I. Cataract and Glaucoma - Important Issues

A. Commonly coexist and present special problems: As our population ages, ophthalmologists must be prepared to simultaneously manage cataract and glaucoma. Indeed, decisions related to the lens will increasingly play a role in the management of glaucoma. Certain management issues are unique to either cataract or glaucoma and others share common concerns.

B. Cataract assessment: determine need for cataract operation – can be difficult in a moist pupil and pre-existing glaucomatous optic nerve damage. Assess with maximal dilation, potential acutely leading, brightness acutely testing.

C. Glaucoma assessment: determine type of glaucoma (i.e., OAG, PIG, angle closure) and access degree of optic nerve damage - can be difficult because cataract may affect visual field and view of optic nerve and may even be an inherent cause of glaucoma. Assessment of extent of glaucoma damage is critical for decision-making. Visual fields may “improve” after cataract surgery and may be post-operative.

D. Risks and complications greater with cataract surgery in glaucomatous eyes than in non-glaucomatous eyes due to: moist pupil, posterior synechiae, PAS, CACG, compromised glare, bleb-associated surgery – pre-existing surgery – scarring or pre-existing bleb, associated systemic diseases – diabetes, associated eye conditions – myopia, created anterior chamber - high hypotension, nanophthalmoses increase incidence of post-op IOP rise, increased incidence of suprachoroidal hemorrhage. CME may increase with use of multiple glaucoma medications incorporating BAK (benzalkonium chloride) preservatives.  

II. Indications for Surgery - visually significant cataract in presence of glaucoma

E. Laser Trabeculoplasty (LT): Argon Laser Trabeculoplasty (ALT) Selective Laser Trabeculoplasty (SLT) and Micropulse Diode Laser Trabeculoplasty (DPT)

1. Traditional dogma: LT more effective in phakic eyes than aphakic/pseudophakic eyes a. Statistically significant difference, but not substantial clinical difference b. ALT may still be used after cataract surgery - smaller IOP reduction, but still clinically effective c. LT delayed response in pseudophakic patients may happen if pre-existing IOP is higher, long-term results similar (Shidly)

2. Indications – decision for ALT/SLT/TLM based on glaucoma status as any patient, relatively independent of cataract. (See Indications for Combined Surgery). ALT/SLT/TLM may be performed more often in cataract surgery alone anticipated, rather than combined surgery. Since ALT/SLT result may permit cessation of medicating of intraocular pressure and delay of cataract surgery.

3. If indicated, best performed at least one month prior to cataract surgery. a. P.A.F.T. consider treating inferior 180 degrees away from future sclerectomy site b. Possible role of ALT in exfoliation syndrome formation

4. LT does not blunt early post-op IOP rise after cataract surgery

5. Cataract surgery does not appear to diminish effect of ALT if performed after ALT

F. Combined Phaco and Glaucoma Surgery – Trabeculectomy/canaliculostomy/tube shunt - macromicroincisional glaucoma surgery (“MAGS”)

1. Advantages
a. Restore vision promptly * b. Single procedure * c. Technically easier - short surgical time d. Reduced operative and post-op complications related to wound e. Facility post-op assessment of optic nerve and visual field f. Opportunity for glaucoma operation later if needed – multiple options conjunctiva can be spared g. Smaller incisions – glaucoma bleb formation can yield improved long-term IOP control (Shingleton, Gurkan et al 1 year study; Shingleton, Papadia et al 5 year study; Suzuki 10 year study; Poley et al. Measurement of IOPs)

(1.) Normal and glaucoma suspect eyes have a statistically significant reduction in IOP at 1 year (2-3 mm Hg) maintained at 5 years. Significant IOP reduction for glaucoma eyes at 3-5 years

(2.) Glaucoma eyes have a significantly reduction in glaucoma medication requirements at 1 year, gradual increase IOP in prep/levels over 5 years

(3.) IOP reduction may be greater in eyes with relatively narrower angle pre-op – greatest proportional change in angle width and depth occurs in eyes with narrow angles of ≥4 mm Hg

2. Disadvantages
a. More complications than cataract extraction alone - shallow AC, bleb leak, choroidal effusion/serosanguinous effusion, hypotony, rejection, dehiscence, postoperative hypotony, IOP drop, shift, tube issues, surgical complications, etc.

b. More than 3 medications required for good IOP control

c. IOP reduction may be greatest with “bleb” procedures: AqueSys, InnFocus, Stents

d. ? less IOP control than 2-stage procedure?

III. Techniques

A. Phaco Alone

1. Advantages
a. “Triple Procedure”: phaco/InTrab with ECP, phaco/trabeculectomy with ECP

1. Pre-op

   a. Topical fluorometholone, NSAID 3-days pre-op
   b. Dilation – stop miotics one week pre-op, topical non-steroidal anti-inflammatory agent with usual dilation regimen, especially if pupillary block will be required and/or patient on protonad agonists
   c. Consider pre-op CAL block with or without alpha agonist if post-op IOP spike a concern and tight anisocoria a risk factor
   d. Consider cessation of anticoagulants and/or heparin during fluoroquinolones and NSAIDs

2. Paracentesis – mandatory for two-handed phaco (coaxial or bimanual MICS) and to facilitate aqueous release for TIP post-op

3. Location - Temporal incision phacemulsification approach strongly preferred to minimize conjunctival manipulation. If superior, superior temporal is preferred to preserve virginal conjunctiva for future situations if needed.

4. Management of miotic pupil and iris – Special Situation

   a. Miotic pupil = common finding
      (1.) Long-term miotics
      (2.) Early placement facilitates phaco, but may be associated with

   b. Facilitates separation of IOL from the iris - reduces pupillary capture of IOL, posterior migration of iris

   c. Relax tension on hooks anterior to keratome incision prior to phaco to decrease

5. Capsule/ IOL

   a. Good preservation of function and pupillary contour

   b. Iris suture—if required

   c. Relax tension on hooks anterior to keratome incision prior to phaco to decrease

   d. Critical for effective, safe phacemulsification

   e. Small capsulorrhexis (particularly in pseudoexfoliation eyes) may predispose to anterior capsule dehiscence, no capsule tears.

6. Phacemulsification: points to avoid small pupil phaco

   a. Hydrodissection – critical for hinge-free nuclear phaco

   b. Iridectomy

   c. Capsulorhexis – phacoemulsification - IOL implantation

   (2.) Two-instrument technique helpful - requires bimanual
dexterity

   (3.) Intracameral epinephrine

   (4.) Hydrodissection

   (5.) Iris suture—if required

   (6.) Avoid if potential for IFIS

   (7.) NAPS

   (8.) Bimanual iris stretch without sphincterotomies

   (9.) Scissors sphincterotomies

   (10.) Superior sphincterectomy

(1.) Long-term miotics

(1.) 12 to 6; 9 to 3 meridians – “micro sphincterotomy technique”

(1.) Good preservation of function and pupillary contour

(1.) Superior sphincterectomy

(1.) Avoid for IOP spike

(1.) Superior sphincterectomy

(1.) Capsulorhexis – phacoemulsification - IOL implantation

(2.) Two-instrument technique helpful - requires bimanual
dexterity

(3.) Intracameral epinephrine

(4.) Hydrodissection

(5.) Iris suture—if required

(6.) Avoid if potential for IFIS

(7.) NAPS

(8.) Bimanual iris stretch without sphincterotomies

(9.) Scissors sphincterotomies

(10.) Superior sphincterectomy

(1.) Long-term miotics

(1.) 12 to 6; 9 to 3 meridians – “micro sphincterotomy technique”

(1.) Good preservation of function and pupillary contour

(1.) Superior sphincterectomy

(1.) Avoid for IOP spike

(1.) Superior sphincterectomy

(1.) Capsulorhexis – phacoemulsification - IOL implantation

(2.) Two-instrument technique helpful - requires bimanual
dexterity

(3.) Intracameral epinephrine

(4.) Hydrodissection

(5.) Iris suture—if required

(6.) Avoid if potential for IFIS

(7.) NAPS

(8.) Bimanual iris stretch without sphincterotomies

(9.) Scissors sphincterotomies

(10.) Superior sphincterectomy

(1.) Long-term miotics

(1.) 12 to 6; 9 to 3 meridians – “micro sphincterotomy technique”

(1.) Good preservation of function and pupillary contour

(1.) Superior sphincterectomy

(1.) Avoid for IOP spike

(1.) Superior sphincterectomy

(1.) Capsulorhexis – phacoemulsification - IOL implantation

(2.) Two-instrument technique helpful - requires bimanual
dexterity

(3.) Intracameral epinephrine

(4.) Hydrodissection

(5.) Iris suture—if required
9. Anatomic and structural changes impact both MF and Accommodative IOL’s.

10. Phaco effect on CME - no difference between phaco in glaucoma and non-glaucoma patients, if no surgical complications. Increased IOP after phaco can be decreased by pre-op use of topical glaucoma medications (Shingleton, Chaudhry).

11. IOP results at 1 - 5 years – 1-3 mmHg decrease: normal and glaucoma suspect patients. Reduced medication requirements in glaucoma patients initially with increased need over time. Indications for small incision phacoemulsification has expanded in glaucoma patients because of these results.

12. Phaco effect on CME: no difference between phaco in glaucoma and non-glaucoma patients, if no surgical complications. Increased IOP after phaco can be decreased by pre-op use of topical glaucoma medications (Shingleton, Chaudhry).

13. IOP reduces with phaco greater in eyes with 1% ACG vs. OAG.

14. Flexibility of IOL – reduced incision size, inflammation.

15. beach: preferably with silicone/PMMA with treatment-resistant inflammation.

16. Pre-op Treatment

a. Pupil
b. Zonules

c. Filter bleb effect: low IOP, astigmatism

MP IOL / accommodating IOLs: possible balance between glaucoma damage visual needs – patient expectations. Caution avoided. Avoid in PKP patients.

17. ILD

a. Any size, type implant possible

(1) Foldsile IOL - reduced incision size, inflammation.

(a) Uveal biscompliability

(b) Deposits may occur on silastic, acrylic and PMMA lenses – variable reports on incidence – may be filtered with acidic, second generation silicone lenses.

(2) Folded optic – astigmatism is not more than those observed with IOLs. IOP reduction similar for silicone and acrylic IOLs.

(3) Large optic ILD - best with sub-scleral large pupil or sector iridectomy.

(4) IOP increases to 20 mm Hg (mean peak IOP) during implantation (hydrodissection).

b. Beware of zone occlusion in pseudophakic eyes – may dictate type of IOL.

c. PC-OIL in capsular bag – implant of choice. Reduce postoperative penetration. IOP reported with one-piece acrylic IOL in sulcus or prolapsing through large, eccentric capsulorhexis.

d. Current generation IOP, subincisional AC IOL satisfactory if angle status not anatomically compromised by PAS, resection or ChE (see Donaldson et al). Avoid AC IOL if such circumstances exist.

(4) Post-op – beware aqueous misdirection

f. Angle closure glaucoma – Special Situation

(1) IOP reduction with phaco greater in eyes with 1% ACG vs. OAG.

(2) Effective IOP reduction in Acute primary angle closure IOL – Jacob et al.

(b) Tense anterior chamber: conventional surgical IOL in IOP but associated with multiple surgical interventions confirmed by Lam, 2008.

(3) Acmeus et al: IOP in Japanese population with phaco and previous glaucoma treated with triamcinolone pump can open the angle and IOP in eyes with nonresidual angle closure after IOL (Khalil).

(4) Phaco alone deepens chamber greater than phaco plus triamcinolone (PMM).

(5) Phaco provides better short term IOP control in acute glaucoma than chronic glaucoma with PAS greater than 180° (Zhu).

(6) Phacoemulsification IOP reduction with post-op complications in eyes with chronic IOP more than acute IOP. No difference in glaucoma progression. (Tham et al)

(7) Capability of coupling intrascleral gonioscopy with phacodissection in acute, subacute and chronic angle closure situations (Schlington, Chang et al; Hawesvoyweg et al).

J. IOL

1. Single incision approach is simple, safe and effective; potentially less comfortable for temporal phaco.

2. Preferable incision site or corridor (performed that

a. Temporal approach

b. Conical incision approach - minimizes conjunctival manipulation

c. Small incision: IOL preferred

d. Consider round-10-0 nylon suture closure to facilitate early digital pressure, if needed, in post-op phase.

e. Standard phacoemulsification and IOL implantation

3. Trabecular component - performed second

a. Superior

b. Conjunctival flap of surgeon preference

c. Antimetabolite, if indicated

d. Standard trabeculotomy

e. Peripheral iridectomy may not be required with combined procedures unless iris prolapses through iridectomy. Rending patient paraacclamatic injection to clear anterior chamber vitreous. Problems associated with bleb formation may be greater than risk of pupillary block or secondary cataract formation, in absence of IOL implantation and bleb development equal to between PI and non PI groups in randomized series (Shlanger, Chaudhry et al).

4. Results

a. Equivalent IOP when compared to single incision procedure and may require less glaucoma medications (Jampel/Friedman – evidence based review). No significant difference compared to single-site.

b. Shingleton, Price et al: equal IOP reduction, visual improvement and medication reduction between single-site vs. separate site.


d. Small amount of IVR antifibrinolysis injected. Good with ATR antifibrinolysis

e. Surgeon preference

D. COMBINED PHACO AND TRABECULECTOMY SURGERY (“MAGS”) - via separate incisions

1. Separation of phaco and trabeculectomy components to different sites by all three ophthalmologists to enhance development of effective filtration. Permits phacoemulsification from a position most comfortable for cataract surgeon. Single, safe, effective procedure longer than combined surgical approach.

2. Choice of surgical approach - performed that

a. Temporal approach

b. Conical incision - minimum conjunctival manipulation

c. Small incision: IOL preferred

d. Consider round-10-0 nylon suture closure to facilitate early digital pressure, if needed, in post-op phase.

e. Standard trabeculotomy and IOL implantation

2. Combined phaco and trabeculectomy surgery (MAGS) – via single incision

1. Single incision approach is simple, safe and effective; potentially less comfortable for temporal phaco.

2. Choose your best operation - minimize manipulation, be atmospheric to tissues.

3. Pre-op


b. Beware hypotonic conjunctival changes: not injection, long term topical Visine.

c. Topical: Fluorometholone, NaIO 3 drops, meds twice daily. Dilution – And topical dilution program.

d. Consider post-op CAIL blockers or alpha agonists if post-op IOP spike a concern and treat first.

e. Consider cessation of antiglaucoma drugs in high risk eyes (Counselman, Pilsic, Tickle).

g. Tightness of closure—observed for slow, spontaneous flow under flap with maintenance of anterior chamber.

h. Topical tightness—use of scleral flap modification

k. Scleral flap can be modified: conventional trabeculectomy flap—conventional phaco scleral tunnel with stitch or no stitch—modified scleral tunnel with releasing incision.

(1.) Goal—best IOP: theoretically change trabeculectomy component as little as possible from conventional filter procedure
   (a) Conventional trabeculectomy flap—triangle or rectangle
   (b) Advantages: all advantages of standard filtration procedure: laser suture (LIS) or releasable suture, direct visualisation
   (c) Disadvantages: [1.] Limited based scleral flap architecture predisposed to ATR astigmatism drift
   (2.) Delay visual recovery
   (3.) Longer procedure
   (4.) Astigmatism issues post-operatively

[3.] Delay visual recovery
[4.] Post-operative astigmatism

(b.) Advantages: all advantages of standard-no-stitch scleral tunnel procedure
   (c) Disadvantages: [1.] Variable post-op IOP control—more with 2-TOP and shallow AC;
   (2.) Lack of releasable suture capability to tailor flow through flaps post-operatively
   (3.) Hybrid modified scleral tunnel/trabeculectomy flap: scleral tunnel with central-T releasing incision
   (a) Goal—Theoretically combine best of both traditional trabeculectomy flaps and scleral tunnel architecture
   (b) Technique (Shingleton and colleagues): [1.] Standard scleral tunnel—located 2 mm posterior to Tenon insertion, AC entry; 1 mm anterior to Tenon insertion in clear cornea, 3-5 mm created;
   (2.) Standard phaco-IO/L procedure;
   (3.) Central-T releasing incision in scleral flap 1.5 mm in length;
   (4.) Punch scleral flap counter-flap under 2 mm horizontal septum;
   (5.) 10-0 nylon horizontal mattress suture; bisect "T" releasing incision (0.75 mm from gusset) or scleral tube placement; best flap-folding
   (6.) Temporarily suture: single, 2-loop reverse throw—cinch tightly under flap
   (7.) Deepen AC with BSS via paracentesis: cinch knot will loosen to tension
   (8.) Permanently tie 10-0 nylon suture at above tension (buried)
   (9.) Closure: limbal or fornix-based flap

(c.) Advantages: [1.] Stable architecture of standard phaco scleral tunnel incision—anchored posteriorly (rather than anterior) to minimize ATR astigmatism drift and maximize rate of vision recovery. Central-T releasing incision converts tunnel to "firework" configuration.
   (2.) Central T releasing incision improves aqueous egress over standard scleral tunnel and facilitates bleb development
   (3.) Advantages—LIS or releasable suture technique: AC and max post-op control of IOP and bleb development via LIS; in cases of incomplete cell development with sheep and human eyes.
   (d) Disadvantages—single suture for LIS, slightly more anteriorly directed aqueous egress
   (e) Stable wound architecture with this technique results in predictable mild ATR astigmatism effect. This facilitates simultaneous use of central releasing incisions to modify astigmatism intraoperatively, if indicated.

k. Releasable sutures

(1.) Multiple techniques—all effective in reducing post-operative hypotony (Cohen, Wilson, Johnson and others)
   (2.) Timing of release similar to laser suture (LT)
   (3.) Longer procedure
   (4.) Antagens issues

2. Decision making for cataract surgery in the presence of a filtering bleb

(a.) Direct visualization of ciliary process (CP)
   (b.) Transection energy delivery with least CP injury
   (c) Effect time and proportion from distance to CP
   (d) Stromal graft—zero energy delivery with entire CP. No popping or bubbles
   (e) 180° stromal treatment; 250° best

5. Glaucoma procedure first, phaco second

F. TWO-STAGE: GLAUCOMA PROCEDURE FIRST, PHACO SECOND

1. Filter first
   a. Superonasal—permit easier access for subsequent cataract operation
   b. Favor anterior trabeculectomy/antiscleral component less compromise with subsequent cataract operation, cataract progression not a concern
   c. Scleral tunnel procedure
   (a) Endoscopic endoscopic vitreous with eye bis sutureless deep sclerectomy tube
   (b) Endoscopic vitreous—YAG laser goniosurgery (Feltgen et al) 30% IOP at 1 and 3 years with LIS
   (c) Ab internum quadrants trabeculectomy
   (d) Clear cornea technique—reverse limbal trabeculectomy (Langerman)
   e. Hirolim laser sclerectomy—Terry and others
   f. Grafts—McKibbin and Gills, Drexel and Slimmer; used in JEC, ECCE era
   g. Trabeculectomy with internal tunnel into subcapsular space

2. Phaco second
   a. Some considerations as phaco alone. Be aware low endothelial cell counts
   b. Timing—as long possible after glaucoma surgery, preferably 3-6 months

3. Peribulbar injection may not be required with combined procedures unless intra-pouch through sclerotomy. Rendering patient painful usually deepens AC and angle block. Blending from incision or sclerotomy obstruction may be greater problem than risk of pupil block or sclerotomy obstruction, in absence of inferior lens. IOP in and bleb development equal between PI and PI-2 groups in randomized series (Shingleton et al).

10. Conjunctival closure—utilize non-toxic forces, protect tissues from excessive trauma

a. Limbal
   (1.) Suture—9-0 Vicryl (Ethicon BV-100), 10-0 nylon (BV-75); thin wire, vascular needle
   (2.) Closure techniques
      (a) One or two interrupted sutures—Conjunctivo-Tenon’s- Conjunctiva. Anchors the sutures
      (b) Laparoscopic closure formed by one

b. Forms
   (1.) Sutures
      (a.) 10-0 nylon, regular needle: wing suture closure
      (b.) 9-0 nylon (Ethicon 180) 9-0, 10-0, 9-0 Vicryl, standard limbal running stitch
      (c.) 9-0 Vicryl (Ethicon 200) /AS-100 needle. Wise form-flap closure
   (2.) OKS
      (1.) Intraocular pressure (IOP) monitoring during bleb formation and subsequent conjunctival closure
      (2.) Infusion technique
      (3.) Immediate attention to anterior chamber and bleb post-op
      (4.) Perioperative use of incisional limbal stromal interface
      (5.) Suture tied at end of surgery. Initially use horizontal conjunctival border. Suture tied to itself, then running suture utilizing horizontal mattress technique. Confer adequate tension—reduce bleb lakes and anterior migration of bleb.

E. COMBINED PHACO AND OTHER GLAUCOMA SURGERY—utilizing other types of glaucoma procedures

1. Expose incision glaucoma—under suture flap; shut flap to lie near limbus, create bleb equivalent to filtering bleb

2. Deep sclerectomy procedures
   a. Viscocanalostomy (Shingleton): Park & others 4-6 mm Hg IOP at 1 year. 3.6 mm Hg IOP at 2 years. Better than phaco alone. Mean pressure 4 mm Hg in eyes that alone. Kido and Kobayashmi; micropuncture phaco results equal to viscocanalostomy at 1 year.
   b. Concomitantly with supratarsal canalotomy and median supratarsal incision 0.9 mm Hg IOP reduction at 3 years. Significant results. (Shingleton et al. Ayala et al.); micropuncture phaco results equal to viscocanalostomy at 1 year.
   c. Web procedures with collagen wick (Hyalo-implant, Hyalo-implant (s)), minicollagen (Caudillo, lens capsule incision) or sutures. W/o with or without IOP rise.

3. Tubalshunt to site remote from limbus (e.g. Molteno, Baerveldt, Ahmed, Krupin) —all types possible

4. Ciba body endotheloplasty (CEP)—Uren and others: beavon chronic inflammatory postop characteristics of all external cycloplastic therapies. Such inflammation appears to be much less with ECP

b. No Horion-balloon or external compression

c. Do not caution to AC depth and infusion bottle height in presence of filtering bleb

d. Do not use good functioning bleb—consider filtering bleb on and in bleb for protection

1. Location
   (1.) Temporal infratemporal (30 degrees away from bleb): incision—greatest distance from bleb; easy access for phaco, clear cornea or scleral tunnel incision technique. Clear cornea approach is less inflammatory compared to bleb area. Phacoemulsification and IOL implantation performed with any temporal approach

2. Clear cornea incision vs. bleb (superior)
   (1.) Better IOP reduction sustained at 3 years; increased medication requirements
   (2.) Anterior to bleb (clear cornea) —no conjunctival manipulation; anterior incision—more difficult flap and nuclear expression may increase anterior chamber shallowing

3. Anterior to bleb (clear cornea) (chorioretinal manipulation; anterior incision—more difficult flap and nuclear expression may increase anterior chamber shallowing

4. Postop IOP rise—decreased IOP after cataract surgery

5. Postop IOP rise—decreased IOP after cataract surgery

6. Decision making for cataract surgery in the presence of a filtering bleb

a. IOP too high: consider—

b. IOP too high: consider—

(1.) Adding intracameral viscoelastic at time of cataract surgery with or without antimetabolite supplementation
   (2.) Preface at any time
   (3.) Tubalshunt
   (4.) ECP/Combined Exϕ

(5.) Other nonfilter glaucoma surgery procedures (MG3)—decisions based on bleb conjunctival status

b. IOP okay: vigorous topical steroids to minimize inflammation; consider IOP-5 postop; watch for IOP-2 postop

(1.) Certain aspects of phaco more difficult
   a. Panaretic
   b. Capsulotomy
   c. Corneal sties
   d. Nuclear cracking

(2.) Technology
   a. Viscocanalostomy
   b. Diamond knives
   c. Proper incision size
   d. Chip or crack vs. flake

(3.) IOL power calculation: issue of axial length
   a. Hypesthesia eye results more shallow (up to 3 mm) than normal state/fellow eye
   b. Cataract surgery leads to increased IOP resulting in increased axial length—usually shallower than pre-op, normal IOL, axial length

(4.) Base IOL selection on axial length approximately midway between presumed IOL postop and actual axial length

(5.) Immemurul ultrasound measurements most accurate

(6.) IOP elevation after cataract surgery alone may be enough to reduce macular changes. Autogenous blood injection may also be considered at the time of phaco to limit bleb fistula

b. Macular neovascularization (Farnsworth) trabeculo-plastic graft/Palmberg suture post-op.
GLAUCOMA OPERATION IN PSEUDOPHAKIC EYE: PHACO FIRST, GLAUCOMA OPERATION SECOND

1. Conjunctiva, capsule and vitreous status critical for decision-making
2. All procedures possible: filter, NPD, tube shunt, cyclophotocoagulation, others
3. Results of filters – pseudophakic eye (Shingleton, Allen 2004)
   a. 52 eyes – minimum 1 yearFU, mean 3 years
   b. Stable vision
   c. IOP mean pre-op 25 mmHg, mean post-op 13 mm Hg
   d. Meds mean pre-op 3.3, mean post-op 1.0
4. Virgin conjunctiva results not different from previously manipulated conjunctiva, it conjunctiva reasonably mobile
5. Overall success slightly greater in phakic versus pseudophakic eyes (superior incision); Takihara et al; equal results (Suprennas) et al.

IV. Post-operative care for cataract/filter combined procedure
A. Early compression at edge of flap (Traverso maneuver)
B. Laser suture lysis (LSL) – increase flow through scleral flap
   1. Early LSL (day 3 - 10) if no mitomycin used
   2. Delay LSL after 2 weeks, if possible, when mitomycin used. Minimize hypotony. Beneficial effect of LSL in mitomycin eyes up to months after surgery
   3. Argon or Krypton laser: 50 microns, 250 - 1000 mw, 0.1 seconds
   4. Hosaika or Zeiss 4-mirror lens – compress conjunctiva and Blanch vessels
   5. Longer sutures easier to cut than shorter sutures
   6. Immediate compression at edge of scleral flap at completion of procedure
C. Releasable sutures - timing same as LSL
D. Consider large diameter (14-24 mm) contact lens template or bleb leak develops - more common with fornix-based conjunctival flaps than limbal-based flaps. Bleb leak may seriously compromise bleb development and must be treated
   1. Kuntor - Richmond, CA
   2. Westrom - Grand Junction, CO
   3. Opdahl Polyms (McKibbin) - Englewood, CO
E. Consider supplemental 5-FU if signs of bleb failure: bleb injection, hemorrhages, vascularization, thickening or localization
   1. 5-FU inhibits fibroblast proliferation
   2. 50 mg/ml concentration 1.0 ml injected subconjunctivally 180° away from bleb – move toward bleb with time. Can also needle flap directly to separate adhesions
   3. Topical proparacaine 30 gauge needle; 1 cc syringe
   4. Tilted use to clinical response
   5. Hold for conjunctival wound leaks or large corneal epithelial defects; SPK common and not a contraindication to use

6. Use with intensive steroids and digital pressure
7. Keep vial of 5-FU away from light – preserve potency
8. Couple with direct needling of scarred bleb with episcleral cap (Leiberman/Madnick technique) – with or without 5-FU or mitomycin
9. Surgical revision – internal, external or refilter new site
F. If Tenons cyst (encapsulated bleb) develops
   1. Critical time for diagnosis: 1 - 4 weeks post-op
   2. Critical time for treatment: first 16 weeks post-op
      a. Digital compression
      b. Medical therapy
         (1.) Glaucoma medications
         (2.) Topical steroids
         (3.) 5-FU
         (4.) Cryotherapy
   c. Surgery
      (1.) Outpatient, at slit lamp, topical anesthesia
      (2.) Couple with 5-FU or mitomycin
      (3.) Repeat weekly prn
      (4.) Very effective
   d. Surgical revision

G. Hypotony
   1. Associated with mitomycin, avascular blebs and may lead to CME, disc edema. Occurs less in combined procedures than primary filters
2. Treatment
   a. Close bleb- leak if present
   b. Autologous blood injection, subconjunctival
   c. Laser
   d. Cryo
   e. Surgery – multiple options: sub flap, compression stich, patch graft, excise devitalized bleb, conjunctival flap, posterior segment surgery
H. Bleb development with combined procedures often less than that seen with primary filters alone

V. History – New Frontiers
A. Modern Era
   1. 1970’s: ICEE Filter/ cyclodisectomy; preferably Filter first
   2. 1980’s: ECCE/trabeculectomy
   3. 1990’s: Phaco/trabeculectomy
   4. 2000: Greater appreciation of importance of preoperative procedures: simultaneous or delayed – phaco effect on IOP, non-penetrating deep sclerectomy procedures – “bleb-less"
   5. 2010: New ab externo and ab interno approaches – MIGS procedures utilizing TM/SC and uveoscleral outflow pathways

B. New Frontiers
   1. IOL’s through smaller incisions

REFERENCES
SURGICAL MANAGEMENT OF COEXISTING CATARACT AND GLAUCOMA


Packard RB. Phacoemulsification for IGD. Cataract and Refractive Surgery 6(9):75-76, 2006.


