

2007-7-5 6:19:46

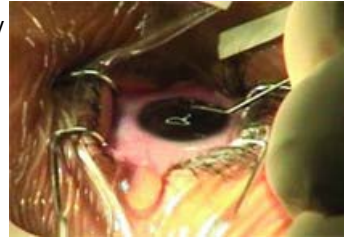
[print\\_now](#)**REFRACTIVE  
SURGERY****Infection prevention in an unlikely place****by Matt Young EyeWorld Contributing Editor***Will infection control significantly reduce LASIK-related complications?*

Cataract surgery prophylaxis is widely discussed and debated in order to prevent nasty ophthalmic infections like endophthalmitis.

But one ophthalmologist has recently turned the antiseptic spotlight on a procedure less known for its surgical complications than its commoditization: LASIK.

In the January/February 2007 issue of the Journal of the Louisiana State Medical Society, Leon C. LaHaye, II, M.D., Lafayette, La., outlined a series of steps to cleaner LASIK, as well as pitfalls.

"Over the past 10 years LASIK surgery has improved owing to advancements in excimer laser and keratome technology," Dr. LaHaye reported in his article. "The only other avenue of substantial improvement has to come through the improvement of surgical methods and devices that reduce the majority of complications associated with laser refractive procedures."



**Backwash can create infectious and non-infectious contamination.**



**An exposed surgical field.**  
Source: Leon C. LaHaye

**Containment**

Dr. LaHaye first pointed to the importance of containing the surgical field. "Antibiotics are an adjunct and not a substitute for prevention of technique related complications as evident by the recent report in the American Journal of Ophthalmology.<sup>1</sup>" Dr. LaHaye said. In addition to infectious complications, non-infectious contaminants contribute to less than desired outcomes and complications such as diffuse lamellar keratitis (DLK) and epithelial undergrowth.

"The surgical field boundaries of the standard LASIK procedure include the patient's lid margins, lashes, cul-de-sac tissues, and surgical drape if used," Dr. LaHaye wrote. "These regions can be sources of contamination. It is known that the exposed corneal stroma has the potential to absorb and hold invasive fluids like a sponge."

He recommended "down-sizing" as well as containing the surgical field to reduce exposure of the corneal bed and flap to prevent contamination.

**Flap management**

Dr. LaHaye suggests that it is important to try to prevent uncontrolled reflex eye movements. Otherwise, the result could be direct contact of the exposed corneal flap and bed against the lid speculum, lid margins, lashes and fluids during conventional LASIK. His article published two pictures, one of a flap folded against a lid speculum and under the upper lid margin. The other depicted an exposed flap rolled under the lid margin and speculum.

"The highly absorbent flap may be marinating in fluids and secretions that contain debris, oils, and other contaminants from direct contact with the conjunctiva, lid margins, and lashes," Dr. LaHaye noted. "None of these methods provide for containment of the highly absorbent flap."

Unfortunately, he noted, tools used in fixation themselves do not

downsize the surgical field or contain the flap and stromal bed.

### **Fluid**

Hydration is a LASIK fact-of-life.

While necessary, it can decrease the excimer laser's ability to remove tissue, and so sponging the surface is also standard procedure, Dr. LaHaye wrote.

"Unfortunately, the micro-sponge leaves the stromal surface visibly grainy and rough," Dr. LaHaye noted. "A dry sponge is rough and can create abrasions at the margins of the flap bed."

Further, he wrote, "Some conventional LASIK procedures use airflow through tubing, which may not be filtered or sterile, to the corneal surface to minimize uneven and changing hydration conditions, which could result in central islands or under corrections."

### **Plume**

Plume can lead to a variety of health problems for both surgeon and patient, according to Dr. LaHaye, which is understandable judging by its composition.

"The plume composition includes water vapor, cellular and carbonized tissue, blood, and viruses in conjunction with benzene, hydrogen cyanide, toluene gases, formaldehyde, and polycyclic aromatic hydrocarbons," Dr. LaHaye wrote.

Of course, plume occurs when the laser pulse strikes cornea water vapor, live and dead cellular debris.

"Any cleaner LASIK procedure will have to address the problem of proper plume removal with the ability to control dehydration," Dr. LaHaye wrote. "Cleaner LASIK outcomes will require an efficient plume evacuation system that not only reduces the incidence of beam masking and plume splatter onto the laser's lens, but also allows for improved control of dehydration during evacuation."

### **Irrigation and aspiration**

Irrigation fluids that flow backwards (as a 'backwash'), form a lake and mix with the conjunctiva, lids and fornix, thereby creating problems.

"The pooling of fluids can be a contributing source of infectious and non-infectious contamination even after washing the surface with Betadine (10% povidone iodine, Purdue Frederick Company, Norwalk, Conn.) and antibiotic solutions," Dr. LaHaye wrote. "To achieve a cleaner LASIK, the irrigation procedure requires less instrumentation and accompanying manipulations coupled with non-turbulent laminar sterile irrigation without backwash onto the surgical site."

Meanwhile, as part of traditional LASIK practice, fluid that is not removed by an aspirating lid speculum or absorbed by sponge is permitted to run off the surgical field, he noted.

"A cleaner LASIK procedure mandates that these issues be resolved, perhaps by a better irrigation and aspiration design that minimizes flap manipulations and use of extraneous instrumentation while simultaneously guarding against backwash," Dr. LaHaye concluded.

### **Flap repositioning & adherence**

Once again, during flap repositioning, irrigation fluids can pool, backwash and mix with lid margins and lashes, Dr. LaHaye found.

"Any material left in the interface has the potential to cause diffuse lamellar keratitis, infectious keratitis, and can contribute to epithelial undergrowth," Dr. LaHaye reported.

Further, he noted, "Some surgeons may use a surgical sponge to dry the gutter or squeegee the flap in an attempt to shorten the time to adherence. Because the surgical field in conventional LASIK is uncontained, the sponge may absorb surgical fluids and cellular debris. This flotsam inadvertently can be painted over the flap tissues."

### A few more tips

Karl Stonecipher, M.D., medical director, TLC Carolina, Greensboro, N.C., had a few more helpful hints to add.

He said it is wise to use a topical corticosteroid and fourth-generation fluoroquinolone as prophylaxis pre-op. This addition cleans up the tear film and eyelid margin theoretically reducing the patient's natural flora, he said.

As a side note, Dr. Stoncipher mentioned that cleaning up the tear film this way also leads to a better wavefront picture.

While some advocate the merits of disposable instrumentation, Dr. Stonecipher said he just ensures his clinic uses a full autoclave to clean the resterilizable instruments. However, the use of disposables in cataract surgery or LASIK is becoming more common.

One item less frequently discussed is the surgical suite itself. Certain caustic cleaning agents can do more harm than good, Dr. Stonecipher said.

"You can't use Lysol to clean the floor for example," he said. "It is caustic to the lenses that redirect the beams during LASIK. So we use soap and water to clean laser suite floors, walls, and counters on a daily basis."

***Editors' note:** Dr. LaHaye has a financial affiliation with Vision Pro LLC (Opelousas, La.). Dr. Stonecipher has no financial interests related to his comments.*

### Contact Information

**LaHaye:** [ifxiis@lahayesight.com](mailto:ifxiis@lahayesight.com)

**Stoncipher:** 888-TLC-2020, [stonenc@aol.com](mailto:stonenc@aol.com)

### Refrence:

1. Solomona R., Donnenfeld E., Perrya H., et al. Methicillin-resistant Staphylococcus aureus infectious keratitis following refractive surgery. Am J Ophthal 2007; 143(4):629-634.

