the one in our study, a number of criteria must be met in order for the data to be related. For example, the number of data points in each data set must be the same, and they must be organized into pairs in which there is a definite relationship between each pair of data points (3). In other words, the second sample is the same as the first after some treatment has been applied (1).

In our sample, the average number of blinks before LASIK was 6.6, but after the surgery the average blink rate was 5.1. The reduction of 1.5 blinks is statistically significant ($p=0.034$) and thus according to our study LASIK causes a reduced blink rate (2). Seventy percent of the patients in our study had a reduced blink rate postoperatively compared to preoperatively. Of the remaining thirty percent, one patient had no change and two patients had an increase of one blink. The most significant postoperative decrease was five blinks, and the most significant increase was one blink. Table 1 outlines the raw data; the mean preoperative, postoperative and change in blink rates taken in the study. The results of the study are summarized in figure 1.

Preoperative and postoperative LASIK blink rate raw data

Patient	Preoperative blink rate (15 Sec)	Postoperative blink rate (15 Sec)	Difference
1	5	2	3
2	6	4	2
3	10	9	1
4	5	4	1
5	3	3	0
6	6	4	2
7	12	7	5
8	7	8	-1
9	7	4	3
10	5	6	-1
Mean	6.6	5.1	1.5

Table 1

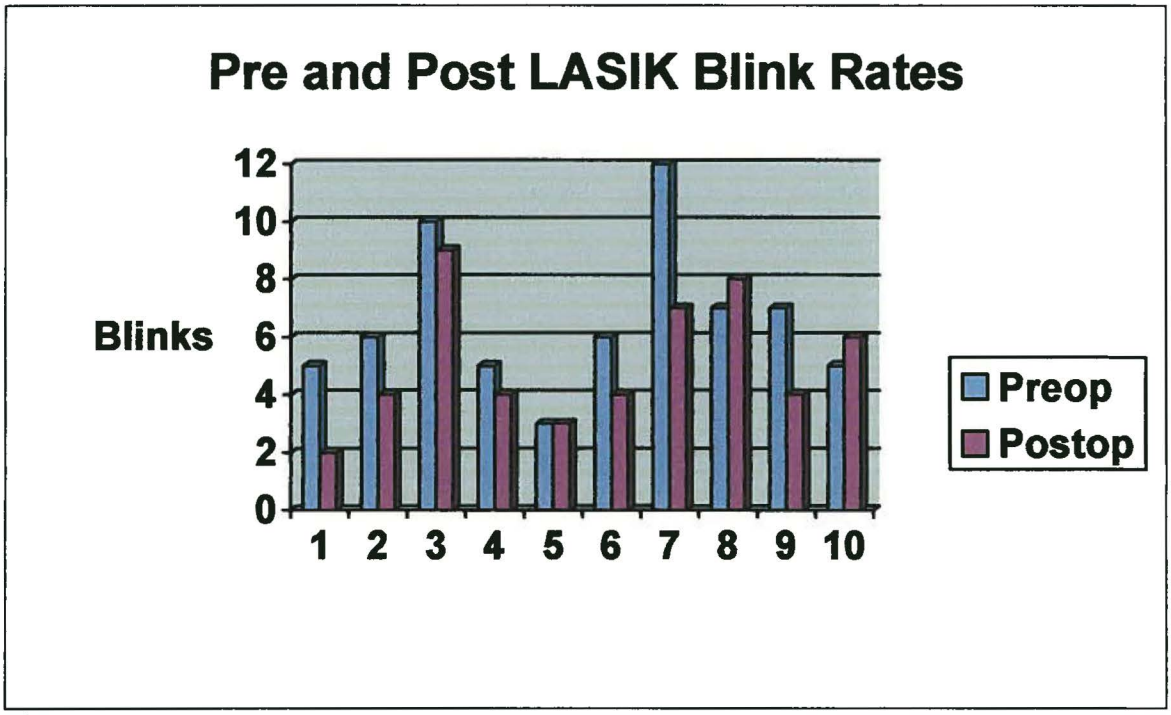

Figure 1

Discussion

The focus of our study was to compare preoperative and postoperative LASIK blink rates to observe if any changes would occur. While many recent studies have been centered on new LASIK technologies, our study emphasizes possible implications of current LASIK technology in order to increase awareness.

Superior-hinged flaps were used on all the patients in our study. Other studies have investigated LASIK flap placement, thickness, diameter, and width of hinge, and there effect on corneal sensitivity. One such study by Eric D. Donnenfeld M.D., Ophthalmic Consultants of Long Island, and medical director TLC Laser center, showed that patients with nasal-hinged flaps have a better return of sensation and less dry eye following LASIK compared to patients with a superior-hinged flap. This is due to the long ciliary nerves growth into the cornea at the 3 and 9 O'clock positions and therefore more nerves are severed with a superior flap. This study also showed corneal sensation was reduced with superior- and nasal-hinged flaps at all visits up to six months. At six months the nasal-hinged flap had returned to normal sensation, while there was still a reduction in sensation in the superior-hinged flap. This study outlined that thinner flaps, wider hinges, and smaller flap diameters all decrease the loss or corneal sensation after LASIK (2).

Our study has limitations, implications, and possibilities for future research. The limitations include: only assessing superior-hinged flaps, the small sample of ten patients, only investigating the patients on the one-day follow up, and no statistical comparison of age, sex, ethnicity, or socio-economic status. The study did not include other factors that may effect dry eye and blink rate including tear film quality, and use of artificial tears after surgery. Finally, the analysis only

included the change in blink rate and did not include possible reasons for the change.

The implications of this study may help enhance the capability of current LASIK procedures and may lead to further research to increase awareness of this surgery. These results may also lead to an overall increased awareness of life after LASIK for those patients who are considering the procedure for themselves. Future research possibilities should include the use of a larger sample, to include variables such as age, sex, ethnicity, socio-economic status, the use of artificial tears, and tear film quality. Further testing at one week, one month, three months, six months, and 12 months should also be included. Finally, flap placement, depth, diameter, and width of hinge should be evaluated along with blink rate.

Acknowledgements

1. Jim Paramore, O.D.

References

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