Delineation of LASIK Flaps with Prednisolone Acetate Eyedrops

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We describe the use and safety of prednisolone acetate eyedrops at the end of laser in situ keratomileusis (LASIK) to aid proper positioning of the corneal flap. The LASIK flap is created using the preferred technique. Following laser ablation and flap repositioning, one drop of prednisolone acetate is instilled on the eye. This delineates the flap “gutters” and allows perfect flap positioning and centration. We used this technique in 425 eyes undergoing LASIK for correction of spherocylindrical refractive errors. Flap margins were adequately delineated intraoperatively. The only complication related to the use of the steroid suspension was crystal deposition under the flap in one case which resolved completely in 48 hours.

Keywords: Prednisolone Acetate; LASIK Flap; Flap Complications

INTRODUCTION

Laser in situ keratomileusis (LASIK), originally described in 1990 by Pallikaris, remains the most commonly performed surgical technique to correct refractive errors. Adequate repositioning of the LASIK flap at the end of the procedure with symmetrical gutters circumferentially is essential to attain good postoperative visual acuity. Despite not being very common (0-12% in different studies), improper flap repositioning may result in striae, and/or folds with a resultant decrease in best-corrected visual acuity and/or increased higher order aberrations. The present way to check proper flap position relies on visual assessment of equidistant “gutters” all around the flap; sometimes the patient is taken to the slit lamp to examine the flap. Herein, we report the use of prednisolone acetate eyedrops to stain the gutters allowing better visualization of the flap margins at the end of surgery. This modification can be used with conventional microkeratome or femtosecond laser assisted LASIK.

Surgical Technique

Our technique was applied in 425 eyes of 222 patients undergoing conventional microkeratome LASIK procedures between January 2011 and May 2012. All patients were screened preoperatively according to our standardized protocol published elsewhere. The flap was fashioned using the Carriazo-Pendular microkeratome with a superior hinge in all cases. Laser was applied to the stromal bed and the flap was repositioned using the wet technique. One drop of 1% prednisolone acetate (Pred Forte, Allergan, Irvine, CA, USA) was then instilled after massaging the flap with a wet surgical sponge. The steroid suspension...
filled the gutters giving a white circumferential ring (Figure 1). If the flap was found not to be centered, it was re-lifted, irrigated and a drop of 1% prednisolone acetate was instilled again and flap position was rechecked. The flap margins were adequately visualized intraoperatively in all cases.

All patients were seen on day 1, week 1, and month 1 postoperatively. Four hundred eyes (94%) were followed for a minimum of 6 months (maximum follow-up was 30 months).

Eleven patients (5%) were lost to follow-up after the first month appointment. Mild to moderate intrastromal cellular infiltration was seen in 9 cases (2.2%). The clinical picture was commensurate with early diffuse lamellar keratitis (DLK). All of these eyes reverted to normal within one week upon increasing the frequency of steroid drops. On the first postoperative day, no crystals were seen along the flap margins in any case.

In 2 patients (0.47%) the flap had to be re-lifted: in one patient debris was found in both eyes on the stromal bed beneath the flaps at the 24-hour visit, the flaps were re-lifted and the stromal bed was irrigated with balanced salt solution (BSS). A drop of prednisolone acetate was instilled after the flap was repositioned. In the second patient significant striae across the central cornea of the right eye was noted seven days after surgery. The flap was re-lifted after debridement of the central epithelium, then it was repositioned and a drop of prednisolone acetate was placed to check that flap edges were symmetrical after which a bandage contact lens was placed.

We encountered only one complication (0.2%) of steroid use: steroid crystals were seen in the interface in the right eye of one patient on day 1 postoperatively (Figure 2). No intervention was done, and the patient was seen 48 hours later at the time which the crystals had completely resorbed.

**DISCUSSION**

The tear film is the first refractive surface of the eye. It fills all microcrevices and thus homogenizes the corneal surface. It can thus mask subtle corneal irregularities. Prednisolone acetate is non-water soluble and is reconstituted as a white-crystal suspension which can be used as topical drops. The crystals tend to settle in the LASIK flap gutters with gravity when instilled on the eye at the end of surgery, while the patient is lying down.

Proper repositioning of the flap in LASIK is necessary to ensure maximal gain in postoperative visual acuity. Misalignment of the flap or unequal gutter sizes may lead to induction...
of higher order aberrations. Management of flap folds involves refloating the flap with or without massage. The earlier the flap is positioned properly, the better the long term results. Our clinical experience with LASIK dates back to more than 14 years. Before we started using a drop of steroids to delineate the gutters, our rate of folds and flap malpositioning was higher than in our most recent cases (unpublished data).

Despite the fact that a pendular microkeratome was used in our series with the hinge placed superiorly, the use of a steroid drop at the end of surgery used to delineate the flap margin can be extended to both microkeratome-LASIK and femto-LASIK regardless of hinge position.

Despite the side effects of prolonged use of steroid drops on the eye, namely, an increase in intraocular pressure, delayed healing, and an increase in the risk of cataract formation, its advantages warrant its use after LASIK. Steroids are used routinely following LASIK procedures to decrease keratocyte activation and prevent scar formation. Their anti-inflammatory role in the cornea is well established. With the technique described herein, we rely on their staining properties.5 This is not the first time that steroids are used for staining. An initial report by Peyman et al6 described their use in vitreoretinal surgery to aid in detaching the posterior hyaloid. Potentially, fluorescein or other dyes can also be used to stain the flap margins; however, fluorescein sodium drops are not used routinely in LASIK surgery and have a long clearance time due to the long-chained molecule. The use of steroid drops is routine in LASIK, so this modification to the established LASIK technique does not involve adding additional medications, nor lengthening surgical time.

Conflicts of Interest
None.

REFERENCES


