Learn to Comanage the Complex and Unusual

Maynard L. Pohl, OD, FAAO
Pacific Cataract & Laser Institute
10500 NE 8th Street, Suite 1650
Bellevue, WA 98004 USA
425-462-7664

Dr. Maynard Pohl has no financial interests to disclose.

Ocular Surgery Comanagement

• Cataract Extraction
• Laser Vision Correction
• Corneal Transplantation
• Pterygiectomy
• Glaucoma Filtration

Penetrating Keratoplasty (PK): Indications

• Visual
• Structural
• Therapeutic
• Cosmetic

Considerations in Corneal Transplant Surgery

• Timing of surgery: vision may be worse than before surgery for 6 months
• Complicating factors: eyelids, dry eye, surface and intraocular inflammation, IOP, previous grafts and incisions

Considerations in Corneal Transplant Surgery

• Definition of success: better vision, less pain, successful spectacle or CL wear, less glare, quality of life improvement
• Meticulous pre, intra, and post-operative care = meticulous comanagement

Expected Outcomes

• Excellent Prognosis (>90% success): keratoconus, central or paracentral inactive scars, stromal dystrophies, early central Fuchs’ dystrophy
• Good Prognosis (80% – 90% success): advanced Fuchs’ dystrophy, aphakic and pseudophakic corneal edema and bullous keratopathy, inactive herpetic keratitis
Expected Outcomes

• Fair Prognosis (50% – 80% success) :
  active bacterial keratitis, active herpetic keratitis, active fungal keratitis, mild chemical burns, grafts on young children, moderate keratoconjunctivitis sicca

• Poor Prognosis (<50% success) :
  severe chemical burns, radiation burns, ocular cicatricial pemphigoid (OCP), neurotrophic disease, congenital glaucoma, anterior cleavage syndromes, multiple graft failures

Penetrating Keratoplasty: Surgical Techniques

• Anesthesia
  • Corneal trephine - approximate 8.0 mm diameter button removed, 8.25 mm diameter donor

Advantages of Suture Adjustment

• Decreased early post-op astigmatism
• Increased regular corneal topography
• Better visual acuity in early post-op period
• Quicker visual rehabilitation

Penetrating Keratoplasty: Postoperative Evaluation

Ideal one day post-op:
• well-positioned, clear graft
• epithelium intact
• suture(s) intact
• negative Seidel
• formed anterior chamber
• normal IOP

Penetrating Keratoplasty: Postoperative Medications

• Pred Forte q 2 hrs x 2 weeks, then qid
• Fluoroquinolone Ab qid
• Artificial tears qid (Celluvisc)
• Oral Ab (ciprofloxacin) x 1 week
• Eye shield qhs

Penetrating Keratoplasty: Postoperative Followup

• 1 day, 3 days
• 1 week, 3 weeks, 5 weeks
• 2 months, 3 months
• 6 months, 12 months
• Annually
Penetrating Keratoplasty: Postoperative Complications

• Graft rejection – early, late
• Endophthalmitis
• Glaucoma
• Wound leak
• Delayed reepithelialization
• Refractive surprise

Graft Rejection

• Symptoms include redness, light sensitivity, decreased vision
• Start or increase steroid drops immediately
• Examine for confirmation asap
• Signs include stromal edema, line of keratic precipitates, uveitis, neovascularization

What is Lamellar Keratoplasty?

• Techniques to transplant individual layers of the cornea
• Anterior
• Posterior
• Superficial
• Deep

Why consider Lamellar Keratoplasty?

• Leaves cornea more intact structurally
• Addresses only the abnormal layer
• Some forms (DSAEK, DMEK) eliminate surface incisions and are sutureless, avoiding suture-related complications and surface irregularities, resulting in faster wound healing, smoother topography, and greater stability
• Lower risk of endothelial rejection (DALK)
• Steroid-sparing surgery (DALK)

Who is a Poor Candidate?

• For DALK
  – Combined stromal and endothelial disease
  – History of hydrops in keratoconus
  – Old scars through Descemet’s (deep RK with prior perf)
  – Complex anterior reconstruction cases
  – Prior PK
• For DSAEK/DMEK
  – Complex anterior reconstruction cases
  – Phakic patients
  – Angle closure glaucoma suspects

Lamellar Keratoplasty Terms

• Endothelial Techniques
  – PLK – Posterior Lamellar Keratoplasty
  – DLEK – Deep Lamellar Endothelial Keratoplasty
  – DSEK – Descemet’s Stripping Endothelial Keratoplasty
  – DSAEK – Descemet’s Stripping Automated Endothelial Keratoplasty
  – DMEK – Descemet’s Membrane Endothelial Keratoplasty
• Anterior Stromal Techniques
  – SALK – Superficial Anterior Lamellar Keratoplasty
  – DALK – Deep Anterior Lamellar Keratoplasty
  – Big Bubble Deep Anterior Lamellar Keratoplasty
Posterior Lamellar Keratoplasty (PLK)

- Eliminates surface incisions and results in faster wound healing, smoother topography, and greater stability
- Avoids post-PK surface irregularities
- Avoids suture-related and wound healing complications
- The preferred surgical methods for corneal endothelial disease

DSAEK: Descemet’s Stripping Automated Endothelial Keratoplasty
DMEK: Descemet’s Membrane Endothelial Keratoplasty

Pentacam (Oculus)

- Scheimpflug Images
- 3D Anterior Chamber Analyzer
- Pachymetry Map
- Topography Maps (ant. & post.)
- Elevation Maps (ant. & post.)
- Anterior Chamber Depth Map
- Cataract Analyzer
- Holladay Report
- Tomography

Post-Op Comanagement

- For DSAEK/DMEK
  - Look for wound leaks
  - Early - expect air in the AC – quantify by %
  - Look carefully for graft separation
  - Other clues include intense stromal edema
  - Don’t worry too much about decentration
  - Look for pupillary block in patients with air still in the eye
  - Longterm expect slow gradual improvement even with interface haze

DSAEK Edge Slit Lamp Exam

DSAEK Dislocation Slit Lamp Exam
Endothelial Cells after FT Penetrating Keratoplasty - Bourne 2001 Castroviejo Lecture - Progressive Biexponential Decay of Endothelial Cell Counts

- Months/Years
- Pre-Op
- 2 Mo
- 3 Yr
- 10 Yr
- 20 Yr
- Cell Density
- %Loss
- 2973
- 2467 17%
- 1376 53%
- 960 67%
- 756 77%

Anterior Lamellar Keratoplasty (ALK)

The Big Bubble Technique

Who is a Good Lamellar Candidate?

- DALK
  - Thinning disorders
    - Keratoconus
    - Pellucid marginal degeneration
    - Terrien’s corneal degeneration
  - Deep non-perforating corneal scars
    - Traumatic
    - Post-infectious
    - Herpetic with stromal involvement (esp HSV)
    - Shallow RK

Patient Education – What are Special Considerations for DALK?

- Better longterm endothelial results
- More uncertainty of successful lamellar procedure
- Patients must know that a possible fallback with DALK is full-thickness PK
- Post-op care: must look for double AC – treatment with AC air

Post-Op Comanagement

- For DALK
  - Look for double anterior chamber
  - Stromal edema may be a clue
  - Double AC more common with intraoperative Descemet’s rupture
  - Treatment is AC air injection – similar to detached Descemet’s membrane
  - Expect longterm gradual improvement even with interface haze
  - Longterm epithelial cell ingrowth is rare
Pterygiectomy: Indications

- Loss of clarity within visual axis
- Increasing corneal astigmatism
- Chronic irritation and inflammation
- Cosmesis
- Motility restriction

Pterygiectomy: Surgical Approaches

- Bare scleral excision/closure
- Conjunctival flap
- Conjunctival autograft
- Peripheral lamellar keratoplasty
- Adjunctive therapy: chemotherapy, radiation therapy
- Amniotic membrane

Typical Surgical Times

- Sutured grafts
  - 18 minutes to 26 minutes
- Fibrin grafts
  - 6 minutes to 15 minutes

Pterygiectomy: Normal Postoperative Followup

- 1 day, 1 week, 3 weeks, 5 weeks, 12 weeks
- Patch 1st night
- Vicodin ES, #18, 1 or 2 po q 4 hr prn for pain
- Ab/steroid drop qid x 1 week

Pterygiectomy: Normal Postoperative Followup

- Steroid drop qid with taper until quiet
- Artificial tears qid (indefinitely)
- UV protection (indefinitely)

Pterygiectomy: Complications

- Recurrence
- Subepithelial scarring
- Scleral melt (mitomycin-C)
- Muscle insertion damage
Pterygiectomy: Complications

- Graft inversion
- Dellen
- Steroid complication

Trabeculectomy

Risk Factors for Glaucoma Progression

- Age
- Central corneal thickness
- Intraocular pressure
- Vertical C/D ratio
- Pattern Standard Deviation
- Disc hemorrhage
- OCT measurements of RNFL and GCC

Structure and Function

- Structural progression is associated with functional progression in glaucomatous eyes.
- Structural and functional progressions are not in perfect agreement.
- Both are useful in detecting glaucoma progression.
- A combination of structural and functional measurements is the future in managing glaucoma.

Practical Considerations in Glaucoma Management

- When to start treatment?
- When to change treatment?
- What to use?
- Would you like help putting drops in?
- How to implement: Use nonjudgemental words. Be on the patient’s side.
- Comanage with skilled and respectful surgeons.

Goal In Patient Treatment

- Highest efficacy with lowest side effects at lowest cost
- Prevention of blindness during a patient’s lifetime
- Patient understanding of the disease
- Compliance with treatment
### Treatment Approaches

- Current therapy is directed solely at reducing IOP, despite other possible factors.
- If glaucoma is detected, then the IOP is considered to be at a damaging level.
- **Target IOP:** the lower the pre-tx IOP, the lower the target IOP; the greater the ONH and VF damage, the lower the target IOP

### Laser Therapy In POAG

- **Thermal Laser Trabeculoplasty (Argon or Diode) - LTP, ALT, SLT**
  - 180 vs. 360 degrees
  - early vs. later tx
  - repeat tx
- **Cyclophotocoagulation (CPC) – cyclodestructive procedure for endstage cases**

### Filtration Surgery In POAG

- **Trabeculectomy with chemical manipulation** has been the standard of care
- **Chemical manipulation of wound healing** (5-fluorouracil, mitomycin-C):
  - previous ocular surgery
  - inflammation
  - younger patients
  - Black patients

### Other Filtration Techniques In POAG

- **Tubes, valves, shunts and stents** (aqueous drainage devices)
- **Canaloplasty – moderate glaucoma**
- **Trabectome (FDA-approved) – long term results poor**
- **MIGS (Micro-Invasive Glaucoma Surgery) – iStent (FDA-approved), Hydrus, CyPass, Aquecentesis; milder glaucoma and combined with cataract surgery (> 20% IOP reduction)**
Cyclodestructive Procedures In POAG

- Cyclocryoablation
- Cyclophotoablation (CPC)

Trabeculectomy Postop Care

- The ideal postoperative outcome is low IOP, a deep anterior chamber, and a well-functioning bleb.
- Evaluate at day 1, at day 2 or 3, at week 1, and weekly until week 6, or until relatively stable.
- Consider suturelysis or suture removal at 1 to 4 weeks.
- Consider ocular massage after suture removal.
- Antibiotic drop x 1 week, corticosteroid drop x 12 weeks (with slow taper).
- Once stable, continued regular monitoring of IOP, VF, and ONH, maintaining an ideal target IOP, reinstating antiglaucoma meds pm.

Trabeculectomy Postop Evaluation

- IOP
- Anterior chamber depth
- Nature of the filtering bleb

IOP

- Immediately after surgery IOP may be low, medium, or high; typically low (0 to 8 mm Hg); higher with combined CE/Trabeculectomy.
- Eventual ideal IOP is 10, but may range 8 to 15.
- With persisting low IOP, consider overfiltration, wound leak, or ciliary body shutdown.
- With moderate or high IOP, consider bleb failure: tight sutures if early, encapsulated bleb if later.
- If higher IOP and a well-functioning bleb, consider a steroid response.

Anterior Chamber Depth

- Immediately after surgery, a shallow anterior chamber in 10 to 20% of cases, resolving spontaneously within the first week.
- Shallow anterior chamber = ocular hypotony
- Ocular hypotony = overfiltration or wound leak or ciliary body shutdown
- Consider pressure patching x 2 to 3 days prior to suturing of a wound leak.

Nature of the Filtering Bleb

- The ideal bleb is diffuse, moderately-elevated, microcystic…and functions well.
- Most blebs are comfortable regardless of shape or size.
- With an early poorly-formed bleb, consider wound leak, tight scleral flap sutures, hyposecretion of aqueous, or scarring tendency.
- With a well-formed bleb and high IOP, consider an encapsulated bleb vs a steroid response.
Take Home Message to Patients

- Immediately report any excessive pain, unusual redness, discharge, or blurred vision at any time following filtering surgery and immediately direct patient management to either the comanagement center or glaucoma specialist.