

Incomplete Flap due to Lost Suction

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CASE PRESENTATION

A 40-year-old man underwent attempted LASIK with laser flap creation. His preoperative manifest and cycloplegic refractions were -4.00 D OU. Central corneal thickness measured 530 μm . Topography showed regular with-the-rule astigmatism with normal keratometry readings. The palpebral fissures were narrow, and multiple attempts were required to achieve good suction. Creation of the LASIK flap with the IntraLase FS laser (Abbott Medical Optics Inc., Santa Ana, CA) in his right eye was uncomplicated, with an 8.9-mm flap and 120- μm depth setting. In the patient's left eye, suction was lost after 90% of the LASIK flap was created (no side cut was made).

How would you proceed? Would you lift the right flap and complete the excimer laser ablation? Would you recut the flap in the patient's left eye with the same cone? Would you alter the settings of the laser? Would you abandon the excimer portion in both eyes and repeat the procedure at a later date? What are the issues with recutting an IntraLase flap at the same sitting or at a later date? Do you counsel patients preoperatively about such possible scenarios?

PERRY S. BINDER, MS, MD

The position of the laser pass at the time suction was lost will determine the surgeon's options. In this case, the tight palpebral fissures most likely accounted for the loss of suction. If the surgeon recognizes the issue beforehand, he or she can place the suction ring without a speculum, which is the most common approach. Next, he or she can press down in the Z direction *before* applying suction until the conjunctival vessels show through the silicone skirt to ensure solid appplanation. Then, the surgeon can ask his or her assistant to pull slightly on the suction ring to increase vacuum. If the ophthalmologist wishes to further reduce the risk of losing suction, he or she can decrease the intended diameter of the ablation, not create a pocket, and with the assistance of a clinical advisor, increase the separation of the spot and line while

raising the laser raster energy. These steps can save up to 5 seconds, and they may be done prior to any surgery or, in this case, after suction is lost.

IntraLase surgeons are taught that, in the event that suction is lost, they should use the same cone. The reason is that there could be a difference of ± 5 to 10 μm in the height of the cone, even though batches of cones are measured prior to shipment. This case is relatively simple, because the raster passed 90% and no side cut was created. The eye has the gas bubbles and pocket already present to align the re-appplanation of the same cone. The surgeon would turn off the pocket and use the *same* parameters when restarting the raster pass at the beginning. If he or she elected to start where suction was lost, it would be necessary to begin within a minute while the laser thought it was still in the same location. The risk of this approach is that the orientation of the second pass may not be exactly the same as that of the original pass (ie, two raster pattern passes may not be on top of each other). This discrepancy would create a ridge between the two laser passes, which could produce an optical aberration, especially if the difference in the two passes were in the visual axis. Abbott Medical Optics Inc. does not recommend the second approach because of the possibility of the ridge as well as the difficulty of lifting the flap if the laser "skipped" an area; poor alignment on the restart could also misalign the side cut from the raster pass.

Using the aforementioned steps, the surgeon can usually recut the flap immediately. If suction is lost again, then he or she can change the suction apparatus but not the cone. The theory is that minor changes in the anatomy of the suction ring may permit re-appplanation. The same laser settings are used. If suction is again lost, the surgeon stops for the day. Later, after the conjunctiva has returned to its normal condition (ie, without edema), the ophthalmologist uses a fresh suction ring. If the same cone has been kept sterile, he or she may use the same laser settings. Another option would be to recut the flap at least 40 μm deeper on the second day. The risk here is a second optical interface in addition to

not having a sufficiently thick residual bed. In the case presented, the central thickness was 530 μm . If the second pass were at 160 μm (40 μm deeper), the residual thickness before the excimer laser ablation would be 370 μm . For a -4.00 D myope, the surgeon might remove up to an additional 60 to 70 μm , depending on the diameter of the ablation and the laser algorithm, to leave a residual thickness of 300 μm or more.

If suction is lost yet again, the surgeon can perform PRK on the same or a different day. No mitomycin C (MMC) or alteration of the excimer laser nomogram will be necessary. Some surgeons have even performed PRK on the same day as the original loss of suction despite gas bubbles present in the interface.

Just as with mechanical microkeratomers, refractive surgeons tell patients that, sometimes, the procedure cannot be completed and outline the options for them. Luckily, today, laser speeds are much faster, which greatly reduces the risk of losing suction. Using an attempted 8.5-mm diameter for the ablation and a 7- X 9- μm spot-line separation on the IntraLase iFS laser, the surgeon can create the flap in 6 to 8 seconds. Compared to the 97 seconds required with the 10-kHz laser engine in 2002, the risk of losing suction is exceedingly low.

PREEYA K. GUPTA, MD, AND DAVID R. HARDTEN, MD

A loss of suction, although uncommon, is not rare. Its occurrence highlights an important point: the evaluation of a potential refractive surgery patient starts before the slit-lamp examination. We routinely screen patients for dry eyes and keratoconus, scrutinize their topography, and try to assess their expectations. It is also important to examine the orbital and adnexal structures of their eyes to look for lax eyelids and determine exposure for the suction ring when the flap will be created by a femtosecond laser.

Based on the case presentation, we would lift the flap and proceed with the excimer ablation of the patient's right eye. This decision would allow one of his eyes to function without correction, although the unanticipated event in his left eye might delay achieving the desired refractive goal.

If the flap in his left eye were found to be mostly complete except for the side cut, one could create the side cut only with the same cone, which requires less suction time. The challenge of this case revolves around the severe difficulty of obtaining suction. The lamellar flap apparently was not adequate for the laser ablation with a side cut only. One therefore has the option of reapplying suction and repeating the creation of the entire flap or aborting the process and proceeding with surface abla-

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—*Preeya K. Gupta, MD, and
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tion on the same or a later date. If one decided to recut the flap, it would be important to use the same cone, because not all cones are identically thick. Using a new cone could lead to a second plane of dissection with an irregular interface.

In this case, we would first attempt to reapply suction and perform the entire cut again, because the sort of lamellar cut present would not be adequate for the excimer ablation pattern. If suction could not be adequately maintained, we would perform surface ablation at a later time. Some surgeons would proceed with surface ablation immediately, but we prefer to allow the patient to prepare for the recovery period after surface ablation.

Complications with the LASIK flap occur, and informed consent is a delicate process. Although it is not possible to cover all potential complications such as a loss of suction during the flap's creation, we do tell patients that there are potential but unlikely complications during the LASIK procedure.

AMINA HUSAIN, MD, AND TERRY KIM, MD

In the unfortunate event that suction is lost after 90% of the LASIK flap has been created, it is still possible to use the flap created depending on the size and location of the original flap (ie, by adjusting the position of the side cut only). Assuming an adequately sized flap and correct centration, the appropriate next step is to disengage the foot pedal and select “cancel” on the menu box in lieu of “restart.” Then, the surgeon may use the same applanation cone to re-establish the same depth, but he or she should use a new suction ring assembly. After reapplying the suction ring, the surgeon should select the “treat OD/OS” option. Once the applanation cone has been docked into the new suction ring assembly, he or she can select “adjust params” and then “side cut only” or press Alt-Ctrl-S to activate the side cut-only function. It is advisable to decrease the diameter of the flap by at least 0.5 mm to ensure that the side cut is made within the originally created flap.

The surgeon uses the arrow buttons to align/center the previous treatment's bubble pattern with the yellow overlay on the screen—a very important step in the

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—William B. Trattler, MD

process. He or she should bear in mind that the original flap’s diameter or bubble pattern should be larger than the yellow overlay. After properly aligning the yellow overlay within the original flap, the surgeon selects “OK” and starts the laser to complete the side cut. He or she can also use the view through the laser’s microscope to help confirm proper centration during the creation of the side cut. Under the excimer laser’s microscope, the flap can then be lifted using the surgeon’s customary technique to confirm that the flap’s edge and diameter are acceptable (a larger-diameter flap and the flap’s centration are more important in hyperopic ablations). If so, the surgeon can proceed with the excimer laser ablation as usual.

WILLIAM B. TRATTLER, MD

Although the IntraLase FS laser has greatly reduced the risk of intraoperative complications involving the LASIK flap, the scenario presented herein occurs and leaves the surgeon with a few options. My first step would be to take a moment to inform the patient that, although the procedure on his right eye has gone smoothly to this point, the flap could not be completed in his left eye. I would remind him that, during his preoperative visit, we discussed the rare possibility that I would not be able to lift the flap and that we would have to consider another procedure, in this case, surface ablation with the application of MMC 0.02% for 12 seconds.

After discussing the situation with the patient, I would lift the flap in his right eye and complete the LASIK procedure. I would then switch to his left eye, where I would place a corneal protector sponge that was wet (but not dripping) with dilute alcohol for 25 seconds. After rinsing the eye, I would use a hockey stick spatula to remove the central 8 mm of epithelium and then proceed with the laser ablation. Of note, I would reduce the ablation by 10%, since my next step would be to apply MMC intraoperatively for 12 seconds via a circular corneal protector sponge, followed by gentle rinsing of the eye with balanced salt solution. Lastly, I would place a bandage contact lens on the patient’s left eye and prescribe antibiotic and anti-inflammatory drops for both eyes.

Some surgeons might choose to recut the flap with the IntraLase FS laser, which requires using the same cone. Although a recut is theoretically possible, I believe that switching to surface ablation avoids any small, related risks. The surgeons at my center have had a highly positive experience with surface ablation to enhance previous LASIK, so switching to PRK in this case would be straightforward. ■

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