Abstract

Treatment for Idiopathic Intracranial Hypertension (IIH) typically involves oral Diamox and weight reduction. When standard treatment fails or visual or other symptoms continue to worsen, surgical options must be considered.

Title

Recalcitrant Idiopathic Intracranial Hypertension: Therapeutic Options when Conventional Management Fails

- **Case History**
  - **Patient Demographics**
    - 54 year old Caucasian female
  - **Chief Complaint**
    - Progressive vision loss, worse in the right than the left eye, which started a week and a half ago. Headaches began about a month and a half before the vision changes. Headaches are constant but vary in severity and sometimes are severe enough to wake the patient from sleep. Ringing in ears comes and goes, but has been occurring for years with no recent increase in frequency. Tinging in digits distally that comes and goes for about 2 weeks.
  - **Ocular History**
    - Maculopathy, OD
      - RPE and IS/OS disruption with longstanding decreased BCVA (stable 20/60)
      - Unknown etiology – most likely old Central Serous Retinopathy
    - Blepharitis OU
    - Myokymia LUL
    - Cataract, Nuclear Sclerosis, Trace, OU
    - Myopia, Astigmatism, Presbyopia OU
  - **Medical History**
    - Vitamin D Deficiency
    - Allergic Rhinitis
    - Obesity
    - Hypertension
    - Chronic Low Back Pain, Knee Pain, Hip Pain
    - Tobacco dependence
    - Gastroesophageal Reflux Disease
    - Obstructive Sleep Apnea
    - Osteoarthritis
    - Cervical Radiculopathy
    - Hyperlipidemia
    - Cobalamin Deficiency
- Depressive Disorder
- Post-Traumatic Stress Disorder
- Chronic Sinusitis
- Hypothyroidism
- Asthma
- Migraines
- s/p Hysterectomy

Medications
- Albuterol, Budesonide/Formoterol, Cetirizine, Fluticasone, Guaifenesin, Hydrocortisone acetate, Montelukast, Potassium Chloride, Aspirin 81mg, Calcium / Vitamin D, Cyanocobalamin, Etodolac, Hydrochlorothiazide, Levothyroxine, Pantoprazole, Simvastatin, Venlafaxine

Other Information
- Allergies
  - Penicillin, Omeprazole, Shellfish
- Brief course of Doxycycline 3 months prior to presentation for chronic sinusitis
- Pt has de-clawed cats at home

Pertinent findings
- Initial Exam
  - Best Corrected Visual Acuity: 20/150 OD, 20/20 OS
  - Confrontation Field: Superotemporal and Inferonasal Restriction OD, FTFC OS
  - Extra-Ocular Motility: Full range of motion OU
  - Pupils: PERRL, (+) APD OD
  - Intraocular Pressures: 17mmHg/18mmHg OD/OS per tonopen
  - Anterior Slit Lamp Exam: Unremarkable
  - Dilated Fundus Examination:
    - 3+ Optic Nerve Head Edema with temporal exudates and splinter hemorrhage OD, 2+ ONH Edema with inferior splinter hemorrhage OS
    - Venous engorgement, arterial attenuation OU
    - RPE disruption stable to previous exams OD
- Additional Testing:
  - Blood Pressure: 133/79
  - Color Vision: 01/14 OD, 14/14 OS per Ishihara Test
  - Red Cap Desaturation: 4% OD, 100% OS
  - OCT RNFL:
    - OD: Average Thickness 286
    - OS: Average Thickness 195
    - Significant thickening OU
- Fundus Photos
- Imaging ordered: STAT Brain/Orbits MRI with and without contrast
- Lumbar Puncture with opening pressure pending MRI results
- Labs ordered:
  - **CSF:** WBC with Differential, protein, glucose, cytology, gram stain, culture, Lyme, Bartonella, TB
  - **Serum:** Lyme, Bartonella Ag, Syphilis IG, CBC with Differential, Basal Metabolic Panel, TB, HIV, ACE, Lysozyme

**Plan**
- Discharge to Emergency Department with STAT MRI
- STAT Lumbar Puncture with opening pressure if MRI shows no space occupying lesions
- Neurology consult same day

**Follow Up – 1 week**
- Pt Diagnosed with IIH per neurology
- Patient taking Diamox 500mg BID PO per Neurology service
- **Best Corrected Visual Acuity:** 20/200 OD, 20/20 OS
- **Pupils:** PERRL, (+) APD OD
- **Intraocular Pressures:** 14mmHg OD/OS per tonopen
- **Dilated Fundus Examination:**
  - 3+ Optic Nerve Head Edema with temporal exudates and splinter hemorrhage OD, 2+ ONH Edema with inferior splinter hemorrhage OS
  - Venous engorgement, arterial attenuation OU
- **Additional Testing:**
  - **Color Vision:** 14/14 OD/OS per Ishihara Test
  - **Goldmann Visual Field OD:** enlarged blind spot 20 by 30 degrees with superior constriction and significant inferonasal constriction
    - Goldmann VF ordered OD only per neuro-ophthalmology due to decreased BCVA OD
  - **Humphrey Visual Field OS:** superior and nasal depression, enlarged blind spot
  - **Fundus Photos**

**Plan**
- Increase Diamox to 1,000mg BID PO with slow titration, increasing 250mg per every 3 days
- Return in 2 weeks

**Follow up (2 weeks after last visit)**
- **Best Corrected Visual Acuity:** 20/60 OD (back to baseline), 20/20 OS
- **Pupils:** PERRL, (+) APD OD
- **Intraocular Pressures:** 12mmHg OD/OS per tonopen
- **Dilated Fundus Examination:**
  - 1+ ONH Edema with temporal exudates OD, 1+ ONH Edema OS
- **Additional Testing:**
- **Color Vision:** 14/14 OD/OS per Ishihara Test
- **OCT RNFL:**
  - OD: Average Thickness 127
  - OS: Average Thickness 139
  - Within normal limits OU, significant decrease in swelling
- **Goldmann Visual Field OD:** Overall severe constriction (45 degrees horizontally, 36 degrees vertically) with enlarged blind spot
- **Humphrey Visual Field OS:** Overall mild constriction, progression from last scan

- **Fundus Photos**
- **Recommendations**
  - Neurosurgery consult for Ventriculoperitoneal Shunt due to progressing visual field loss
  - Return in 1 week for repeat visual fields

- **Laboratory Studies**
  - **Blood / Serum / Plasma**
    - Sedimentation Rate, Lysozyme: within normal limits
    - Angiotensin Converting Enzyme: within normal limits
    - Prothrombin, PTT: within normal limits
    - Quantiferon TB: Negative
    - Syphilis IgG Bioplex, Lyme EIA Screen, HIV AG-AB Bioplex: Nonreactive
    - Glucose: 101 (high)
  - **Blood Counts (within normal unless stated otherwise)**
    - RBC: 4.07 (relatively low)
    - Eosinophil #: 0.35 (high)
    - Mono %: 8.0 (high)
    - Eosinophil %: 5.2 (high)
  - **Urine**
    - Pregnancy test: negative
  - **Nares**
    - MRSA Surv DNA: negative
  - **Cerebrospinal Fluid**
    - No Bacterial Growth
    - Borrelia SPP-PCR-CSF/Synovial FZN: negative
    - VDRL: nonreactive
    - Constituents within normal limits
    - Opening pressure: 27cm H2O

- **Radiology Studies**
  - MRI: no mass lesions

- **Differential diagnosis**
  - **Primary:** Idiopathic Intracranial Hypertension
Diagnosis and Discussion

- **Idiopathic Intracranial Hypertension** diagnosis based upon:
  - Patient presented with headaches, visual disturbances, tinnitus, decreased color vision and bilateral optic nerve head swelling
  - Absence of mass lesions on brain imaging
  - Elevated opening pressure on lumbar puncture
  - Unremarkable labs from fluid specimens

- **Definition**
  - Papilledema is bilateral swollen optic nerve heads secondary to increased intracranial pressure (ICP)
  - IIH is papilledema in the absence of space occupying lesions in the brain and an elevated opening pressure on lumbar puncture with normal cerebrospinal fluid (CSF) constituents

- **Patient Demographics**
  - Vast majority present as obese female of childbearing age with average age of onset of 30

- **Common symptoms**
  - Headaches that are worse in the morning
  - Visual loss
  - Pulsatile tinnitus
  - Back and neck pain
  - Diplopia from 6th nerve palsy
  - Numbness

- **Systemic Associations**
  - Sleep Apnea
  - Addison’s disease
  - Thyroid dysfunction
  - Uremia
  - Anemia
  - Systemic Lupus Erythematosus

- **Pharmaceutical Associations**
  - Tetracyclines
  - Vitamin A derivatives

- **Pathophysiology**
  - Not well understood
- Proposed mechanisms
  - Excessive CSF production
  - Insufficient CSF absorption
  - Altered serum levels of pro-inflammatory mediators

- Course of Disease
  - Prolonged papilledema can result in axonal loss
  - Visual field loss begins as enlargement of the blind spot followed by arcuate defects that eventually progress to severe constriction of field
  - 25% of patients result in noticeable vision loss
  - Fulminant form, defined as severe visual loss within 4 weeks of symptom onset, has shown 50% of patients remaining blind despite treatment

- Notable Case Features
  - Atypical age of 54
  - History of recent doxycycline use and sleep apnea
  - Two week course of acetazolamide exhibited improvement upon optic nerve head thickness, but severe visual constriction in the right eye and mild constriction in the left eye

Treatment and Management

- Treatment Goals
  - Vision preservation
  - Headache reduction

- Disease Monitoring
  - Visual field testing

- Nonsurgical Treatments
  - Oral acetazolamide or topiramate or furosemide
  - Weight loss of approximately 5-10% of total body mass

- Surgical Treatments: indicated when conventional therapy fails or medication side effects intolerable
  - Optic nerve sheath fenestration
    - Immediate favorable effects but 32% show visual degradation after an average of 10 years
  - CSF diversion
    - Ventriculoperitoneal (VP) Shunt
    - Lumboperitoneal (LP) Shunt
    - Immediate favorable effects but studies show 51% of CSF shunts need will need surgical revision
  - Venus sinus stenting
    - Immediate favorable effects with studies showing low failure rate of 8.1% after 9 years
• **Case Treatment**
  - This patient was started on acetazolamide 1,000mg twice daily and began to show improvement in visual acuity and fundus exam. However, despite an improving appearance to the optic nerve heads, subsequent visual fields showed rapid constriction of the right eye and less severe constriction of the left. Improvement upon optical coherence tomography is assumed to be due to axonal atrophy rather than improved ICP. The decision was made to refer to neurosurgery for VP shunt in 2 weeks.
  - Continuous monitoring of visual acuity and visual fields will be implemented following surgical intervention.

**Conclusion**

With a growing number of obesity prevalence, there will be an associated increase in IIH. Although IIH overwhelmingly favors obese, fertile females, it is important to remember that any age, gender or weight can acquire the disease. IIH should be considered as a differential when patients present with headache and systemic or pharmaceutical risk factors. It is important for a clinician to be able to discern axonal atrophy from improving edema and initiate aggressive treatment to preserve vision due to the potential for rapid visual loss in fulminant cases.

**Bibliography**


