Postoperative follow up and treatment after refractive surgery

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Target of postoperative treatment

- Avoid or prevent complications
- Regulate healing
- Increase patient comfort
- Topical antibiotics
- Topical anti-inflammatory agents
- Painkillers
- Artificial tears
Topical antibiotics

- The incidence of post LASIK infection is estimated to be between 1 in 1000 and 1 in 5000 procedures.
- Incidence after PRK 0.02%. Rare but potentially vision-threatening complication, usually evolves until one week postoperatively
- Common pathogens, PRK: gram-positive organisms, S aureus, S. epidermidis, S. pneumoniae, MRSA. More rare fungal and mycobacterium
- Common pathogens, LASIK: gram-positive organisms, S aureus, S. epidermidis, S. pneumoniae, Streptococcus Viridians. More rare fungal Nocardia, atypical mycobacterium
- Prophylaxis against corneal infection is absolutely necessary,
- Infection occurring after photorefractive keratectomy (PRK) may be secondary to the defect in the epithelium as well as the use of therapeutic contact lenses.
- Bandage lenses have a high rate of bacterial contamination
- Infection after LASIK due to intraoperative or postop contamination, microkeratome contamination or epithelial defect.
Topical antibiotics

• broad spectrum antibiotics
  – Tobramycin (Tobrex, Ikobel, Eyebrex)
    • bacterocidal
    • effective against gram- and S aureous and s epidermidis,
    • toxic for epithelium, increased resistance
  – Chloramphenicol-Azithamfenicol
    • Bacteriostatic
    • Gram+ amd Gram- anaerobes, chlamydia, Riketsia, Mycoplasma
    • non-toxic, penetrates cornea
    • increased resistance
  – Fluoroquinolones
    • inhibitors of DNA replication (DNA gyrase), bacterocidal
    • spectrum: aerobic Gram- and some gram+ (Pseudomonas, E. Aureus ,chlamydia, Mycoplasma, Mycobacterium)
    • very good penetration, small effect on epithelial healing (less for moxifloxacin and ofloxacin)
    • 2nd generation:
      – Ofloxacin (Exocin, Oxatrex), norflaxacin (Setanol), ciprofloxacin (Nafoxin)
    • 3rd generation
      – levofloxacin (Lexacin)
    • 4th generation
      – moxifloxacin (Vigamox)
      – enhanced activity against gram+, and atypical Mycobacteria
  • Special prescription is needed
Topical administration q.i.d until complete epithelium healing and bandage contact lens removal in PRK.

Similarly in LASIK antibiotics can be administered for a few days.

Usually chloramphenicol in a fixed combination with steroid and a Fluoroquinolone.
Topical steroids

- LASIK: used to prevent postoperative inflammation, pain and DLK
  - DLK: 1-6 days after LASIK, potentially visually threatening complication
- PRK: used to prevent postoperative inflammation, pain and development of corneal haze and regression
  - there is no consensus regarding the role of steroids in haze prevention, no action on keratocytes
  - some proof of role after medium to high myopia correction
  - role in prevention of sterile infiltrates due to BCL use
- postoperative inflammation in both procedures has been demonstrated in AC
topical steroids

steroids

- inhibiting: release of arachidonic acid, release of lysosomal enzymes, fibroblast activity, neovascularization
- Ester: loteprendol
- Ketone: all others
  - best penetration for ketones are the acetate
- potency: Fluorometholone- Dexamethasone- Loteprendol- Rimexolone
- IOP elevating potential: Dexamethasone- Fluorometholone- Rimexolone- Loteprendol
Topical administration q.i.d until complete epithelium healing and bandage contact lens lens removal in PRK (some prefer after)

Long term administration depending on surgeon preference, ablation depth, intraoperative use of MMC and other predisposing factors to haze/regression (e.g. sunlight)

Usually up to 1 month with gradual tapering (depending on over/under-correction)

In LASIK steroids are administered for at least one week

Usually Dexamethasone (in a fixed combination with antibiotic) and then Flurometholone or Loteprendedone for long term use

IOP monitoring essential (11-25% increase in IOP)

might delay epithelial healing
Pain after PRK

- Postoperative discomfort or pain is considered a bothersome side effect of PRK.
- PRK causes injury to the corneal sensory afferent nerves with release of pain-inducing inflammatory factors such as prostaglandins and neuropeptides.
- Although the link between prostaglandins and hyperalgesia is not fully understood, it is believed that prostaglandins cause hyperalgesia by sensitizing pain nerve endings.
- NSAIDs target cyclooxygenase, the enzyme that catalyzes the synthesis of prostaglandins from arachidonic acid.
- By inhibiting prostaglandin biosynthesis, NSAIDs exhibit potent analgesic, anti-inflammatory, and antipyretic effects.
NSAIDs

• Salicylates, Acetic acids (indomathacin, diclofenac, ketorolac, nepafenac, bromfenac), Phenylacanoic acids (Flurbiprofen, pranoprofen)

• Studies on Nepafenac, Ketorolac, Diclofenac, Bromfenac, Flurbiprofen and Indomethacin show effective pain relief

• complications reported with the use of NSAIDs: delayed re-epithelialisation, transient burning, stinging, and conjunctival hyperemia, superficial punctate keratitis, corneal infiltrates, epithelial defects, corneal melts
administration

- Topical administration for two days postop or until epithelium healing
- dosage depends on selected regimen, usually bid (Nepafenac 0.3% qd)
- oral administration (nimesulide)
on unbearable pain..

- diluted topical anesthetic
- danger of toxic epitheliopathy
- careful administration and patient meticulous information
epithelium healing

• new artificial tears contain agents that facilitate healing (Hyaluronic Acid, dexamethasone, Trehalose, Vitamins etc)
• administration q1h or q2h until epithelium healing, regimen containing BAK should be avoided

• matrix regenerating agent (RGTA) Cacicol has been shown to expedite healing in studies
Dry eye after refractive surgery

- In LASIK mechanical dissection of corneal nerves
- In PRK ablation of corneal nerves.

- In both PRK and LASIK, additional damage to stromal nerves by the laser procedure
- The greater the myopic correction, the greater the damage
- Corneal nerve regeneration takes 6 months to two years postoperatively
- Decrease in corneal sensitivity for 3 to six months after PRK and six months to more than a year after LASIK.
Dry eye & LASIK

❖ LASIK-induced dry eye is caused by a combination of decreased corneal innervation and chronic ocular surface inflammation
❖ damage to the corneal nerve plexuses (flap, photoablation) can lead to sensory denervation of the cornea:
   ❖ ↓ corneal sensation
   ❖ ↓ tear production
❖ Dry eye after LASIK likely represents a multifactorial spectrum of conditions that includes:
   ❖ a neurotrophic epitheliopathy component
   ❖ underlying inflammatory dry eye
   ❖ loss of conjunctival goblet cells that may in turn reduce mucin production
Artificial tears

• new artificial tears contain agents that facilitate healing (Hyaluronic Acid, dexpanthenol, Trehalose, Vitamins etc)
• administration qid until up to 6 months postop
• regimen containing BAK should be avoided
F/U after PRK

• patients should be followed closely until epithelium heals
• postoperative visits @ 1 month, 3 months 6 months and yearly are advised to monitor VA, refraction, IOP (especially if steroids are administered) and haze
F/U after LASIK

• one day postoperatively to monitor for flap related complication such as flap striae or flap dislocation and DLK
• 3 to 6 days postoperatively to monitor DLK formation
F/U after LASIK- ectasia

- 25% of eyes developed ectasia within 3 months, 33% within 6 months, 50% by 12 months, and 75% by 18 months. 10% of cases had not manifested by 36 months after surgery.
- Average time to the development of ectasia was 15.3 months.
- The earliest reported presentation was 1 week after surgery, and the latest reported presentation was 62 months after surgery.

Randleman et al., *Ophthalmology* 2008

corneal topography at 1 month and/or 3 months, one year and then yearly
thank you for your attention
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