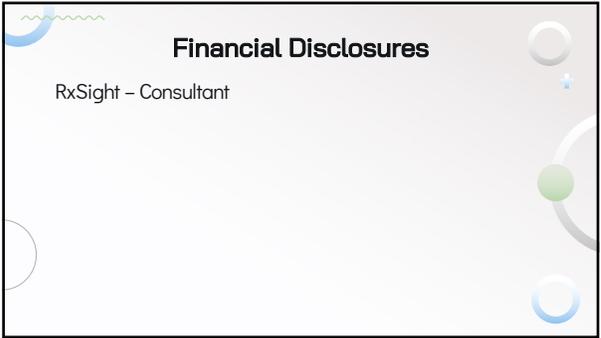


Post-LASIK Problems and What to Do About Them

Lily Arendt, OD, FAAO
UIW Rosenberg School of Optometry
San Antonio, TX

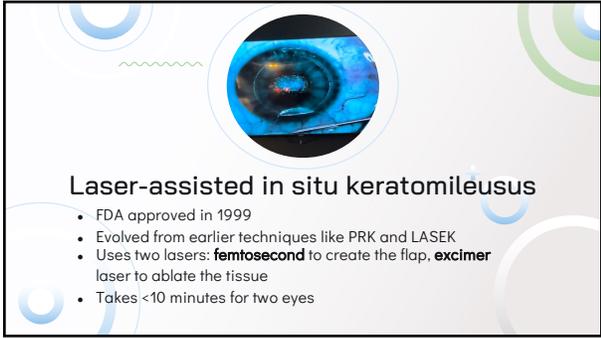
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Financial Disclosures

RxSight - Consultant

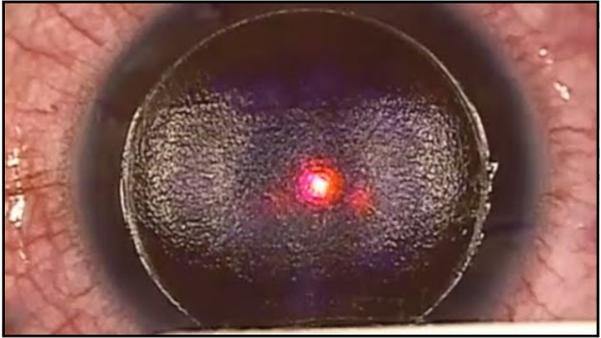
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Laser-assisted in situ keratomileusis

- FDA approved in 1999
- Evolved from earlier techniques like PRK and LASEK
- Uses two lasers: **femtosecond** to create the flap, **excimer** laser to ablate the tissue
- Takes <10 minutes for two eyes

3



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Postoperative Recovery

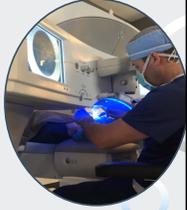
- **Incredibly quick** – improvement in vision instantly, improving over the first few days
- **On the 1st day,**
 - Keep protection goggles on *at all times*
 - NO eye rubbing
 - Go home and nap!
 - Frequent lubrication with PFATs
- Common complaints:
 - Blurriness
 - Burning
 - Tearing



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Postoperative Recovery

- **1 day post-op exam:**
 - Expecting vision of at least 20/40
 - If worse than 20/40...
 - Corneal dryness
 - Flap wrinkling or displacement
 - Immediate referral back to surgeon!



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Postoperative Recovery

- **Throughout 1st week,**
 - Use antibiotic and steroid drops QID x 7 days
 - No swimming, hot tubbing or getting water in the eyes
 - Showering is still encouraged! ☺
 - No makeup or facial products around the eyes
 - No eye rubbing!
 - Lubricate frequently!
 - QID – q30min, if necessary



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Postoperative Recovery

- **At 1 week post-op exam:**
 - 20/20 or better monocular VA is expected
 - If worse than 20/30
 - Refraction
 - Reassurance
 - Cornea should be clear and flap well secured
 - Common complaints:
 - Fluctuating vision
 - Halos

Restrictions are lifted at 1-week post-op exam!



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Postoperative Recovery

- **1-month post-op exam.**
 - Final post-op visit (usually)!
 - VA at it's best with minimal fluctuations in vision
 - If not, refraction is warranted
 - No longer on any medication
 - Assessment of ocular surface
 - Continuing lubrication with PFATs, if needed



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Postoperative Recovery

- **1-month post-op exam.**
 - Obtain refraction to determine end results and use data to refine laser nomograms
 - An opportunity for patients to express any concerns with remaining or new onset symptoms
 - Referral back to OD for yearly exams or sooner for dry eye management/other conditions



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Expected Short-Term Symptoms

- Fluctuations in vision
- Foreign body sensation or scratchiness
- Light sensitivity
- Altered night vision, including glare, halos, starbursts
- Eye redness
- **Not every patient will experience every symptom, but setting proper immediate post-op expectations is important!**

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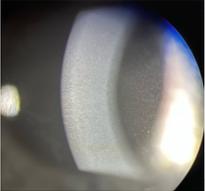
Addressing more serious side effects of LASIK

Within the 1st month postoperatively

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Diffuse Lamellar Keratitis

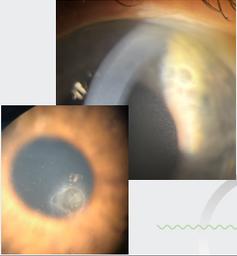
- An early post-op complication that is most often diagnosed at the 1-day post-op exam
- **Often mistaken for infection**
- Unlikely to cause FBS, pain, or decrease in vision early on
- **Signs**
 - Whiteish, granular, diffuse inflammation within the LASIK interface and corneal stroma



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Diffuse Lamellar Keratitis

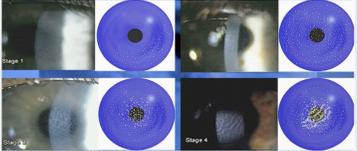
- Common cause is contaminants introduced into the LASIK interface *during surgery*
 - Bacterial endotoxins
 - Chemicals
 - Foreign particles
- Can also occur after post-LASIK trauma



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Diffuse Lamellar Keratitis

- 4 stages of severity
 - Both stages 1 and 2 present with mild inflammation the responds well to **frequent topical corticosteroid treatment**
 - Stages 3 and 4 present with severe inflammation requiring surgical intervention like LASIK flap lifting and irrigation



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Infection

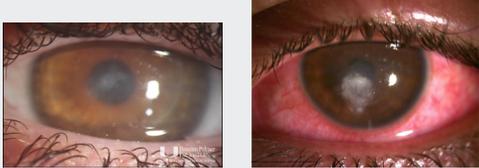
- **The most sight threatening complication of LASIK**
- Two categories:
 - Early (within 2 weeks)
 - Gram + organisms like Methicillin-resistant S. aureus (MRSA)
 - Late (2 weeks – 3 months)
 - Atypical mycobacteria and fungi²

LASIK infection risk:
0.0046 to 0.034%¹

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Infection

- Signs of infection:
 - Dense, grey-white corneal infiltrates with indistinct margins
 - Conjunctival hyperemia



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Infection

- Treatment
 - Lifting the flap and culturing
 - Treating empirically with antibiotics
 - Some infections require flap amputation
 - Helps for better penetration of topical antibiotics
 - Removes necrotic corneal tissue harboring microorganisms



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Macrostriae

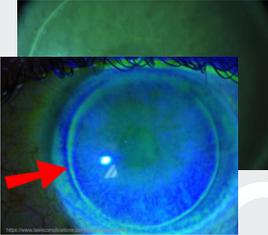
- A sign of flap displacement
- **Almost always visually significant**
- Can occur during surgery due to uneven flap alignment
- Often due to eye rubbing or injury postoperatively
 - Eye drop bottles
 - Goggles



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Macrostriae

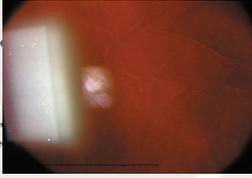
- Incidence = 0.2 to 1.5% of LASIK cases¹
- Signs
 - Broad undulations of parallel lines
 - A widened gutter
- Use NaFl dye to help in diagnosis
 - Highlights the macrostriae as areas of negative staining
 - Helps reveal the gutter



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Macrostromiae vs Microstromiae

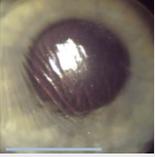
- Important to differentiate between the two
- **Microstromiae**
 - More common
 - Less serious
 - Present in a more random pattern of fine folds
 - Best visualized with retro illumination
 - *Unlikely to cause visual symptoms*
 - Often do not require treatment
- **Macrostromiae should be identified within 2 weeks**
 - To prevent the folds from becoming fixed and causing epithelial ingrowth and contracture of the cornea



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Macrostromiae

- **Treatment**
 - Flap lift and irrigation with a balanced salt solution
 - Gentle flap repositioning while smoothing back into place
 - Bandage CL placement to stabilize the flap and reduce risk of epithelial ingrowth



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Halos and Glare

- Visual phenomena that can frustrate patients even after a successful LASIK procedure
- Most often noticed at night or in poor lighting conditions
- Peak in severity ~ 1-month post-op before decreasing over time¹



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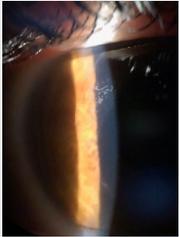
Halos and Glare

- May be due to short-term ocular surface-related effects
- High order aberrations
 - Only lower-order are treated unless using wavefront-optimized or topography-guided LASIK technology
- Educate pre-operatively on the expectation of temporarily seeing halos and glare
 - Likely to improve over time with neuroadaptation
- Aim to optimize patient's tear film both pre- and post-op

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Epithelial Ingrowth

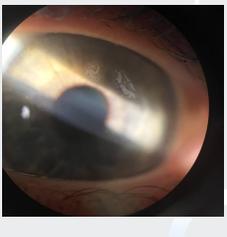
- Ingrowth of corneal epithelial cells under the LASIK flap
- Most often occurs ~1 month post-op
- Incidence 0.03-9.1%¹
 - <5% of primary LASIK cases²
- Unlikely to be visually significant
- **How does it happen?**
 - Intraoperatively during flap creation by deposition of clumps of epi cells
 - Post-op migration of surface epi cells into the flap gutter and across the interface



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Epithelial Ingrowth

- Two types:
 - Isolated epithelial **nests** (not connected to flap edge) often resolve within months with no impact on vision
 - Progressive epithelial ingrowths forming a continuous sheet of limbal stem cells – can lead to flap melt ☹
- If progressing rapidly towards the visual axis, **treatment is recommended** as it can induce irregular astigmatism
- Treat with flap lift and irrigation of the ingrowth



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Epithelial Ingrowth

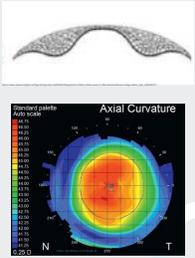
- Increased risk of development associated with:
 - Older age
 - Hyperopic LASIK treatment
 - Epithelial defects during surgery
 - EBMD
 - LASIK retreatment



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Epithelial Ingrowth

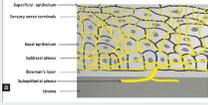
- Hyperopic LASIK treatment
 - Flattening the periphery to relatively steepen the central cornea
 - Up to 20% enhancement rate in 1 year likely due to epithelial remodeling filling in the treatment zone¹
 - Hyperopic LASIK often involves larger and deeper ablations leading to wider flap edges
 - Flap edges are less stable creating a pathway for epithelial cells to migrate



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Corneal Neuralgia

- LASIK impacts the sensory sub-basal nerve plexus:
 - Impaired blink rate
 - Altered corneal sensation
 - Increased dry eye symptoms
- Dry eye symptoms are typically transient, peaking within the 1 week to 3-month post-op
 - Often resolves within 6 months
- An extremely small minority of patients may develop **persistent corneal neuralgia**¹



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Corneal Neuralgia

- An intractable dry eye syndrome after LASIK that presents with *clinical signs inconsistent with the patient's symptoms*
- Unresponsive to standard therapy
- Symptoms
 - Burning
 - Soreness
 - Achiness
 - Light sensitivity
 - **Pain**

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Corneal Neuralgia

- If you suspect corneal neuralgia, perform the **Proparacaine Challenge Test** in office
 - Instill 1 drop of proparacaine 0.5%
 - **If there is a complete relief of symptoms**, continue treating with ocular surface management
 - **If no relief, or symptoms worsen**, patient should be assessed by a neurologist to examine nerve function
 - May need systemic therapy for relief¹



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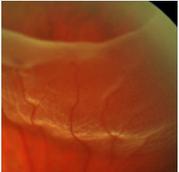
Contending with Complex Complications

After two-months postoperatively

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Retinal Detachment

- Risk of developing a RD in low-to-moderate myopes is 3-5x higher than hyperopes and 15x higher for high myopes¹
 - This risk remains after LASIK!



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Retinal Detachment

Grading Anis Clois Exp Ophthalmol (2012) 250:960-970
DOI 10.1007/s10633-012-9867-2

RETINAL DISORDERS

Rhegmatogenous retinal detachment after LASIK for myopia of up to -10 diopters: 10 years of follow-up

J. Fernando Arevalo · Andrés R. Linares · Francisca Torres · Enrique Saenz

- 2012: Evaluating risk of RD in 11,500 myopes up to -10.0D over 10 years post-op
 - 0.05% at 1 year
 - 0.15% at 5 years
 - 0.19% at 10 years

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Retinal Detachment

- A thorough DFE should be performed preoperatively, and any retinal lesions should be evaluated by a retinal specialist for treatment prior to LASIK surgery
- Educate patients that they will no longer have a myopic Rx, but their myopic eye can still change
 - Look out for symptoms of RD
 - Instruct them to seek medical care immediately with new onset flashes, floaters, curtain/veil, or decrease in vision

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Ptosis

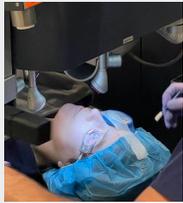
- More often a post-op complication of cataract surgery
- Exceedingly rare following LASIK
- Important to assess for ptosis pre-op
 - CL patients may have one already d/t years of stretching the upper lid



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Ptosis

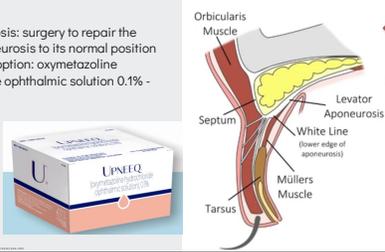
- During LASIK, a ptosis may be induced by a lid speculum used to hold the eyelid open
- Ptosis may occur due to stretching, dehiscence, or disinsertion of the levator muscle
- Can be categorized as either transient or persistent!
 - **Transient:** resolves within 6 months of surgery – a mechanical ptosis caused by swelling or inflammation
 - **Persistent:** unresolved by 6 months – an acquired aponeurotic ptosis



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Ptosis

- Treatment
 - Persistent ptosis: surgery to repair the levator aponeurosis to its normal position
 - Nonsurgical option: oxymetazoline hydrochloride ophthalmic solution 0.1% - Upneeq



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Ectasia

- A rare, but serious complication
- Leads to progressive corneal steepening, inducing irregular astigmatism, and a reduction in vision and visual quality
- Likely multiple variables involved
 - Genetic predisposition
 - Eye rubbing



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Ectasia

- Ectasia after LASIK is thought to be induced partially by removal of anterior stromal lamellae, which weakens the cornea's integrity
- Prevalence of post-LASIK ectasia ranges from 0.04 – 0.09%¹
- Post-operatively corneal collagen cross-linking (CXL) can be used to stabilize the cornea and slow or stop progression
- Best way to prevent post-LASIK ectasia is to do a thorough screening at the pre-op exam
 - Corneal tomography
 - Epithelial thickness mapping

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Ectasia

- Epithelial Thickness Mapping
 - Used for early screening in keratoconus
 - Epithelial thickness profile of normal cornea is nonuniform likely due to eyelid forces and blinking¹
 - Changes in the epithelial thickness profile are highly predictable with the epi responding to changes in stromal curvature²

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Ectasia

- Epithelial Thickness Mapping
 - **Epithelium is known to thin over the area overlying the cone**
 - Anterior Segment OCT – Pachymetry Scan

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Myopia Regression

- Known to limit long-term patient satisfaction with LASIK
- **A change of 0.50D or more** of myopia post-operatively
- Exact mechanism is unknown, multiple risk factors exist¹
 - Axial length > 26mm
 - High astigmatism
 - Corneal steepness
 - Older age

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Myopia Regression

- 2022 study following 1630 myopic LASIK patients after 6 years:
Myopic regression occurred at a rate of 16.1%¹
- Treatment
 - LASIK enhancement following confirmation of refractive stability
 - Rule out reasons for myopic shift like cataract development, myopic degeneration, or post-LASIK ectasia

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The post-operative period for a LASIK patient can be one of the happiest times in their lives as they experience their new vision...

HAPPINESS = RESULTS - EXPECTATIONS

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FINAL REMARKS

- Know the **expected** common, **short-term**, and **long-term** side effects and complications of LASIK surgery so that you can better educate your patients
- Do not let the rare complications scare you away from recommended refractive surgery – know the info so you can inform your patients if they ask
- Reach out to the surgeon and their team if you have any questions or concerns regarding the post-operative process

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Questions?

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Thank you!

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