DIABETIC VITRECTOMY

INDICATIONS AND TECHNIQUES

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INDICATIONS FOR PPV

- Traction Retinal Detachment
  - Macula involved TRD
  - TRD with rhegmatogenous component even if extra-macular TTRD
  - Extra-Macular TRD should be observed w/o surgery unless rhegmatogenous component or discovered after removing a vitreous hemorrhage

- Vitreomacular Traction Syndrome (VMT)
  - Diabetic Macular Edema without traction should be treated with anti-VEGF agents, not PPV, grid laser, or micropulse laser
  - DME with VMT requires PPV, ILM peeling (brilliant blue stain) and anti-VEGF agents
Hemorrhage duration is not the only consideration when considering vitrectomy

Other key considerations include:

- Vision & retinal status of the other eye
- Visual potential of the proposed operative eye
- Cataract, glaucoma
- Medical status (cardiac, renal, CVA, anti-coagulation)
- Density of hemorrhage, estimated clearing time w/o PPV
Rapid fibrosis ("crunch" syndrome) from pre-op Avastin is overemphasized; patients that got "crunch syndrome" would have been blind from neovascular glaucoma, retro-lenticular neovascularization, and/or glial recurrence driven redetachment if they had not received Avastin

All patients with active neovascularization should receive Avastin 3-7 days before PPV

All patients with active neovascularization at the time of PPV should receive Avastin at the end of the procedure to prevent rebound

ANTI-VEGF AGENTS & PPV
- Phaco-vit does not produce optimal refractive outcomes
- Phaco-vit can compromise visualization during PPV and increases use of iris hooks or pupil expanders which increase inflammation
DIABETIC TRACTION
RETINAL DETACHMENT
- High Speed Cutting, Smaller Cutter Diameters & Advanced Fluidics Allow Safer Removal of ERM in Diabetic TRD Surgery
- Attempts to Remove All ERM with Vitreous Cutter in Tabletop TRDs Results in More Iatrogenic Retinal Breaks
- Curved Scissors Used With Inside-Out Delamination Is the Safest Method of Managing Broad Areas of Highly Adherent ERM

PREMISES
Truncation of Posterior Vitreous Cortex

No Core Vitrectomy or Vitreous “Bands” in TRD Cases, Posterior Vitreous Cortex Continuum Crucial, It Is Attached to Outer Edge of ERM and Connects All ERM Epicenters
Never Make a Forceful PVD in TRD Cases; ERM Adherence Too Great, Iatrogenic Tears Result Causing Excessive Use of Silicone Oil
25/27G Cutter
- Port-Based Flow Limiting Reduces Iatrogenic Retinal Breaks Due to Sudden Elastic Deformation of ERM Thru Port (resistance is proportional to 4\textsuperscript{th} power of diameter)
- High Cutting Rates Reduce Surge & Pulsatile Vitreoretinal Traction
- Port Closer to Tip Facilitates “Vertical” Access to ERM
- Smaller Diameter Facilitates “Lateral” Access to ERM

25/27G Laser for Hemostasis
- Small Spot Size Facilitates Use for Non-Contact Coagulation of Vascular Attachment Points After Delamination (less retinal damage than diathermy)
- **Foldback Delamination** – Cutter Applied Behind Edge of Flexible ERM, ERM Folds Back Into Port

- **Conformal Delamination** – Cutter Applied to Edge of Rigid ERM, Side/Oblique Approach, Not Port Up, Rotate Cutter Around Longitudinal Axis to Control Angle of Attack, Follow Retinal Contour
Conformal Cutter Delamination, Modulate Angle of Attack to Feed (not push or suck) ERM Into Port & Protect Retina
Foldback Cutter Delamination, Top of ERM Approach Requires Flexible ERM, ERM Protects Retina
- ERM Adherent to Macula
- Broad Zones of Adherence
  - Tabletop TRD
- Dense ERM with Marked Adherence to Thin, Atrophic Retina
  - Peripheral Retina is Thinner Than Posterior Retina
  - Intense Prior PRP
  - Marked Ischemia
  - Chronic TRD Causes Atrophy

**HIGH IATROGENIC RETINAL BREAK SCENARIOS REQUIRE SCISSORS**
Vertical Scissors Require More Space Between ERM & Retina

Curved Scissors Are Better Than Vertical for Segmentation and Delamination
Less Space Required Between ERM and Retina (often just a potential space)

Scissors Curve Matches Curved Retinal Surface Which Reduces Risk of Impaling Retina with Scissors Tips

Handle/Tip Rotation Enables Transition from Access Segmentation to Inside-Out Delamination Without Tool Exchange
Vertical & Horizontal Scissors are Obsolete

• 25G Curved Scissors are Better Than Vertical Scissors for Segmentation

• 25G Curved Scissors are Better Than Horizontal Scissors for Delamination

• Straight Scissors are Required for 27G and Reasonably Effective in TRD Cases
Access Segmentation to Expose Delamination Plane
- Inside-Out Direction, Typically Near Disk, Delaminate Outward Along Temporal Arcades

Highly Adherent ERM Overlying Thin, Atrophic Retina
- Chronic, Ischemic, Post-PRP Scenarios

Segmentation Without Delamination Applications:
- Excessive Bleeding Scenario
- Previous Bad Outcome in Other Eye Due to Fibrin Syndrome & Glial Reproliferation

CURRENT ROLE OF SEGMENTATION
Access Segmentation with Curved Scissors Facilitates Transition to Delamination
Delamination Entry Options

- Blades Closed, Open After Entry
- Blades Open, Close After Entry
- Small Snips at ERM/Retina Interface

- Retinal Breaks
- Best Option
Spreading with Scissors Causes Breaks
Take Many Small Snips While Moving Scissors from Side to Side is Best Approach

25G Curved Alcon DSP Scissors
DIRECTION OF DELAMINATION

Inside-Out (best)
- Central Retina Thicker
- Central Retina Redundant
- Central Retina Stronger
- ERM Thicker Centrally
- View Better Centrally
- Detach Vessels From Disk

Outside-In (suboptimal)
- Causes Breaks Just Outside Arcades (PRP, chronic RD, or ischemia induced retinal weakness)
- Breaks at Vitreous Base from Traction on PVC
- Occasionally Required
Inside-Out Delamination
25G DSP Curved Scissors
Inside-Out Removal of PVC After Delamination
- Used if Minimal/No PVD (aggressive PVD creation causes retinal breaks)
- ERM is Virtually Always Contiguous With Posterior Vitreous Cortex & Easily Visualized & Removed After Inside-Out Delamination of ERM
- Conventional Teaching Is That Truncation of Posterior Vitreous Cortex Should Always Precede ERM Dissection
- Inside-Out Delamination Before PVC Truncation Technique Developed by Charles, Subsequently Called “En Bloc” by Others Was Initially Described as Outside-In Using Dangerous Traction on Vitreous Cortex
  - En Bloc Concept (one piece removal) is Irrelevant and Dangerous

INSIDE-OUT DELAMINATION BEFORE VITREOUS CORTEX TRUNCATION
ARGUMENT AGAINST BIMANUAL SURGERY

- If Forceps Plus Scissors Are Used; Enables Forceps Stabilization of ERM to Offset Scissors Push-Out Force
- Pics Plus Cutter May Result in Peeling-Related Breaks
- Forceps Plus Cutter Results in Cutter-Related Breaks
- It Should Be Done Without Lifting But Inadvertent Traction Often Results When Attempting Precise Positioning of Two Hands
- Requires Chandelier Illumination (see next slide)
Disadvantages of Chandelier

- Shadowing and Glare, Especially with Fluid-Air Exchange
- 4th Wound
- Scleral Tunnel, Conjunctival Displacement, and Vitreous Removal are Essential to Prevent Vitreous Wick
  - Enabled by Alcon Cannula Based, Steerable Chandelier

Chandelier is Essential for Bimanual Surgery
Pics, Tissue Manipulators, and Spatulas Cause More Retinal Breaks Than Delamination with Advanced Vitreous Cutters & Curved Scissors

ERM Peeling Has Virtually No Role in Diabetic TRD Surgery

ILM Peeling Should Be Used If Any Macular Distortion
Focal Laser to Cut End of Vascular Attachments After Delamination Eliminates Post-Op Late “Atrophic” Holes Often Caused By Diathermy