COMPREHENSIVE STRATEGY FOR UNPLANNED VITRECTOMY FOR THE ANTERIOR SEGMENT SURGEON

- LISA BROTHERS ARBISSE, MD
- MICHAEL HOWCROFT, MD, FRCSC

EYE SURGEONS ASSOCIATES, P.C.

COMPREHENSIVE STRATEGY FOR UNPLANNED VITRECTOMY FOR THE ANTERIOR SEGMENT SURGEON

Lisa Brothers Arbisser, MD
Adjunct Associate Professor
University of Utah Moran Eye Center
FINANCIAL DISCLOSURE

• No Financial Interest

PRE-OP EVALUATION – PROBLEM CASES

• Pseudoexfoliation syndrome and loose lenses
• Post-traumatic cataract (unilateral cataract)
• Cataract complications in fellow eye
• Prior vitrectomy surgery
• Unilateral shallow chamber

PRE-OP SURGICAL PLANNING

• Consider peribulbar anesthesia if complex
• Vitrectomy instrumentation on standby
• Book additional time for difficult/complex cases
• Level of difficulty classification
PREVENTION

- Recognize zonular laxity
- Avoid convexity of the lens dome
- Burp bag to prevent tampanade of ccc
- Have nucleus mobile-beware fibrosis
- Respect zonules during rotation
- Stay in “safe zone” with phaco tip
- Know where ccc edge is & keep vector safe

PREVENTION CONTINUED

- Keep paracentesis small and wound appropriate to control fluidics
- Understand machine settings/dynamics
- Keep instrument behind phaco tip to shield posterior capsule for last fragment removal
- Maintain capsular cul de sac during I&A
- Have post capsule concave for IOL insertion
- Maintain positive pressure during patient valsalva

UNIFYING PRINCIPLES

- Prevent intraoperative vitreous traction
- Avoid postoperative vitreous traction
- Maintain normotensive globe
- Tight incisions for vitrectomy
- Vitreous always seeks lowest pressure
- Protect tissues from collateral damage (cornea, iris, capsule)
PREPAREDNESS

- Incidence: 0.45% - 12% (2.09% Swedish NCR over 600K from 02-09)
- Code "V" practice
- Instrumentation
- Triessence
- Medications
- Anesthesia
- Practice with pedal without patient

STAGES OF COMPLICATIONS

- Broken posterior capsule with intact hyaloid
- Vitreous prolapse into the anterior segment
- Vitreous loss through the incision
- Retained lens material

FIRST COMMANDMENT OF ANTERIOR VITRECTOMY

- THOUGH SHALL NOT AVERT ATTENTION DURING SURGERY
- Early detection=limited damage
EARLY RECOGNITION

- Sudden bounce or pupil size change
- Loss of anterior chamber depth during phaco or I&A
- Inappropriate loss of followability of lens material
- Unexplained loss of phaco efficiency
- Spidering of capsule, strangely clear area of capsule
- Tilt of nucleus equator
- Wound won’t seal despite proper construction
- Peaked pupil

SECOND COMMANDMENT

- THOU SHALT NOT ALLOW THE CHAMBER TO COLLAPSE AFTER CAPSULE RUPTURE
- Vitreous flows from a high to a lower pressure gradient

EARLY RESPONSE

- Don’t withdraw phaco instrument
- Go to foot position one (stop phaco and aspiration)
- Maintain chamber stability-don’t allow collapse
- Fill chamber with enough viscoelastic through side port to close incision as phaco tip is withdrawn (dispersive preferred)
- Assess situation: Inspect-Relax-Think-Announce Delay
ANESTHESIA

- Vitreous doesn’t hurt
- Topical/pledget or sponge ring
- Subconjunctival lidocaine over PPI site
- Intracameral expert amaurosis
- IV sedation
- Vocal local
- Akinesia prn by parabulbar or sub-Tenons

THIRD COMMANDMENT

- THOU SHALT NOT ALLOW AN OPEN SYSTEM INTRA OR POST-OP
- Use a biaxial vitrectomy technique with irrigation anteriorly and vitrector through a tight paracentesis or pars incision
- Keep the globe formed with OVD and with closed incisions or scleral plug

FOURTH COMMANDMENT

- THOU SHALT NOT IRRIGATE, DISPLACE, OR FISH THROUGH VITREOUS
- If nucleus is below posterior capsule refer for 3 port vitrectomy
TO RAISE FROM PC TO AC: **DO**

- Stabilize and protect with OVD sandwich
- Remove impediments to forward movement
- Pupil stretch or iris hooks
- Tangential cut and spiral CCC (don't radial relax)
- Raise descending nucleus from posterior to anterior chamber
- Visco-levitation from pars plana
- -Arbisser Nucleus Spears to elevate from

POSTERIOR APPROACH: **VISCO-LEVITATION**

- Risk of some fragments going peripheral under the iris unseen
- Pressure OVD injection may promote vitreous prolapse or vitreous base detachment
- **Only the vitrector** should go pars plana to avoid traction

ONCE RAISED TO AC: **DO**

- Compartmentalize lens and vitreous with OVD
- Miocoll E, lens glide, IOL optic capture or IOL scaffold technique
- Identify vitreous (Triessence)
- Slow motion phaco if no admixture
- Conversion to ECCE if in doubt
MAKE DECISION TO PHACO OR CONVERT

- Phaco only if:
  - No mixture of vitreous and lens material
  - Adequate compartmentalization
  - Rent is limited and controlled or can be covered with a lens glide
  - Consider miococh E to use iris as safety net
  - Optic capture IOL then phaco (M. Snyder)
  - IOL scaffold (A. Agarwal)

PHACO TECHNIQUE

- Slow motion phaco parameters:
  - Low flow 25
  - Moderate vacuum 250
  - Short bursts of low phaco energy to promote followability
  - Adequate flow to avoid burn

CONVERSION TO EXTRACAP

- Choose wound based on fragment size
  - If > 4mm is needed: abandon CCI for superior standard limbal or scleral tunnel incision
- Technique:
  - Do not express with external pressure
  - Remove nucleus with pick, forceps, or vectus
  - Glide with viscoelastic sandwich
  - Kansas alligator forceps
FIFTH COMMANDMENT

- THOU SHALT NOT FAIL TO IDENTIFY VITREOUS PRESENTATION
- Preservative free Triamcinolone particulate staining after OVD removal
- Instill as last maneuver

PARTICULATE IDENTIFICATION WITH TRIAMCINOLONE

- Steroid binds to vitreous once OVD is gone
- Facilitates vitreous recognition and removal
- Like throwing a sheet over a ghost
- Reduces post-op inflammation
- Triessence (Alcon) diluted 10:1 with BSS
  Kenalog (washed of preservative) 40 mg/ml off label

SIXTH COMMANDMENT

- THOU SHALT NOT ASPIRATE VITREOUS WITH PHACO OR I&A
- Compartmentalization vitreous and lens fragments
- Remove cortex dry, with vitrector on I-A-cut or bimanual I&A
SEVENTH COMMANDMENT
• THOU SHALT NOT WECK OR SWEEP VITREOUS FROM THE WOUND
• -Traction on vitreous = retinal tear

EIGHTH COMMANDMENT
• THOU SHALT NOT FAIL TO UNDERSTAND VITRECTOMY SETTINGS
• Always cutting while aspirating
• Highest cut rate available
• Lowest effective flow and vacuum (not linear)
• Bottle balanced to maintain normal tension

PARS PLANA ANTERIOR VITRECTOMY RATIONAL
• More efficient to call vitreous back and not encourage forward; less vitreous removed
• Leaves lower pressure posteriorly resulting in less likelihood of vitreous representation
• Won’t unzip zonules
• Thorough removal amputating any vitreous within incisions without wecking
• No oar locking; better view
• Less likely to harm capsule or iris
**VITRECTOMY PARAMETERS**
- Select Settings to Reduce Vitreoretinal Traction
- Always irrigation/cut/vacuum for vitrectomy
  - Highest Cut Rate Available (450-5000)
  - Flow Rate 20 ml/min (15 for 23g)
  - Lowest Vacuum Producing Vitreous Removal
  - 150-250 mm hg (350-500 for 23g) panel setting not linear (depends on presence of OVD)
- Raise bottle to create normal tension

**ANTERIOR INCISION**
- Biaxial (separate sleeve from vitreor shaft)
- Irrigation through sideport
- Never use primary coaxial incision site
- Make new paracentesis to fit bare vitreor shaft using original sideport for irrigation
- Hold steady tilted below posterior capsule
- ANTICIPATE REPEAT PRESENTATION

*New Clear Corneal Incision to fit Vit*

Best for minimal vitreous presentation
Only choice when view behind pupil is obscured
PARS PLANA INCISION?
DO WHAT YOU KNOW
- Still controversial in the US
- Skills transfer lab
- Eye bank eyes, animal eyes
- Accompany local retinal surgeon to OR
- Shadow at former residency department

VITRECTOMY TREATMENT OPTIONS
- Wisp around zonules
- Cut with intraocular scissors to amputate, reposit with OVD
- Small prolapse or no view through pupil: Automated vitrectomy, anterior incision
- Vitreous loss or sheet around zonules: Automated vitrectomy, direct pars plana
Vitrectomy Techniques for Vitreous Loss at Cataract Surgery

Michael J. Howcroft MD, FRCSC
Eye Surgeons Associates P.C.

FINANCIAL DISCLOSURE

• SPEAKER FOR Genentech’s LPOP program

Anterior Vitrectomy – CCI Incision vs. Pars Plana

• Incisional vitrectomy for limited vitreous prolapse/lens fragments
• Disadvantage of incisional vitrectomy is aspirating additional vitreous into AC
• Pars plana vitrectomy allows a more complete anterior vitrectomy
• Vitrectomy through pupil NOT the same
Anterior Vitrectomy – Surgical Techniques (Pars Plana) - 20 gauge

- Conjunctival peritomy – hemostasis
- MVR sclerotomy 3.0 - 3.5 mm from limbus
- Sclerotomy avoid 3,6,9 and 12:00 (ciliary vessels and nerves)
- Infusion through angled cannula/AC maintainer in paracentesis incision

Anterior Vitrectomy – Surgical Techniques cont’d

- Aim MVR blade at optic disc
- Penetrate completely
- Maintain IOP at normal levels (20 – 25 mm Hg)
- Direct and angled illumination

Anterior Vitrectomy – Surgical Techniques cont’d

- Avoid inserting cutter too deeply - ? Mark cutter at 10 mm
- Cutter port facing vitreous/lens material
- Cutter tip always in view
- Proceed slowly and methodically
Anterior Vitrectomy - Endpoint

- Round pupil
- No iris movement during vitreous aspiration
- Anterior chamber deep
- No more Triessence identification

Anterior Vitrectomy – Wound Closure

- Aspiration off – infusion off – cutter off – remove cutter
- 8-0 Vicryl
- Crossing “X” suture
- Weiss-cel wound not recommended for anterior vitrectomy only total vitrectomy
- Separate conjunctival closure

Anterior Vitrectomy – Surgical Techniques
23 and 25 gauge

- Transconjunctival or scleral entry
- Angled (two-stage) incision
- Trocar and cannula placement
Anterior Vitrectomy – 23 Gauge - Advantages

• Small incisions
• Suture-less
• Less inflammation
• Faster healing

Anterior Vitrectomy – 23 Gauge – Disadvantages

• Familiarity/experience
• More complex incision
• Complication rate unchanged

Anterior Vitrectomy – Post-op Care

• Refer for residual nucleus (risk/benefit of viscolevitation)
• Discuss complication with patient early
• Post-op IOP control
• More frequent follow-up visits
• Careful peripheral indented exam within 1-2 weeks
• Vitreoretinal consultation as required
Summary

- Anticipate and prepare for complicated cases
- Pars plana approach allows a more efficient and complete removal of vitreous
- Be aware of your limitations and obtain expert consultation where appropriate

DIRECT SCLEROTOMY NEEDS SUTURE

New voiced over videos/23ga direct entry endoscc

NEED FIRM GLOBE FOR TROCAR ENTRY

- 23 g trocar entry exit BB Q.mpg
RESIDUAL CORTEX REMOVAL

- “Dry Technique” under OVD without irrigation
- Bimanual I/A small risk of incarcerating vitreous
- Vitrector on I-A-Cut mode (not I-Cut-A default) – avoids traction on vitreous by cutting in foot position 3
- Prevent chamber collapse on removal of instruments: vitreous will follow path of lowest pressure and represent

INSPECT

- Verify clean bag
- Absence of vitreous
- Re-install triamcinolone and rinse away – round pupil and clean, sealable incisions
- Verify status of CCC
- Evaluate extent of posterior capsule tear

NINTH COMMANDMENT

- THOU SHALT NOT PURPOSELY VIOLATE BOTH ANTERIOR AND POSTERIOR CAPSULE
- Destruction of CCC = unstable IOL
- Enlarge with radial cut and spiral tear
IMPLANT POSITION
- Foldable through CCI
- In the bag: only if small PCCC opening or supported zonulolysis
- Bag implanted haptics PCCC (POBH) or CCC-forward captured optic
- Sulcus implanted haptics CCC-captured optic
- Sulcus fixation: adequate capsule support??
- Sulcus implantation with scleral or iris suture fixation
- Glued scleral fixed IOL
- Open loop AC LOL (use vitrector to make PI)

VITECTOMY PROCESS
- Secure primary wound if no vitreous loss; fill globe with OVD to firm if so
- Always visualize the port
- Always foot position 1 or 2 (if visible) when moving
- Petal to the metal to establish removal of vitreous at lowest vacuum possible
- Maintain firm normotensive globe by raising bottle

ENPOINT
- Remove all vitreous from anterior chamber to below capsular plane
- Amputate any vitreous to incision severing posterior attachments BEFORE wecking
- Do not sweep the incision (traction)
- Never allow chamber to shallow thereafter
- No aggressive OVD removal
- Final Triessence to confirm absence of
TENTH COMMANDMENT

- THOU SHALT NOT FAIL TO PROVIDE AGGRESSIVE ANTIBIOTIC PROPHYLAXIS
- Ruptured capsule = 14x endophthalmitis risk
- Consider intracameral even for routine 1:14,000 vs 1:1100 (Arshinoff JCRS 2012)
- Single dose oral fourth generation fluoroquinolones

POST OP CARE

- Intracameral Vigamox and oral moxifloxacin (Avelox 400 mg) prophylaxis
- Warn patients to expect floaters, educate for retinal symptoms
- Prophylax and treat pressure spike
- Timely referral to retinal surgeon for retained nucleus
- Scleral indented retinal exam
- Aggressive anti-inflammatory management

ON LINE VIDEOS

- http://www.Eyetube.net/unplanned-vitrectomy
THANKS TO:

- MICHEAL HOWCROFT
- SCOTT BURK
- STEVE CHARLES
- LILIANA WERNER
- RUPERT MENAPACE
- HOWARD GIMBEL
- RICARDO GLIKIN
- KEVIN WALTZ
- DOUG FANNY
- RON ROSE
- DAVID CHANG

REFERENCES

- Phaco Chop 2013 ed D. Chang Slack chapter 29 Arbisser, L
- CRST January 2012 Supplement and eyetube.net/arbisser
- Management of Vitreous Loss and Dropped Nucleus During Cataract Surgery
  Lisa Brothers Arbisser, Steve Charles, Michael Howcroft, Liliana Werner
  Ophthalmology Clinics of North America
  December 2006 (Vol. 19, Issue 4, Pages 495-506)
- "Anterior Vitrectomy for the Anterior Segment Surgeon" Focal Points, AAD, Arbisser, L March 2009
- "Safety of Intracameral Moxifloxacin for Prophylaxis of Endophthalmitis after Cataract Surgery", Arbisser, L JSCRJ Jul 2008
THANK YOU FOR YOUR ATTENTION!

drlisa@arbisser.com
Lisa Brothers Arbisser, MD