Disclosures:

• None
Bio:

- Anterior Segment and Cornea Surgery Fellowship
  Wills Eye Hospital 2015
  Preceptors: Brandon Ayres MD, Irving Raber MD

- Ophthalmology Residency
  New Jersey Medical School 2014

- Medical School
  Robert Wood Johnson Medical School 2011

- Masters Degree
  University of Pennsylvania 2004

- Bachelor of Science
  Rutgers School of Engineering 2001
Outline

- Femtosecond Laser Assisted Cataract Surgery (FLACS)
- ORA assisted Cataract Surgery
- Penetrating Keratoplasty
- DSEK
- DMEK
- Management of Decentered or Subluxed IOLs
- LASIK and PRK
Femtosecond Cataract Extraction

- Femtosecond Laser assists with some steps of cataract extraction
  - Capsulorhexis
  - Nuclear Fragmentation
  - Astigmatic Keratotomy Incision
  - Main Corneal Incision and Paracentesis
- The rest of the surgery is completed with the traditional phacoemulsification technique
- Advanced technology, often used in refractive cataract procedures
Femtosecond Cataract Platforms
Femtosecond Cataract Extraction

• Benefits:
  – Decreased amount of total phaco energy (Abell 2013)
  – Decreased phaco energy time
  – Less endothelial cell loss in early post-op period (Abell 2014)
  – Less corneal edema in early post-operative period (Abell 2014)
  – Better centration and uniformity of capsulorhexis
  – May be safer in cases of zonular weakness/pseudoexfoliation

• Risks/Disadvantages:
  – Increases OR time 11.1-12.1 minutes (Lubahn 2014)
  – Increased risk of anterior capsule tears 1.84% vs 0.22% (Abell 2015)
  – Increased IOP during docking 11-25 mmHg (Baig 2014)
  – Not covered by insurance
Femtosecond Cataract Extraction
Femtosecond Cataract Extraction

• Video
Intraoperative Aberrometry Assisted Cataract Extraction

- Post-refractive (LASIK or PRK) IOL calculations are less predictable due to altered corneal curvature
- Used in eyes that are longer or shorter than usual
- Often leads to hyperopic surprise, as the calculations overestimate the power of the cornea
- ORA and Holos systems are attachments to the operating microscope
- Crystalline lens is extracted with traditional phaco technique
- In the aphakic state, the system is used to calculate the IOL power
- Toric IOL position can be verified as well
- 50% increase in accuracy with use of ORA in eyes with previous myopic LASIK or PRK (Ianchulev 2014)
Currently Available Platforms
ORA Assisted Cataract Extraction
ORA Assisted Cataract Extraction

The ORA™ System with VerifEye™ Technology confirms...
ORA Assisted Cataract Extraction
Treatment of Decentered or Subluxed IOL’s

• 3-piece sulcus IOL can be sutured to the iris
• 1-piece IOL in the bag, which is partially dislocated can be sutured to the sclera with the under-over technique
• More severe cases require explantation and suturing to the sclera
Sutured IOL

- Video
Penetrating Keratoplasty (PK)

• First Performed in 1906 by Eduard Konrad Zirm
• First successfully transplanted solid tissue
• Cornea is a site of immunologic privilege, it is protected from immunologic destruction
• Typically 16 interrupted sutures are placed which are removed starting at POM#6 on steep axis
• Can take up to 1 year to achieve full vision
• 30% spectacle free, 30% spectacle correction, 30% RGP correction
• Some series report up to 50% RGP correction
• Current Surgical Indications (2012 Report)
  – Keratoconus
  – Repeat transplant for previous failed graft
  – Pseudophakic Bullous Keratopathy
  – Corneal Dystrophies
  – Fuchs
  – Mechanical or Chemical Trauma
Penetrating Keratoplasty (PK)

• Video
Descemet’s Stripping Endothelial Keratoplasty (DSEK)

- First described by Melles in 2004
- Only the endothelial layer is stripped and removed
- The transplanted tissue contains endothelial cells, Descement’s membrane, and the thin layer of stroma ~100 microns thick
- Takes approximately 3 months to achieve full vision
- Rejection rate approximately 10%
- Surgical Indications (2012 Report)
  - Fuchs Dystrophy
  - Pseudophakic Bullous Keratopathy
  - Other causes of endothelial dysfunction
  - Repeat transplant after DSEK or DMEK graft failure
Descemet’s Stripping Endothelial Keratoplasty (DSEK)

- Video
Descemet’s Membrane Endothelial Keratoplasty (DMEK)

• Latest iteration in Endothelial Keratoplasty
• First described by Melles in 2006
• Similar to DSEK but more technically challenging
• Better final visual acuity and contrast sensitivity
• The transplanted tissue contains endothelial cells and Descement’s membrane, without any stroma ~10-15 microns thick
• Rejection rate approximately ~1% (Anshu 2012)
• Surgical Indications
  – Fuchs Dystrophy
  – Pseudophakic Bullous Keratopathy
Descemet’s Membrane Endothelial Keratoplasty (DMEK)

• Video
LASIK (Laser in Situ Keratomileusis)

- Femtosecond laser creates a corneal flap
- Microkeratome can be used if corneal scars are present
- Excimer laser reshapes the cornea under the flap
- Flap is replaced
- Faster healing, less discomfort, allows the patient to return to work the next day
- Treatment of -10D to +4D with up to 5D of astigmatism
- At least 250 microns of residual stromal bed, but most surgeons leave at least 300
- Higher risk of corneal ectasia and epithelial ingrowth
LASIK (Laser in Situ Keratomileusis)

• Wavefront guided
  – Attempts to reduce preexisting aberrations and minimize induction of new aberrations
  – Creates ablation profiles customized to individual patients

• Wavefront optimized
  – More prolate peripheral ablation to reduce spherical aberration
  – No effect on other higher-order aberrations
Contraindications to LASIK

- Forme fruste keratoconus
- Steep keratometry
- Thin corneal pachymetry (thickness)
- Dry eye
- Anterior Basement Membrane Dystrophy
- Unstable refractions
- Collagen vascular diseases
- Eyelid abnormalities
- Previous HSV, HZV infection
- Medications: isotretinoin, amiodarone
- Uncontrolled DM
- DM retinopathy
- Patients who are pregnant or nursing
- Patients with unreasonable expectations
LASIK – Patient Selection

- Stable refraction
- EBMD patients benefit from PRK but LASIK is contraindicated
- Pachymetry
  - 110 micron flap
  - 14 microns per diopter of ablation
  - 300 micron residual stromal bed
- Topography must rule out
  - Forme Fruste Keratoconus
  - Pellucid Marginal Degeneration
  - Contact lens induced warpage
Microkeratome vs. Femtosecond Laser Flap Creation

**Making LASIK Safer, Better**

**INTRALASE**

INTRALASE® is the first blade-free laser technology for performing the critical first step of the LASIK procedure: creating the corneal flap. Intralase makes LASIK safer by replacing the hand-held microkeratome blade with the computer-guided precision of a laser.

**Traditional LASIK Process**

1. There are two steps to the LASIK procedure. First, the surgeon cuts a flap of corneal tissue (the outer surface of the eye). Prior to Intralase, this first step was done manually using a hand-held device with an oscillating metal razor blade, called a microkeratome. Even in skilled hands, this device can be unpredictable, causing the majority of LASIK complications.

2. The flap is then lifted to expose the inner cornea for the second step: vision treatment by the excimer laser.

**The Intralase Difference**

The INTRALASE® FS laser uses an infrared beam of light to create the flap from below the surface of the cornea using an ‘inside-out’ process.

**Total Time: 45 Seconds**

1. The beam of laser light is focused to a precise point within the stroma (central layer of the cornea), where a string of microscopic bubbles is formed.

2. Thousands of these tiny bubbles are precisely positioned to define the flap’s dimensions and distinct beveled edge, as well as location of the hinge. Bubbles are then stacked along the edge of the flap up to the corneal surface to complete the flap.

Source: Intralase Corp.

INTRALASE is a registered trademark of Intralase Corp.
AMO’s Intralase and VISX
Alcon’s WaveLight FS200 and EX500
PRK (Photorefractive Keratectomy)

- Epithelium is removed mechanically
- Flap is not created
- Laser reshapes the cornea, large epithelial defect remains
- Patient wears a bandage contact lens for about 1 week
- Slower healing, more discomfort, higher risk of infection
- Same residual bed thickness of 250-300 microns, but without the need for a flap, patients with thinner corneas may be treated safely
- Higher risk or stromal haze than LASIK, but this risk decreases with the use of Mitomycin C
- Lower risk of corneal ectasia
- Lower risk of dry eye
- Enhancements are more commonly performed with PRK as lifting the flap after a long period of time may be difficult
QUESTIONS?
THANK YOU

Sebastian Lesniak MD
slesniak@matossianeye.com