

LASIK Buttonhole After Cataract Surgery

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CASE PRESENTATION

A 51-year-old white female with a refraction of -8.50D OS underwent cataract surgery in December 2003 with a target refraction of -2.50D sphere. Postoperatively, her refraction was -1.75 +1.00 X 90 = 20/20 OS, and she was unhappy with her near UCVA.

In June 2004, the patient underwent hyperopic LASIK in her left eye, with a planned ablation of +0.75 +1.00 X 90 for a final endpoint of -2.50D sphere. Her preoperative manifest and cycloplegic refractions were both -1.75 +1.00 X 90 = 20/20, and her corneal pachymetry measured 536µm centrally. Figure 1 shows her preoperative topographic measurements.

The surgeon attempted to create a lamellar flap with a Hansatome microkeratome (Bausch & Lomb, Rochester, NY) using a 9.5-mm ring and a 160-µm plate, but the effort was complicated by a central buttonhole. The ophthalmologist repositioned the flap. One month after the attempted LASIK, the patient's refraction was -0.25 +1.25 X 125 = 20/20- with halo. Figure 2 shows the corneal topography.

The patient requests visual rehabilitation to achieve good near UCVA in her left eye. How would you proceed?

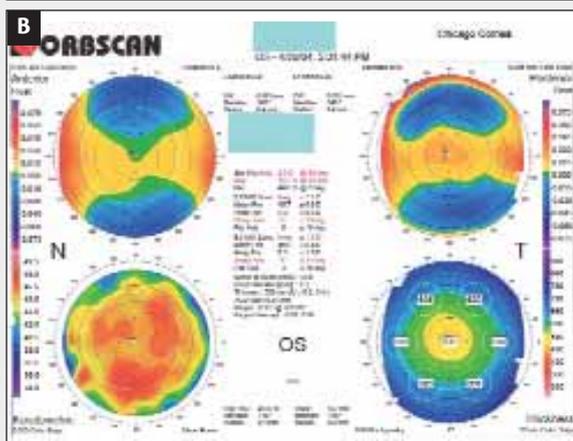
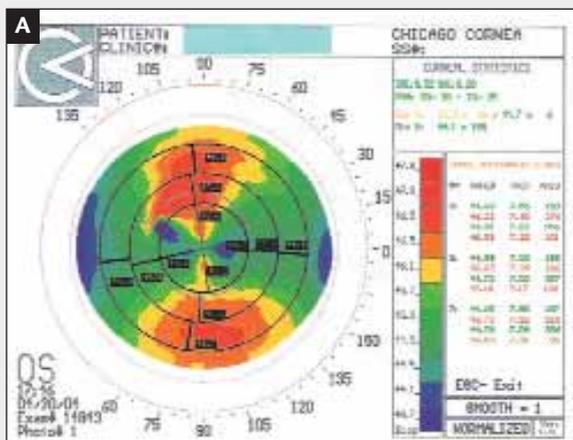


Figure 1. The preoperative measurements with a standard topographer (A) and the Orbscan topographer (Bausch & Lomb) (B) are shown.

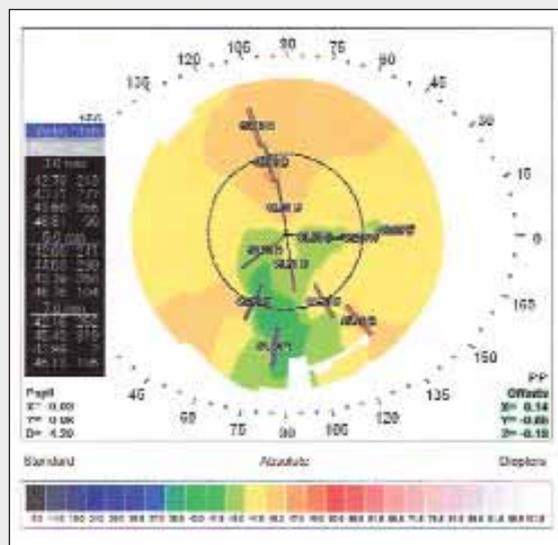


Figure 2. This topographic measurement was taken after an attempted LASIK procedure produced a buttonhole.

ROY S. RUBINFELD, MD

Had this case been presented to a panel of experts just a few years ago, the consensus would likely have been simply to recut the flap after waiting 3 to 6 months. My colleagues and I recently published a series¹ of 12 serious complications incurred by highly experienced LASIK surgeons when attempting to recut flaps under similar circumstances. A majority of these patients lost visual acuity to the point where the surgeons considered gas-permeable lenses, homografts, or corneal transplantation. A recent survey of refractive surgeons that we initiated demonstrated a trend away from recutting flaps in general,¹ and this change is clearly appropriate. Recutting such flaps, even with femtosecond technology, is likely too dangerous in this case because of the potential for transecting the original lamellar plane with a second cut. Surface ablation would be preferable.

“A recent survey of refractive surgeons that we initiated demonstrated a trend away from recutting flaps in general.”

—Roy S. Rubinfeld, MD

If this patient is not willing to use spectacles or contact lenses, I would recommend PRK with an intraoperative application of 0.2mg/mL mitomycin C (MMC) for 30 seconds after the ablation. A growing body of literature attests to the safety of a single application of MMC following surface ablation to prevent haze, which is a significant risk in cases of PRK following previous lamellar surgery. Several ophthalmologists have published their long-term, safe experience with this technique versus the higher risks of previous techniques using MMC at high concentrations over a long period of time.²⁻⁹ The application of ice “popsicles” (frozen Weck-Cel sponges [Medtronic Xomed Ophthalmics, Inc., Minneapolis, MN]) enhances patients’ comfort postoperatively as does the judicious use of NSAIDs and a bandage contact lens.

One outstanding question in this case relates to which type of laser ablation to use. If, over time, the patient achieves excellent BSCVA and the topographic abnormalities visible in Figure 2 resolve, then a wavefront-optimized treatment using a small flying-spot laser such as the Allegretto (Wavelight Laser Technologie AG, Erlangen, Germany) would be appropriate, because small-spot lasers with nonrepetitive patterns appear to be associated with a reduced risk of haze. If, on the other hand, the patient remains symptomatic with spectacle

correction and her irregular astigmatism and higher-order aberrations remain significant, then either a wavefront-guided or a topography-guided ablation might be more appropriate.

A discussion should be held with the patient, during which the complexity of her case is made clear. She should understand that her risk of potential surgical problems may be higher than for a patient who has not had prior refractive surgery or a similar flap-related complication.

FRANCESCO CARONES, MD

Buttonholes are becoming less and less frequent thanks to improvements in microkeratome technology and more selective surgical indications. When the complication occurs, however, its consequences can be challenging to manage. In this case, the eye has some mild corneal irregularity due to the previous buttonhole, which has produced some loss of BSCVA and, more importantly, some visual complaints. I do not know whether there is any epithelial ingrowth or flap melt at the edge of the buttonhole or corneal haze/scarring, but I assume not.

I see only one way to manage this patient and obtain some degree of visual rehabilitation. I would recommend a customized topography-driven excimer laser surface ablation, followed by the application of MMC to control wound healing. I would perform the procedure as soon as the patient is available in order to avoid the risk of epithelial ingrowth with time.

Usually, the most challenging part of this approach is epithelial removal. In this case, I would remove the epithelium with the excimer laser and then perform the required correction in a transepithelial fashion. This approach would minimize the risk of displacing the flap during epithelial debridement. Should the laser available be ineffective at removing the epithelium, I would consider using a 25% diluted alcohol solution to melt the epithelium. I would apply the solution for 30 seconds by filling the barrel of a marking trephine placed on the cornea. After absorbing the alcohol solution with microsponges, one must take particular care in removing the epithelium with dry sponges or blunt instruments so as to avoid any movement of the flap.

The ablation has to correct, or at least reduce, some of the corneal irregularity produced by the buttonhole. For that reason, a customized procedure is seemingly mandatory. My choice for a topography-driven versus wavefront-guided procedure is justified by two factors. First, because the eye is pseudophakic, I would be concerned that higher-order aberrations coming from the edge of the IOL’s optic might contribute to the total

wavefront error of the optical system. Second, given the abrupt changes in curvature generating the irregularity, I would prefer to use more data measurements with greater spatial resolution (as currently provided by corneal topographers rather than wavefront sensors) to program the ablation pattern.

Immediately after the customized ablation, I would apply MMC 0.2mg/mL for 30 seconds in order to prevent the formation of haze and to promote controlled wound healing. The postoperative regimen would be similar to that for a routine surface ablation, with the use of a bandage contact lens until complete re-epithelialization occurs. I would not advocate using steroid eye drops during the postoperative period, because, in my experience, they are not indicated after the use of MMC.

WILLIAM B. TRATTLER, MD

Complications related to the LASIK flap can be challenging for the surgeon and the patient, both of whom expect rapid positive results upon entering the laser suite. When an intraoperative complication occurs, it is important to identify the problem immediately and to outline for the patient the corrective steps required. A positive attitude and close follow-up are critical to keeping patients in the right frame of mind. Also, it is important to address concerns arising from questions posed by their friends and family, especially if they are comparing their own LASIK results to your patients'.

“It is important to identify the [intraoperative] problem immediately and to outline for the patient the corrective steps required.”

—William B. Trattler, MD

It is worth considering discussing the possibility of an immediate transepithelial PRK with every LASIK patient and obtaining informed consent preoperatively in case of a flap-related complication. Jain et al¹⁰ reported excellent visual results in their series of seven patients treated with immediate transepithelial PRK following flap-related complications. Of course, this case was a planned hyperopic ablation, so transepithelial PRK was not an option, as laser epithelial removal is only available on the Visx Star S4 laser (Advanced Medical Optics, Inc., Santa Ana, CA) for myopic corrections.

Most surgeons prefer to replace the flap after a buttonhole and to perform a retreatment 1 to 6 months later. Evaluating these eyes for epithelial ingrowth and

corneal haze is important during the postoperative period. In this case, the patient has recovered 20/20- vision after 1 month, but the quality of her vision is compromised. The problem could be related to mild corneal haze or corneal irregularity, so a slit-lamp examination is critical to the decision-making process. The postoperative topography reveals an area of flattening inferiorly, which may be contributing to her visual complaints.

I would offer this patient a few options. The first would be a contact lens, which could provide the desired goal of monovision in this eye. A second option would be surgical and would first involve addressing two potential problems, the removal of corneal haze/scarring (if present) and the treatment of irregular astigmatism (as seen on topography). One could perform a transepithelial phototherapeutic keratectomy (PTK) to remove haze or scarring from the buttonhole, and this procedure could also help reduce the degree of irregular astigmatism. Of course, PTK could result in a significant hyperopic shift, which would make the patient's refractive goal of -2.50D a challenge with excimer laser ablation. If that were the case, once this patient reached refractive stability a few months postoperatively, I would offer her a piggyback IOL to correct the hyperopic refractive error created by the PTK procedure.

BRIAN S. BOXER WACHLER, MD

As only 1 month has passed since this complication occurred, I would wait at least another 2 months to allow the cornea to heal. Topography at this stage shows mild irregularity.

The recommended treatment would depend on whether the buttonhole resulted in significant scarring in the pupillary axis that is causing visual distortion in addition to the residual refraction. Using a trial lens with the attempted correction would determine if the scar is significant or not. If the patient liked the trial lens, then the refraction is the sole issue.

In this case, I would consider two options: surface ablation with MMC or a thermal procedure (laser thermal keratoplasty or conductive keratoplasty [CK; Refractive, Inc., Irvine, CA]). If the patient is sensitive to the cylinder, then I would favor surface ablation over thermal procedures (it would be necessary to back off on the nomogram due to the preexisting flap). If the trial lens yielded distortions, then the scar is likely a factor, and I would recommend surface ablation to help remove the scar in the process of correcting vision.

DEEPIK K. DHALIWAL, MD

This is a classic case in which “better” is the enemy of “good.” This patient started out as a high myope and,

after cataract surgery, had a refraction of -1.25D spherical equivalent instead of the targeted -2.50D. With such patients, I conduct careful preoperative counseling to inform them that IOL selection is not an exact science and that there are no guarantees as to their final visual outcome, although I will do my best. Most of my highly myopic patients who undergo cataract surgery and end up close to emmetropia are thrilled to wake up and function without spectacles.

“Most of my highly myopic patients who undergo cataract surgery and end up close to emmetropia are thrilled.”
—Deepinder K. Dhaliwal, MD

Unfortunately, this patient insisted on preserving her reading ability and underwent complicated hyperopic LASIK that has resulted in persistently insufficient reading power and mildly irregular astigmatism secondary to a buttonhole flap. Despite topographic irregularity after the buttonhole flap, her BCVA is 20/20-.

The options for correction in this patient include repeat hyperopic LASIK, surface ablation, and CK. I would hesitate to perform repeat LASIK because of the potential for further flap-related complications. I would not choose surface ablation, because there would be minimal central treatment with the hyperopic/astigmatic ablation and the central scarring might still be present.

I favor CK here, because the procedure does not risk further compromising the flap, it can improve her irregular astigmatism and is titratable, and subsequent visual recovery is rapid. As noted by Hersh et al,¹¹ CK allows the correction of hyperopia, hyperopic astigmatism, and irregular astigmatism in some cases in which further manipulation of the flap or additional laser ablation is undesirable. ■

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