Management of Vitreoretinal Interface Disorders

Justis P. Ehlers, MD
Assistant Professor
Cole Eye Institute
Cleveland Clinic

Financial Disclosures

- Bioptigen (P)
- Synergetics (P)
- Thrombogenics (C,R,S)
- Genentech (R)
- Regeneron (S)

Off-label Discussion

- Ocriplasmin (Jetrea)
- Indocyanine green
- Brilliant blue
- Zeiss RESCAN 700

Case Presentation

- 60 year old female:
  - Decreased vision OS
  - Moderate distortion OS
  - Mild floaters OS
  - No flashes
  - All for several months
  - VA: 20/50
Diagnosis

Epiretinal Membrane

- Etiology
  - Idiopathic
  - Secondary
    - Uveitis
    - Trauma
    - Retinal breaks
    - Intraocular surgery, part of the PVR spectrum
    - Retinal vascular occlusions
    - Others
Epiretinal Membrane

- **Symptoms:**
  - Asymptomatic
  - Metamorphopsia
  - Micropsia
  - Monocular Diplopia
  - Photopsia
  - Reduced visual acuity (20/20 to 20/200)

- **Appearance and visual acuity remain stable in majority of patients**
  - 75% of patients maintain VA 20/50 or better
  - Over 2 years 10-25% lose one or two lines of VA

- **Diagnostic Testing**
  - FA:
    - Vascular tortuosity/straightening
    - Leakage usually irregular and corresponds to area covered by the membrane
    - Facilitates evaluation for concurrent disease
Epiretinal Membrane

- Diagnostic Testing
  - OCT:
    - Hyperreflective preretinal band
    - Cystic and/or noncystic thickening
    - Irregular inner retinal surface consistent with retinal striae/folds
    - Evaluate subretinal pathology and integrity of the ellipsoid zone

- Prognostic Factors
  - RPE disruption poor prognostic factor
  - Long-standing leakage or cystoid edema may be poor prognostic factor
  - Membranes following RD may have poorer prognosis
Epiretinal Membrane

- Treatment
  - Observation
  - Pars plana vitrectomy with membrane peeling
    - Consider for patients with VA < 20/40 or with other severe symptoms and VA > 20/40

- Observation

- Pars plana vitrectomy with membrane peeling
  - Consider for patients with VA < 20/40 or with other severe symptoms and VA > 20/40
  
Epiretinal Membrane

- Procedure:
  - Pars plana vitrectomy
  - Core vitrectomy performed, PVD induced if not present
  - Chromovitrectomy may be used to highlight surgical anatomy:
    - Indocyanine green (ICG), membrane blue, brilliant blue, triamcinolone, and others
    - Differential staining (ERM vs ILM)
      - Example: Negative staining ERM with ICG

- Procedure:
  - Forceps, membrane scraper, pick, or barbed MVR blade can be used to elevate an edge from the retinal surface
  - ERM peeled gently off the retinal surface, with close attention to removal over the fovea

- Consider ILM Peel:
  - Simultaneous
  - Sequential
  - Reduces ERM recurrence, does not appear to change final visual outcome

- Consider image-assisted/guided surgery with intraoperative OCT (iOCT)

iOCT and ERM: Exploring a new view
**Epiretinal Membrane**

- Surgical Complications:
  - Increased nuclear sclerosis
  - Retinal tears occur in 1-6% of cases
  - Retinal detachment is seen in 1-7%
  - Visually significant recurrent ERMs occur in 5%
- Recent study suggested iOCT may change surgical decision-making in > 10% of cases (e.g., more peeling, completed surgical objectives).

**Epiretinal Membrane**

- Recovery/Prognosis:
  - Visual recovery takes months
  - > 60% of patients improve 2 or more lines
  - Many eyes have residual symptoms
  - Metamorphopsia improved but typically not resolved

**Case Presentation**

- 55 year old male blurred VA OS for 6 months
  - Main complaint is distortion
  - VA 20/50
  - Anterior exam is WNL
  - Posterior exam as shown
Case Presentation

Diagnosis

Vitreomacular Traction
VMT Syndrome

- **Diagnostic Tests**
  - **FA:** May show leakage of fluorescein from vessels as well as optic nerve
  - **OCT:** Demonstrates vitreoretinal interface abnormalities. Vitreous traction. Cystic changes in the retina

- **Clinical Course:**
  - Variable
  - May be progressive
  - May spontaneously resolve

**Treatment:**
- Observation
- Intravitreal ocriplasmin
- Pars plana vitrectomy with membrane peeling
  - Elevate the posterior hyaloid
  - Care to avoid unroofing foveal cyst
Clinical Example 1

20/50 20/40

6 weeks later

20/50 20/25

4 months later

20/20 20/20

Clinical Example 1

Clinical Example 2

20/50
Clinical Example 2
1 week later

Clinical Example 2
4 months later

Pharmacologic Vitreolysis

- Ocriplasmin (Jetrea, Thrombogenics)
  - Approved in 2012 for the treatment of symptomatic vitreomacular adhesion (e.g., VMT)
  - Proteolytic enzyme with activity against proteins related to the vitreous and vitreoretinal interface (e.g., fibronectin, collagen, and laminin)
  - Phase III studies included 464 eyes treated with ocriplasmin and 188 treated with vehicle
  - Primary endpoint—resolution of VMA at 28 days
    - 26.5% ocriplasmin vs 10.1% vehicle
  - First pharmacologic alternative to surgical intervention for VMI condition

Patient selection and counseling critical.
- Advise of potential peri-injection symptoms:
  - Blurred vision
  - Photopsia
  - Alterations in color vision
**Pharmacologic Vitreolysis**

- Ocriplasmin (Jetrea, Thrombogenics)

  **Advantages:**
  - Avoids concerns related to vitrectomy (e.g., anesthesia, increased nuclear sclerosis)
  - Office-based procedure

  **Potential predictors of response**
  - Lack of ERM
  - Small adhesion width (<1500 microns)
  - Phakic
  - Age < 65
  - Macular hole

- Ocriplasmin (Jetrea, Thrombogenics)

  **Possible safety concerns**
  - Dyschromatopsia
  - ERG changes
  - Vision changes
  - Lens subluxation (animal studies)
  - Retinal tear/retinal detachment (higher in vehicle group)

---

**Clinical Example 3**

- 20/30
- 2 days later
- 20/200
Clinical Example 3

2 days later

20/20

Clinical Example 3

7 days later

20/80

Clinical Example 3

1 month later

20/20

Ocriplasmin: Cole Eye Initial Experience

- Nineteen eyes treated with ocriplasmin for symptomatic VMA
- 9/19 (47%) showed release
- Mean stability in vision
- No eyes lost > 2 lines at final follow-up
Ocriplasmin: Cole Eye Initial Experience

- Nineteen eyes treated with ocriplasmin for symptomatic VMA
  - 10/19 (52%) showed ellipsoid zone attenuation
  - Outer retinal thickness reduced significantly at 1 week but returned to baseline at 3 months.
    - This reduction was related to changes in the ellipsoid changes
  - Subretinal fluid accumulation was strongly associated with ellipsoid zone loss and symptomatic dyschromatopsia.

Ocriplasmin: Cole Eye Initial Experience

VMT: Vitrectomy

- Procedure goal
  - Release hyaloid traction
  - Preserve inner retinal continuity
  - Identify residual membranes
  - Consider gas tamponade and ILM peeling
**iOCT and VMT**

- Immediate surgical feedback
  - Release of traction
  - Preservation of inner retinal wall
  - Residual membrane
- New discoveries
  - Increased subretinal hyporeflectivity

**Case Presentation**

- 60 y/o male with blindspot OS for 2 months
  - VA 20/100 OS
  - Anterior exam WNL
  - Posterior exam as shown
Garbo for vitreous schisis
VMT for butler
Parsley for macula involving RD

Justis P. EHlers, 10/16/2011
**Primary Macular Hole**

- **Stage Zero**: Configuration proposed in eyes at risk for macular hole development
  - Fellow eyes with FTMH history
  - At least one definitive perifoveal insertion of the posterior hyaloid
  - **Impending hole**: Stage zero hole with associated VMT

- **Vitreoretinal surgery**:
  - Core vitrectomy
  - Elevate posterior hyaloid if not separated (may be sufficient with gas bubble for smaller holes)
  - Consider internal limiting membrane peel
  - May augment visualization with dyes or highlighting agents (e.g., ICG, triamcinolone)
    - Circumferential peel around the hole, “maculorrhesis”

**Primary Full-thickness Macular Hole**

- **Treatment options**:
  - Observation
  - Ocriplasmin:
    - Small holes with associated VMT
  - Vitrectomy with gas tamponade
    - Small holes: +/- ILM peeling
    - Medium to large holes: ILM peeling
Primary Macular Hole

- Vitreoretinal surgery:
  - Adjuncts used:
    - ILM peeling
    - Improves closure rates
    - Dye-assisted visualization
    - Autologous serum
    - Fibrinogen
    - TGF-beta
  - Tamponade: Air, SF6, C3F8, Silicone Oil
  - Positioning: Requirement and duration controversial

Trans-tamponade OCT: Clinical Management

- Scan Classification Trans-Tamponade OCT
  - Class 0: No image obtained
  - Class 1: Tamponade/Retina Interface
  - Class 2: TR Interface + RPE
  - Class 3: Retinal architecture
  - Class 4: Near-fluid filled quality

Trans-Tamponade OCT Post-op Day 1

Trans-Tamponade OCT Case 1: Macular hole
Primary Macular Hole

- Surgical Complications
  - Peripheral retinal breaks and rhegmatogenous retinal detachments
  - RD occurs in approximately 2-10% of cases
  - Progression of nuclear sclerosis
  - Others include endophthalmitis, increased IOP, progressive cataract
Other Macular Holes

- Lamellar Macular Hole
  - Unique OCT features
  - Partial thickness
  - Surgical repair controversial
    - Visual outcomes highly variable
  - Management options
    - Observation
    - Vitrectomy with membrane peeling
      - +/- ILM peeling and gas tamponade

Clinical Example

Post-op Week 1
Other Macular Holes

- Traumatic Macular Hole
  - May be associated with choroidal ruptures, subretinal hemorrhage
  - Mechanism may be different:
    - Direct foveal rupture
    - Blunt trauma may result in retinal stretching, thinning and subsequent hole formation
    - Direct vitreous traction during injury
  - High rate of spontaneous hole closure.
Thank you!