

# Grand rounds

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# Patient Presentation

HPI- 38 y/o female from China with past ocular history of “laser surgery” presents with vision loss after trauma with takeout utensils. Patient reports significant pain as well as photophobia which requires her to keep her eye closed. Trauma occurred approximately 6 hours previous. Patient initially went to outside hospital, and transferred to KCHC for further evaluation.

PMH- none  
POH- unknown laser surgery for myopia  
FH- none  
SH- negative x 3  
Allergies- none  
Meds- none  
Gtts- none

Physical Exam:  
nVasc/dVasc- 20/20 OD, 20/200 phNI OS  
EOM- full OU  
CVF- full OD, unable OS  
Pupils- 4-2, no APD  
Tpen- 12, 12 @ 0200 AM

SLE:  
LLA- wnl OU  
C/S- w/q OD, 2+ injection OS  
K- clear OD, circular epithelial defect of 7 mm with scrolling of tissue nasally  
AC- D/Q OU  
L- wnl OU

DFE:  
V- clear OU  
C/D- 0.3 s/p OU  
M- flat OU with myopic fundus  
V- wnl OU  
P- wnl OU

# Assessment and Plan

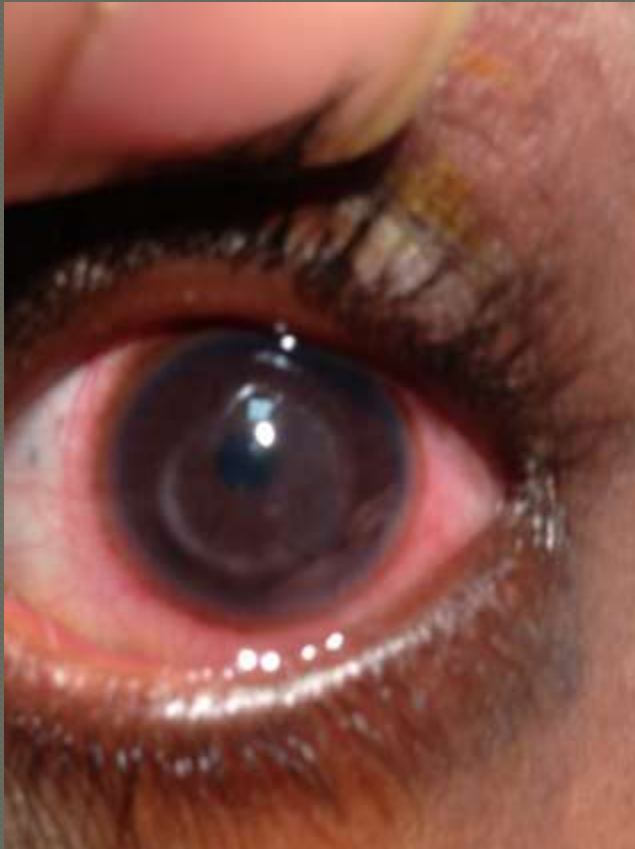
- Call backup



- “Do NOT take that tissue off. This sounds like a LASIK flap dehiscence ..we had a case like this last year. Dr. Elmann replaced the flap and held it down with a bandage contact lens. It worked well.”
- Flap replaced with cotton tip applicator, cornea covered with bacitracin ointment, and pressure patch placed

# Patient presentation

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# Follow up visits

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- Day 1: dVasc OS: 20/150 phNI

- Tapp 13/13
- Bandage contact lens placed (14 mm in diameter)
- Started on ofloxacin 0/4
- Still having discomfort and FB sensation

- Day 5

- Dvasc: 20/150
- Tapp 13/14
- Wound well re-epithelialized
- BCL removed
- Continue oflox 0/4
- Pain much improved

- Day 14

- Vasc 20/70 ph 20/30 OD
- Tapp 14/19
- Started FML 0/3, c/w ofloxacin 0/4

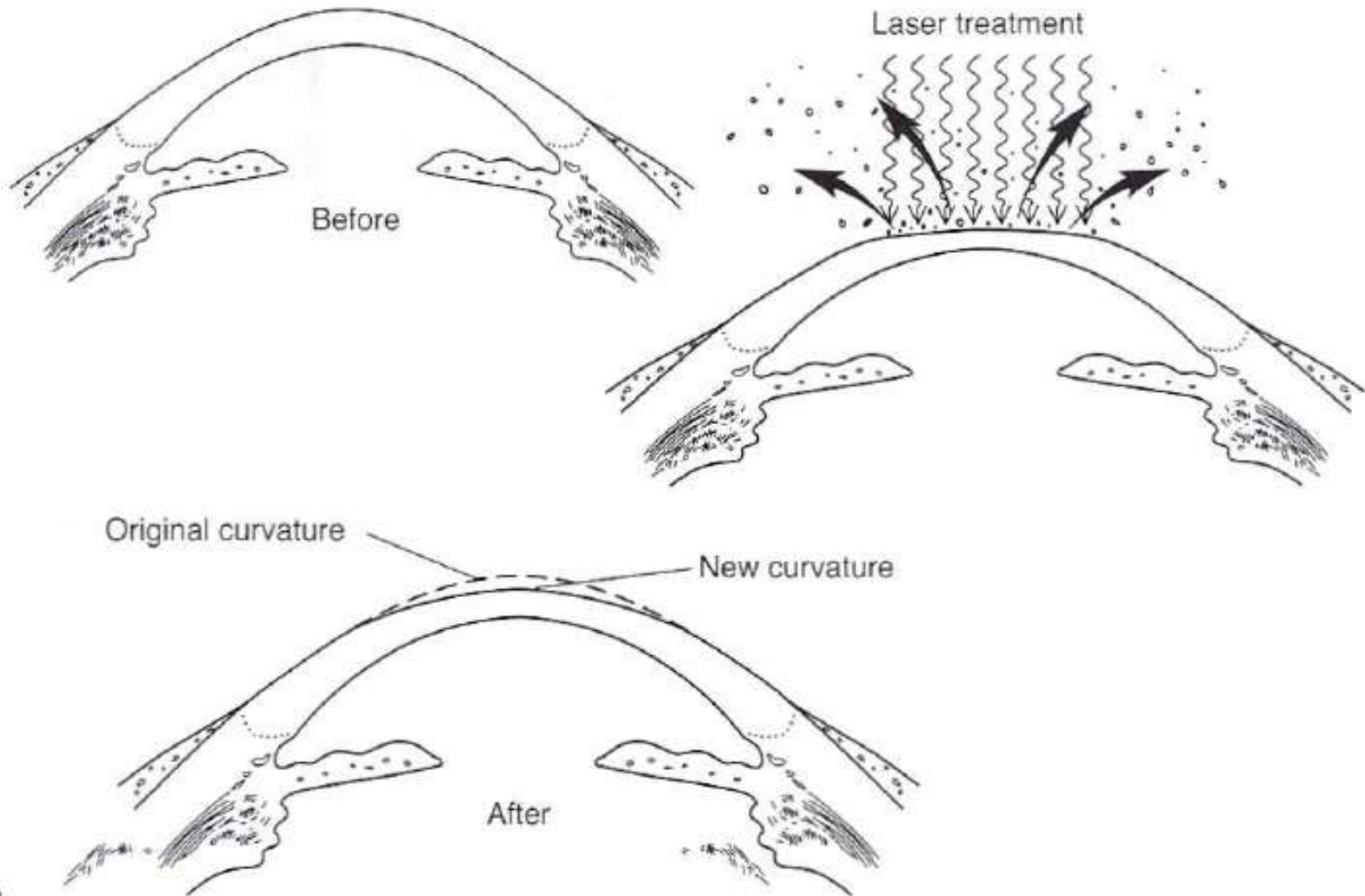
- Day 21

Vasc 20/70

MRx +3.00 20/40

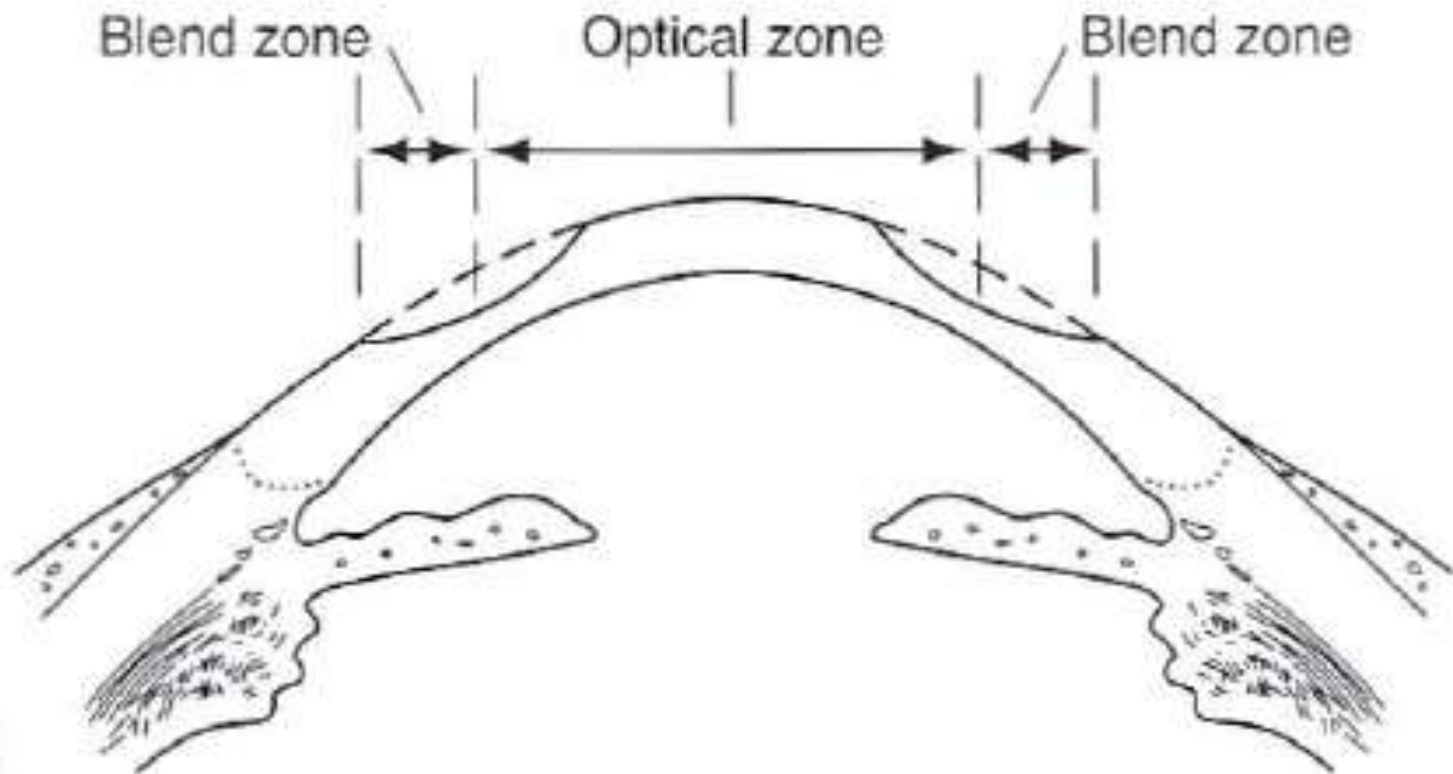
- Ophthalmology offers lasik flap lift and debridement. Patient declines, wants to wait.

# Laser correction of Myopia

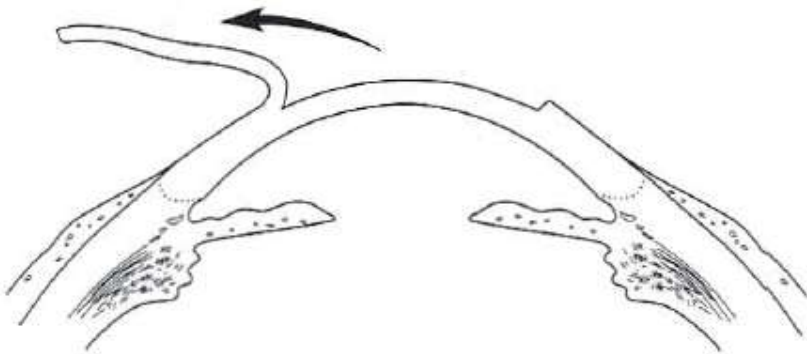


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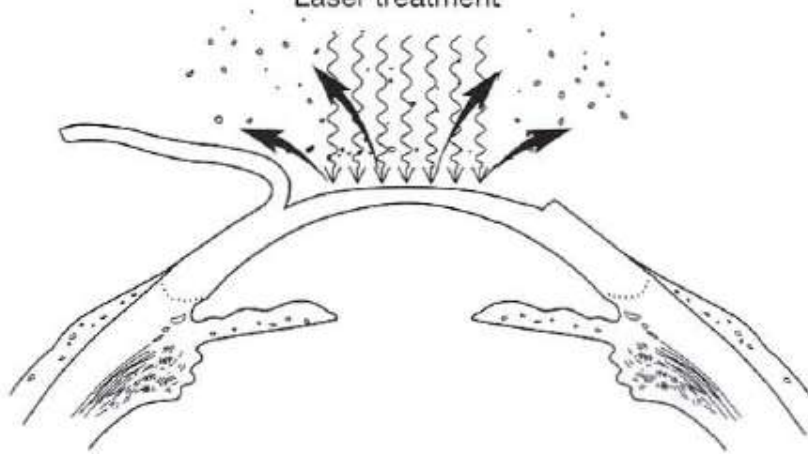
# Laser correction of hyperopia



Flap is reflected

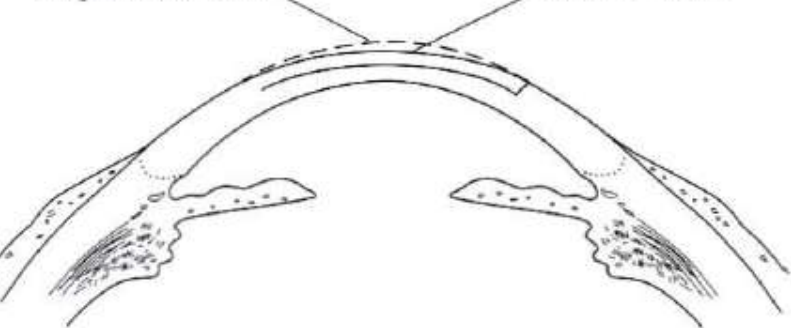


Laser treatment



Original curvature

New curvature





## Table 5-1 Potential Contraindications to Excimer Laser Photoablation

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- Connective tissue disease
  - Rheumatoid arthritis
  - Systemic lupus erythematosus
  - Sjögren syndrome
  - Wegener granulomatosis
- Dry-eye syndrome
- Neurotrophic corneas
- Previous herpes simplex
- Previous herpes zoster ophthalmicus
- Fuchs corneal dystrophy
- Corneal stromal dystrophies
- Corneal ectatic disorders
- Medications
  - Isotretinoin
  - Amiodarone hydrochloride (eg, Cordarone, Pacerone)
- Uncontrolled systemic diabetes
- Diabetic retinopathy
- Thyroid eye disease
- Monocular patients
- Patients who are pregnant or nursing
- Patients with unreasonable expectations
- Patients younger than 18–21 years

# Worldwide Metanalysis

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- Performed in 2008, with focus on patient quality of life and satisfaction
- 2200 patient encounters reviewed
- 95.4 % of patients satisfied with outcome and endorse improved quality of life
- “Based on this review, worldwide, an average 95.4% of patients were satisfied with their outcome after LASIK surgery. With 16.3 million procedures performed worldwide, and more than a decade of clinical studies and technological innovation, LASIK surgery should be considered among the most successful elective procedures. LASIK surgery compares more favorably with other elective surgical procedures in terms of generally higher satisfaction rates.”

# Physician as LASIK patient

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Cohort study of 226 physicians who had LASIK surgery at a single institute over 12 years

Included surgeons (28%), proceduralists (43.2%), and MDs who performed neither (28.8%)

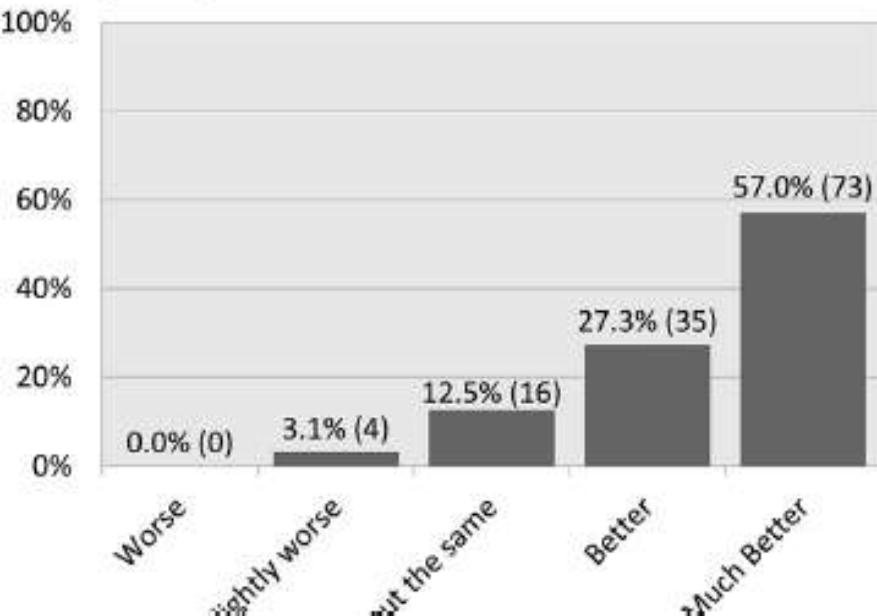
84.8% reported an improvement in the quality of vision compared with the corrected preoperative vision,

39.0% reported that their ability to perform procedures accurately had improved

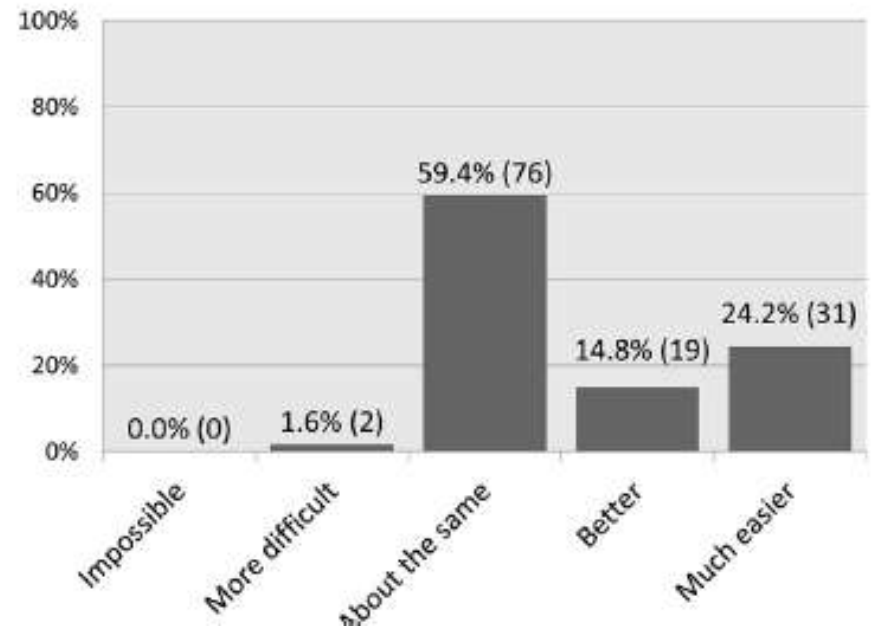
96% reported they would have the procedure again

# Physician as LASIK patient

Q5. "How good is your quality of vision compared to your vision before refractive surgery with glasses/contact lenses or without correction?"



Q8. "Since your refractive surgery, your ability to perform procedures accurately is:"



# Complications and Side Effects

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## ◎ Overcorrection

- typically 3-6 months of regression
- Occurs more often in older individuals due to poor wound response
- Consecutive myopia/hyperopia requires less treatment to achieve emmetropia

## ◎ Undercorrection

- Regression in the first eye indicates a larger likelihood of regression in the fellow eye

# High IOP

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- ⦿ After surface ablation, studies have been shown to occur up to 25% of the time
- ⦿ Prolonged steroid use has been implicated, with occurrence rates of 1.5-3.0% with fluorometholone and up to 25% in patients on dexamethasone.

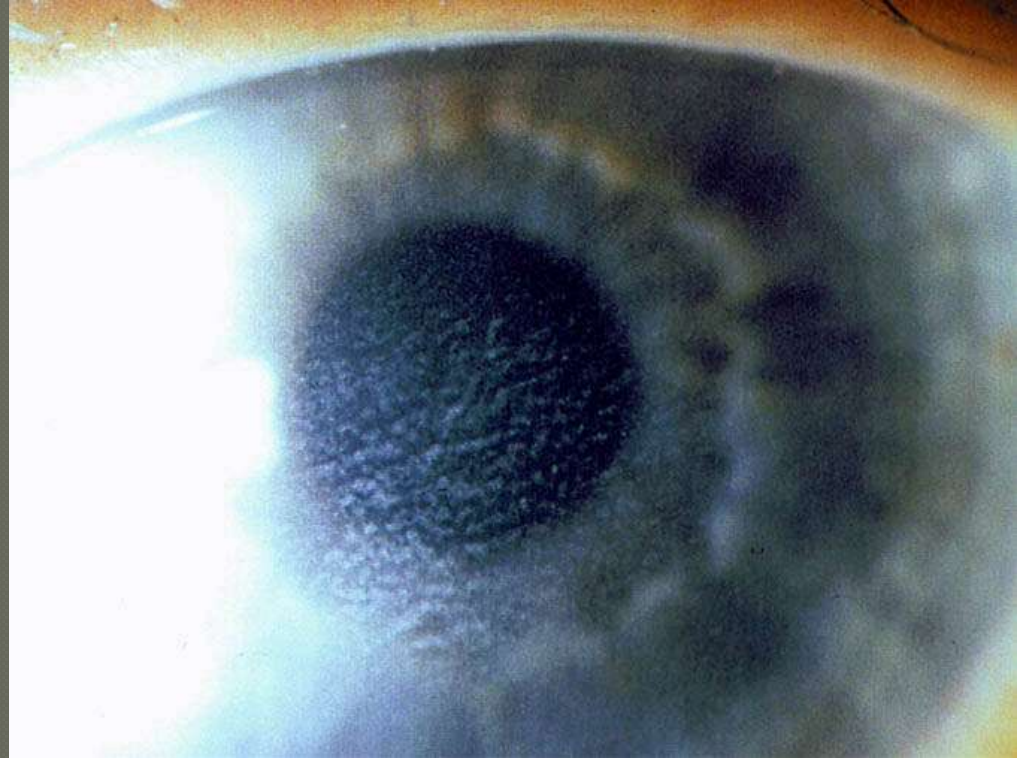
# Dry Eye

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- ◉ May persist for extended periods
- ◉ Has been reported to occur in 60-70% of patients
- ◉ Formation of the flap involves cutting of the nerves, hence there is less incidence of dry eye in surface ablation vs. LASIK
- ◉ Theoretically, there should be less instance of dry eye in surface ablation, but clinically can still be an issue

# Diffuse Lamellar Keratitis

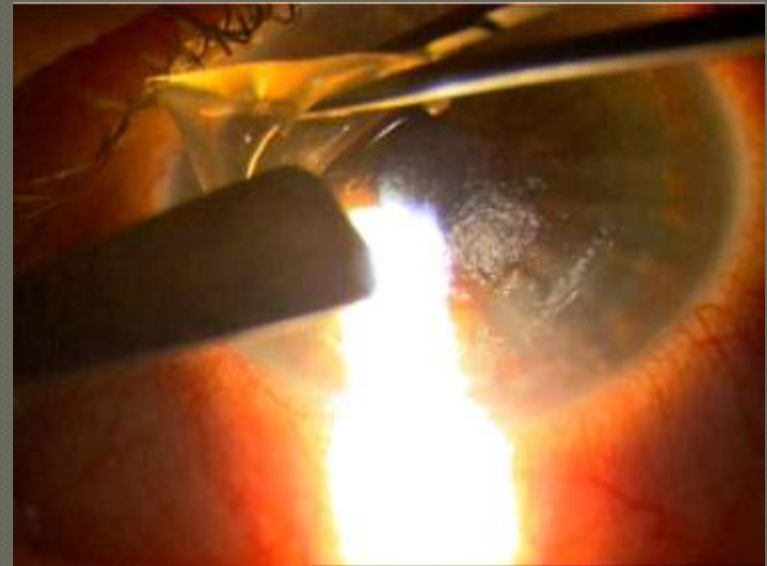
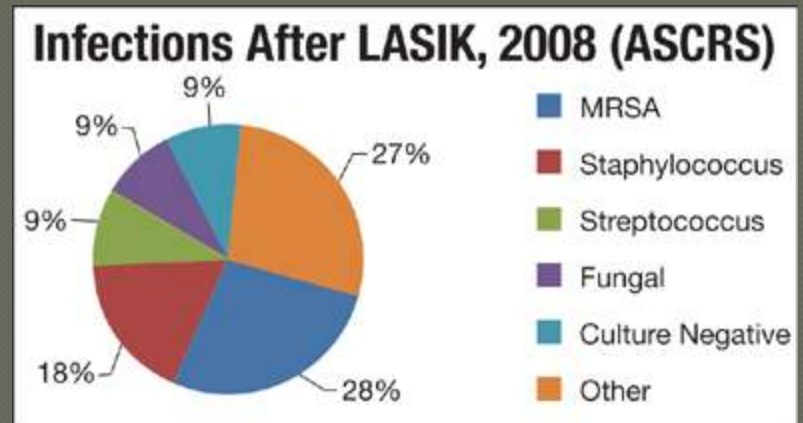
- Also known as “the Sands of Sahara”, diffuse interface keratitis, and sterile interface inflammation
- A nonspecific sterile inflammatory response





# Infectious Keratitis

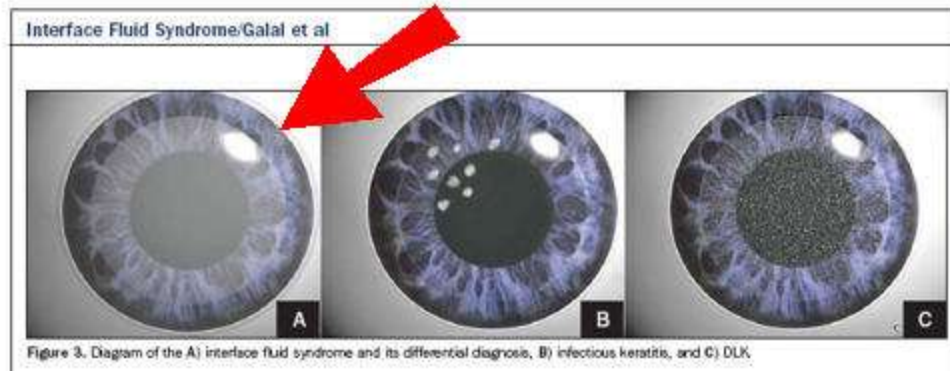
- Most common etiologies are Staph Aureus, MRSA, S. pneumoniae, and S. viridans
- Also reports of atypicals, nocardia, and fungal infections
- Risk of infection is due to the disruption of the epithelium, which is compounded by bandage contact lenses and steroid treatment



# Infectious Keratitis

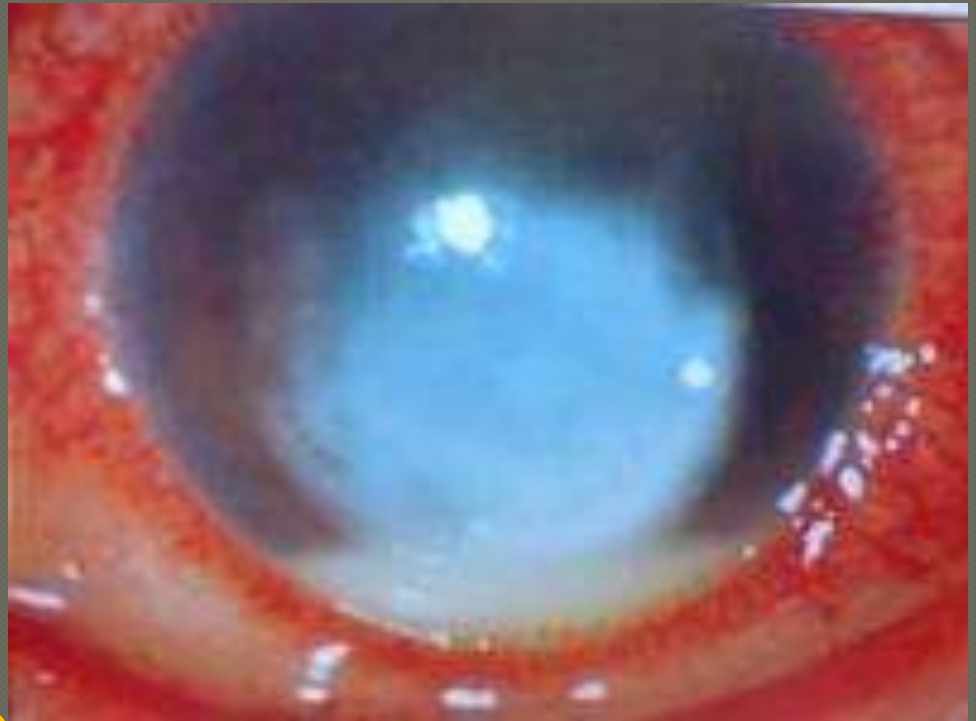
- Flaps and other iatrogenic pathways into the stroma create a situation where antibiotic drops cannot readily penetrate, making treatment of an infection very difficult
- If an infection is suspected in a post-LASIK patient, it is imperative to lift the flap and culture the bed.

Galal et al. Interface Fluid Syndrome. J Refract Surg. 2006 May;22(5):p446.



# Infections after LASIK

- ◉ Within 10 days: gram positives
- ◉ More than 10 days: atypical mycobacteria and fungi
- ◉ Treatment should happen accordingly
- ◉ Cultures should guide management
- ◉ Patients need to know to come in to the office



**Table 6-3 Diffuse Lamellar Keratitis vs Infectious Keratitis**

<b>DLK</b>	<b>Infection</b>
Usually seen within first 24 hours	Usual onset at least 2–3 days postoperatively
Typically begins at flap periphery	Can occur anywhere under flap
More intense inflammation at periphery decreasing toward center	
Inflammation primarily confined to interface	Inflammation extends above and below interface, and beyond flap edge
Diffuse inflammation	Focal inflammation around infection
Minimal to no anterior chamber reaction	Mild to moderate anterior chamber reaction
Flap melts can occur	Flap melts can occur

Modified with permission from Culbertson WW. Surface ablation and LASIK patients share similar infection potential. *Refractive Eyecare*. September 2006:12.

# Complications unique to LASIK

## Microkeratome complications

- Buttonhole flap
- Incomplete flaps
  - Experts recommend aborting the procedure and waiting at least 3 months

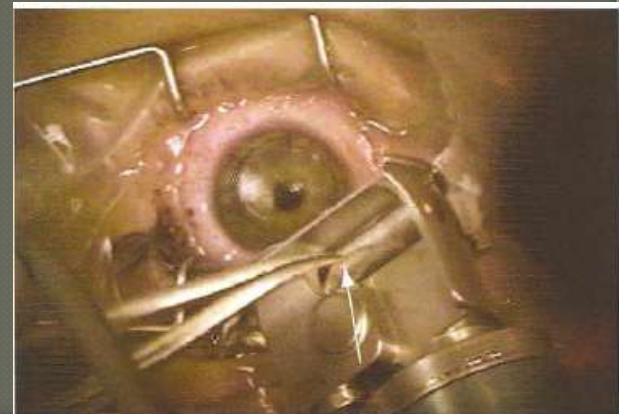


## Flap transection (free floating flap)

- Take care to keep epithelial side identified

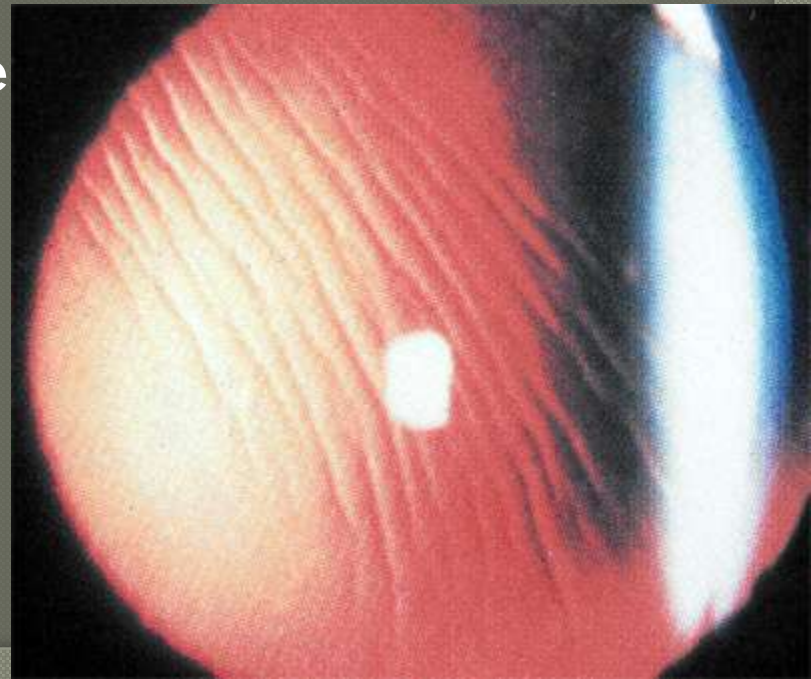
Temporary 10-0 sutures

Higher risk in flat corneas



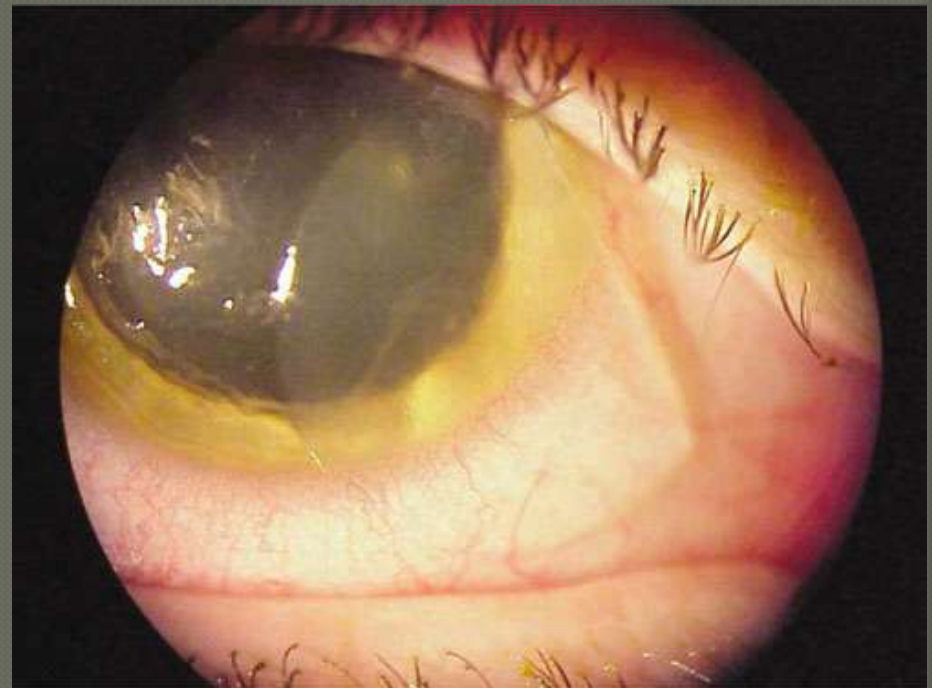
# Flap Folds (striae)

- 56% noted in the first day, 95% in the first week
- Early intervention is critical, as delayed treatment will produce less desirable results
- Parallel striae
  - Usually indicate flap slippage
  - Require prompt intervention
- Circumferential striae
  - High myopia
  - Resolve with time

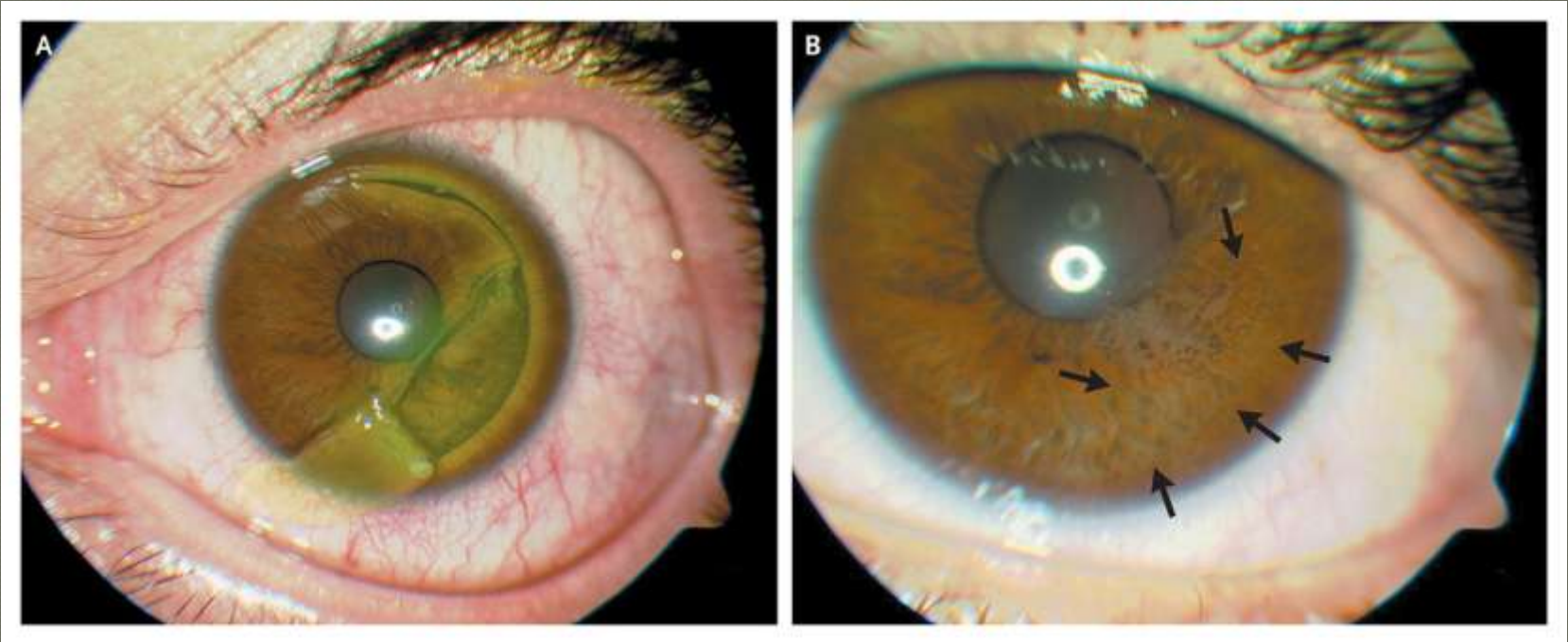


# Flap subluxation

- Has been reported to occur in up to 1.4 % of patients
- Requires immediate repair at the slit lamp
- If the microstriae have been present for more than 24 hours, folds become fixed in position due to hyperplasia and hypoplasia
- If this occurs, de-epithelialization over the central 6 mm is required



# Traumatic Flap Subluxation

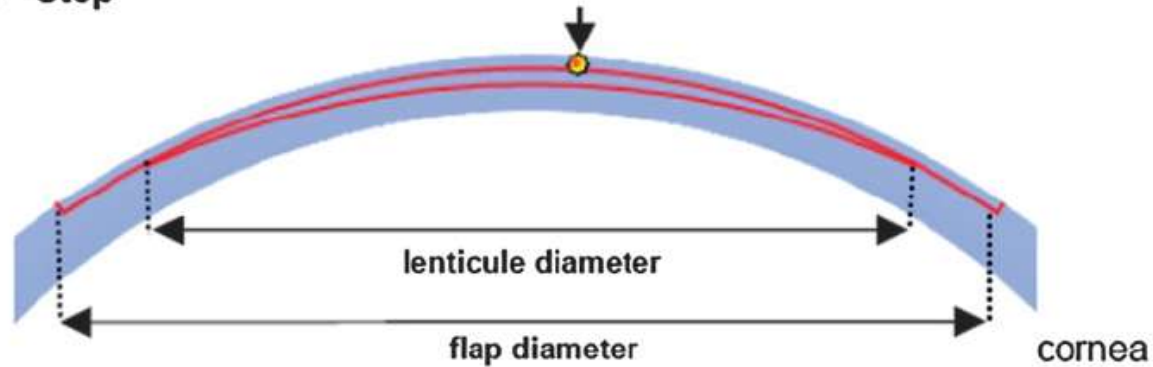


A fine scar is established at the edge of the flap  
Minimal healing occurs for several years, allowing for flap lifts, but also representing a weak spot in the epithelium

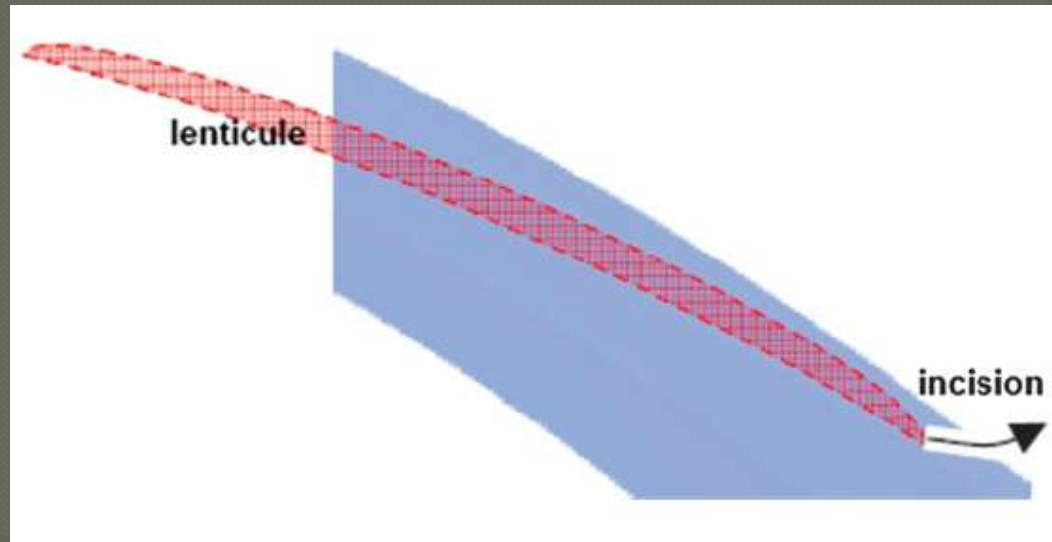


# Small Incision Lenticule Extraction

1<sup>st</sup> & 2<sup>nd</sup> Step



**Figure 1** A schematic drawing of the small incision lenticule extraction (SMILE) procedure. The VisuMax femtosecond laser system cuts the back of the refractive lenticule followed by its front surface incision. In the third step two vertical opposite incisions 80° arc length are carried out. When the patient has returned to the observation position the final fourth step is performed manually, with the lenticule being dissected through the side cut opening incision and removed manually using forceps.



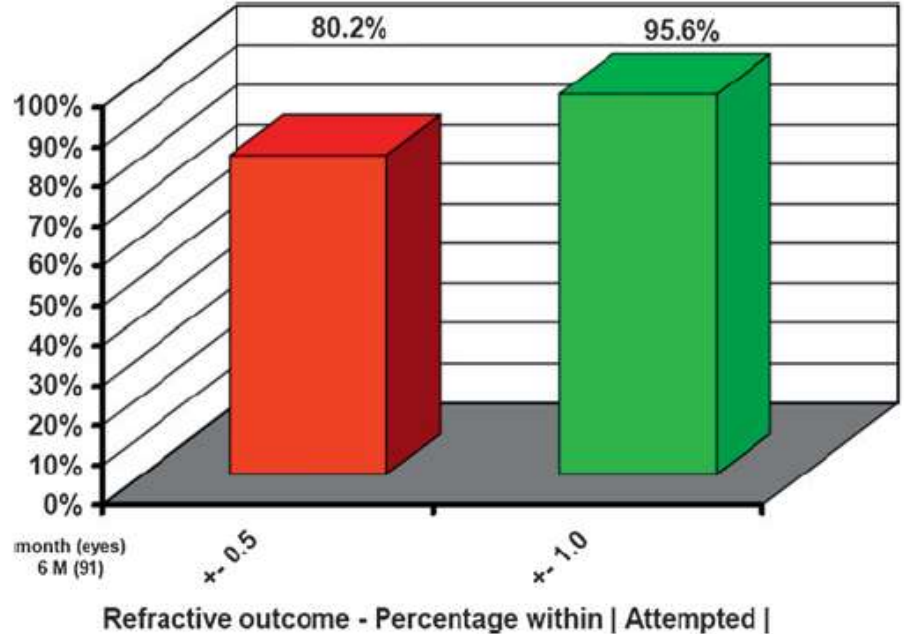
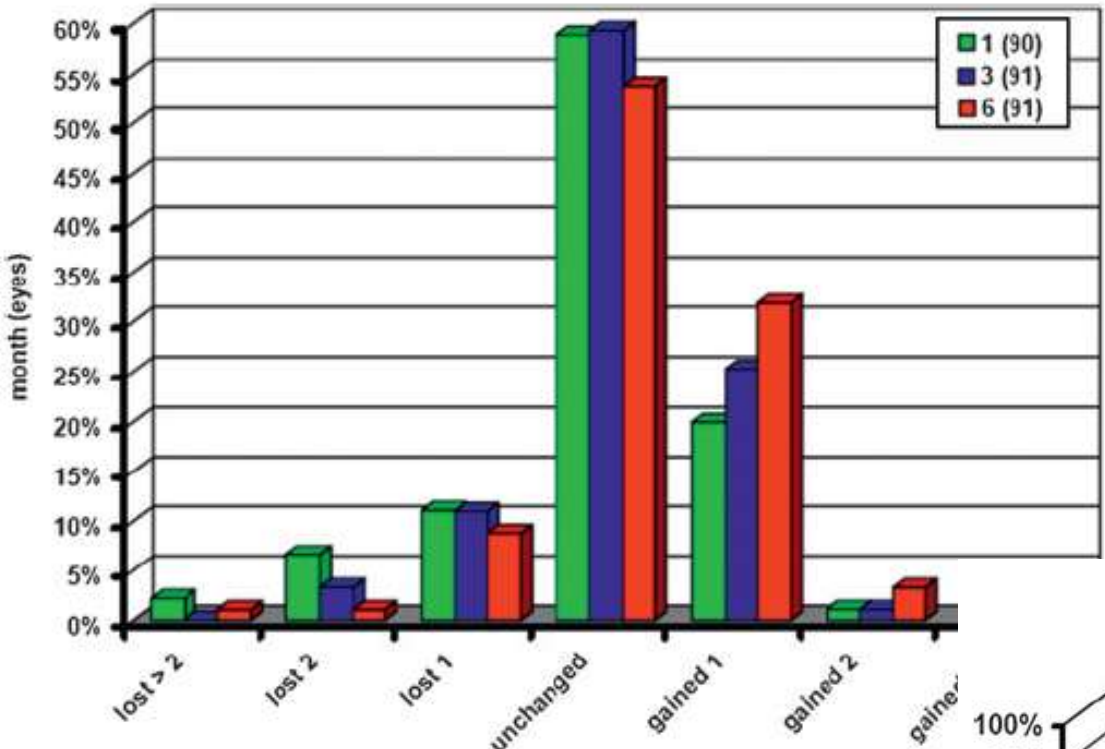
Currently only approved for more than 5 diopters of myopia

## **PARTICIPANTS AND METHODS**

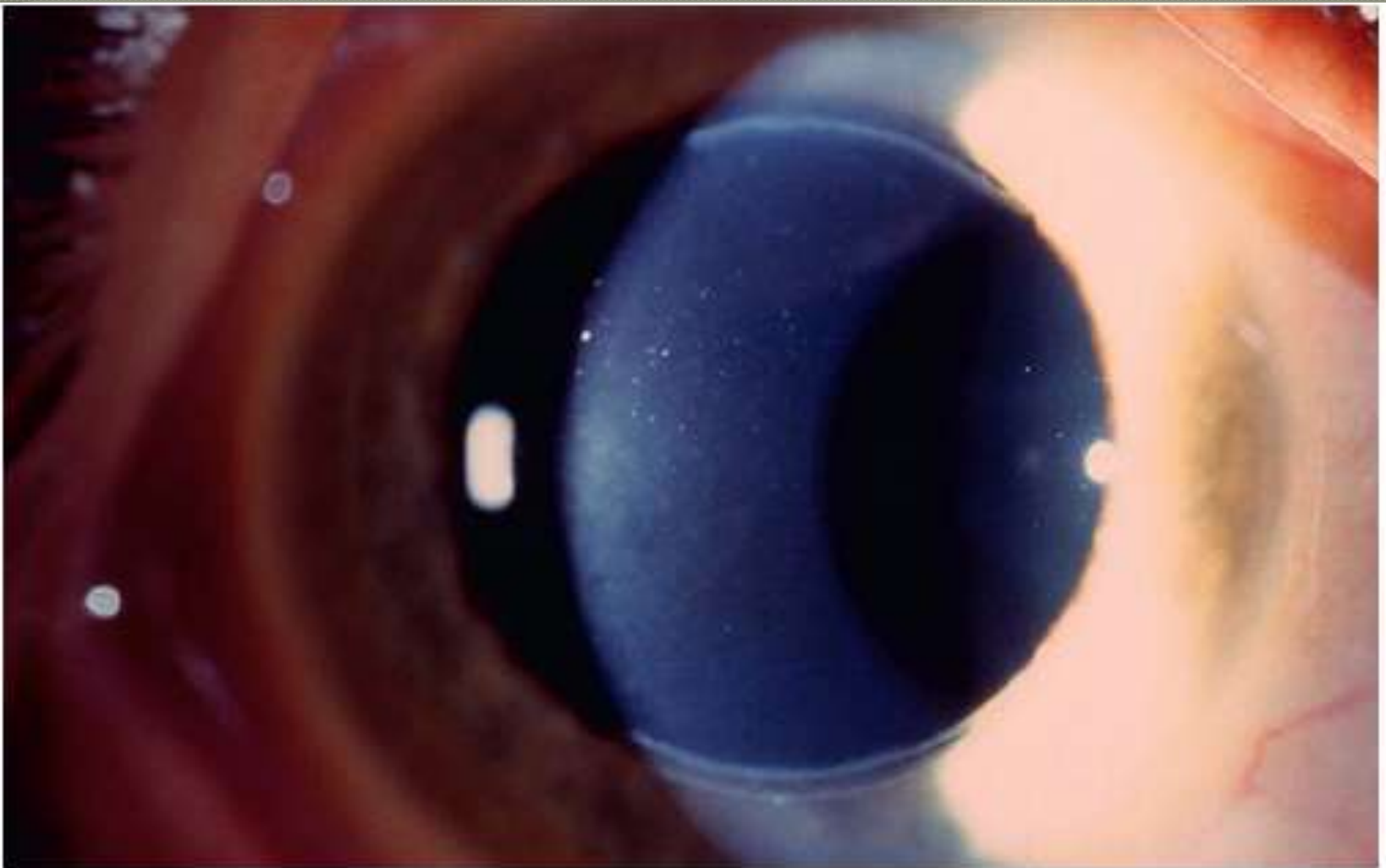
The inclusion criteria were spherical myopia up to  $-10$  D and myopic astigmatism up to  $-5$  D cyl. Other inclusion criteria were a minimum age of 21 years, best spectacle corrected visual acuity (BSCVA)  $\geq 0.8$  (20/25) and no other ocular conditions except myopia. Moreover, the central corneal thickness as measured by AC-Master (Carl Zeiss Meditec AG, Jena, Germany) had to be more than  $500\ \mu\text{m}$  and the calculated residual stromal bed after treatment  $>250\ \mu\text{m}$ . A regular topographic

### **Predictability of spherical equivalent and efficacy**

At the 6 month follow-up 80.2% of eyes treated were within  $\pm 0.5$  D and 95.6% within  $\pm 1.0$  D of the intended refractive target (figure 4). Six months postoperatively the mean SE was  $-0.01 \pm 0.49$  D. A UCVA of 0.5 (20/40) or better was obtained in 97.6% of eyes treated and a UCVA of 1.0 (20/20) or better in 83.5% of eyes treated (figure 5). In the latter group, 28.2% had a UCVA of 1.2 and 10.6% of eyes treated had a UCVA of 1.6 (20/12.5)



**Figure 4** Predictability of spherical equivalent at 6 months follow-up. 80.2% of eyes are within  $\pm 0.5$  D and 95.6% within  $\pm 1.0$  D.



**Figure 2** A 6 month postoperative view of the cornea with two fine scars corresponding to the opening incisions at the 12 and 6 o'clock position. The dilated pupil (for fundus examination) underlines the perfect arcuate shape of the opening incisions.

# Back to our patient

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- Taken to OR 3/27/14, flap was debrided and sutured down with 10-0 nylon interrupted sutures. BCL was placed, and patient has been followed regularly since then.
- Last seen 4/17/14, Vasc 20/200 ph 20/100
- Being treated with ofloxacin 0/4 and predforte 0/4
- Tapp 12
- Follow up scheduled for today

# Questions for the experts

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- ① How do you manage traumatic LASIK flap complications?
- ① In your experience, how long will it take for a traumatic flap reposition to stabilize?
- ① How do you deal with unreasonable expectations? All the literature seems to have an “unhappy” rate of approximately 5%

# Core Competencies

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- Patient Care: The case involved thorough patient care and careful attention to the patient's past ocular history.
- Medical Knowledge: This presentation allowed me to review the proper evaluation/work up, treatment options and post-operative complications of refractive surgery
- Practice-Based Learning and Improvement: This presentation included a literature search of the evolution of and current state of refractive surgery
- Interpersonal and Communication Skills: The patient was treated with respect and every effort was made to communicate with the patient and her family, using CyraCom interpreter services for discussions.
- Professionalism: The patient's care was handled appropriately and with careful attention to our interactions
- Systems-Based Practice: The patient was managed by the ophthalmology service in a timely manner with the intent of providing the best possible result for the patient

# Reflective Practice

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- This case was a great example of how communication and the effective use of the backup system led to the best possible result for the patient
- it also represented an excellent opportunity for me to delve into an area of ophthalmology that I had little exposure to, and helped me answer many questions that I had about refractive surgery



# References

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