

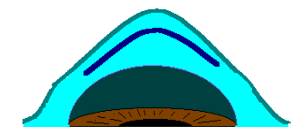
Flap edema from hypotonic Saline

Edema causes rolling up of flap

Epithelial edema following abrasion



Epithelial and stromal swelling are time dependent (1)



Bowman's membrane is no longer intact thus allowing forward movement with swelling

Preferential swelling of the posterior and central stroma (2,3)



■ Central cornea swelling during and after surgery
■ With normalization of hydration the central area collapses into ablated area

Collapse of the flap into the ablated area

Hydration model for microstriae and central islands(4,5)

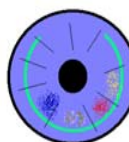


■ widening of the gutters
■ secondary striae related to the hinge



The hinge stabilizes the flap. Folds in the flap are like
■ a towel with folds towards the hooks
■ a bedsheet with folds towards the foot

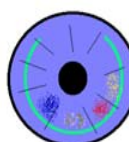
Microstria Direction



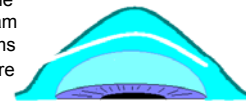
Open gutter
White Cells
Blood
Lipid

After surgery fluid and debris aspirate into the open gutter

Fluid and debris are actively aspirated into the LASIK interface



■ Debris in the interface may appear between the immediate post-op exam and a subsequent exams
■ Interface debris is more often noted in the peripheral interface



Central migration of debris or cells can be seen early after surgery,

Preferential swelling of the central cornea draws fluid and debris centrally

OVERHYDRATION IN THE PATHOGENESIS OF LASIK COMPLICATIONS

Mark E Johnston MD FRCSC
Nebraska Laser Eye Associates
Omaha NE
nebraskaeeye.com

Summary

LASIK creates an epithelial defect that allows fluid and debris to be actively drawn into the LASIK interface.

Preferential swelling of the central and posterior cornea creates suction gradients within the postoperative cornea

Stromal swelling and suction into the interface may be related to

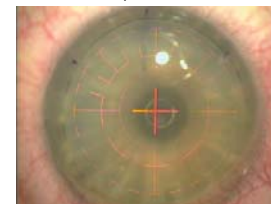
- DLK
- Interface changes
- Islands and Peninsulas
- Microstriae

Overhydration should be avoided

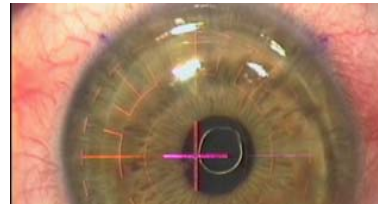
References

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2. Ling T. Chemically induced central and peripheral corneal swelling in the cat. *Am J Optom Physiol Opt* 1987 Sep;64(9):674-7
3. Muller LJ, Pels E, Vrensen GF. The specific architecture of the anterior stroma accounts for the maintenance of corneal curvature. *Br J Ophthalmol* 2001 Apr;85(4):437-43
4. Johnston ME. "Corneal Hydrostatic Pressure and Aspiration of Fluid and debris into the Lasik Interface". Highlights of the American Society of Cataract and Refractive Surgeons, 1999 Annual Meeting, Boston:Ophthalmology Interactive 1999; 12(4):R34E
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Moderate gutter width after irrigation (Muro128 allows easy visualization)

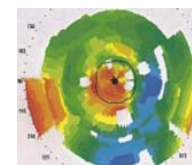


Gutter widens with copious irrigation under the flap

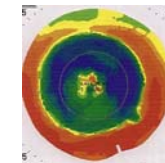


Copious irrigation causes widening of the gutter

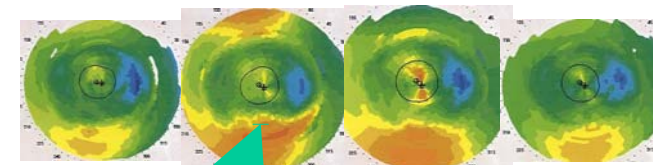
Central swelling immediately after surgery



Four months after surgery a mild central island and microstriae are present



Topographic evidence of preferential central swelling causing microstriae and central island



■ Day One: Grade I DLK with peripheral cells

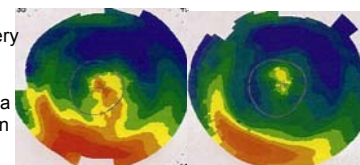
■ Day 1PM: Grade 2 DLK with central movement of cells

■ Day 2 with further central shift in the debris

■ Day 4 and the island is resolved
■ Debris less organized

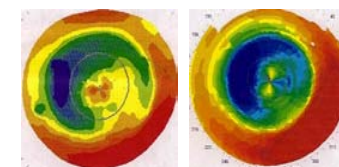
Aspiration of debris into the interface causing DLK, central migration of debris and secondary central island

One day after surgery diffuse lipid is noted under the flap. Topography shows a central island and an inferior peninsula



Three days after surgery less lipid is noted under the flap and topography shows significant resolution

Lipid aspiration into the interface with rapid resolution



Peninsula
• significant blood in the interface during and after Lasik
• increased fluid may have affected ablation

Blood in the interface during and after Lasik

Six weeks after surgery a central island and microstriae persists.