Posterior Ischemic Optic Neuropathy

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Thanks to: Michael Lai, MD (PGY II)
Case Presentation

**ID/CC:**

45 yo Caucasian female with no significant PMH

Ophthalmol. consult on POD#4 s/p vaginal hysterectomy with

Chief Complaint: “I haven’t been able to see out of my right eye since surgery”
Pt underwent vaginal hysterectomy for uterine fibroids, preop Hgb = 13.1.

Noted to have mild intraoperative bleeding, and received 2 units PRBC

 Overnight, pt had BP readings of 100/60, HR low 100s

POD #1: Morning Hgb 11. Patient noticed increased heart rate with standing. Discharged.
HPI (cont...)  

- POD #2: Returned with fever of 101, CBC: Hgb 7.6, WBC = 13, +UTI  
  Started on flagyl, gent, clinda

- POD #3: Started ambulating more
  - Felt lightheaded
  - Noted she could only see in one central area of her field of vision in her right eye
  - Repeat Hgb 5.7 → Transfused 2 units → 7.2
  - Neurology consult was obtained
POD #4: Ophthalmology consulted

POD #4: CT abdomen performed, revealed a large hematoma. Patient was taken to O.R. and the hematoma was evacuated
Exam

- **VA:** 20/20 OD (central field only)
  20/20 OS
- **Pupils:** Reactive to Light OU
  3+ RAPD OD
- **Brightness:** OD 50% of OS
- **Color Plates:** 8/8, 3/7 OD
  8/8, 3/7 OD
### Post Operative Course

<table>
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<tr>
<th>Date/Time</th>
<th>08/13 06:33</th>
<th>08/13 11:45</th>
<th>08/14 07:05</th>
<th>08/14 19:24</th>
<th>08/15 06:00</th>
<th>08/16 10:00</th>
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<tbody>
<tr>
<td><strong>Hb</strong></td>
<td>7.6</td>
<td>7.4</td>
<td>6.0</td>
<td><strong>5.7</strong></td>
<td>7.2</td>
<td>7.4</td>
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<tr>
<td><strong>Hct</strong></td>
<td>22.4</td>
<td>21.8</td>
<td>21.8</td>
<td>16.6</td>
<td>21.1</td>
<td>21.8</td>
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**NOTE PRE-OP HGB = 13.1** (2/3 = 8.7)

Visual loss reported by patient on the morning of 08/15, with note that vision was blurry the day before. Neuro-ophthalmology consulted on 08/17
Questions

- Neurologist to Ophthalmologist:
  Should we start steroids?

- Gynecologist to Ophthalmologist:
  Is there anything we can do to help her see better?

- Neurologist to the Gynecologist:
  Have you called ophtho yet???
Two forms of Shock Induced Optic Neuropathy

- Anterior
- Posterior
ANTERIOR OPTIC NEUROPATHY (AION) INCIDENCE 1/100,000/YR

DIFFERENTIAL DIAGNOSIS

ISCHEMIC

AAION
NAION
PION

NEUROGENIC

Optic Neuritis

COMPRESSIVE

INFILTRATIVE
NAION

- **Vascular Risk Factors:** Hypertension, DM
- **Mechanical Risk Factor:** Small Cup-to-Disc
- **Precipitating Factor:** Nocturnal Hypotension
Optic Nerve Circulation
F/A SHOWS CHOROIDAL NON-FILLING IN AION (HAYREH)
Shock-Induced Optic Neuropathy

- **Anterior:** (SI)AION
- **Posterior:** PION

PION is usually bilateral and more commonly associated with shock than AION
Posterior Ischemic Optic Neuropathy (PION)

Doheny Series
- Retrospective Chart Review of seven patients developing perioperative PION
  - 5 of 7 post spine surgery
  - Simultaneous, bilateral in 6 of 7 patients
- Contributing factors:
  - Blood Loss: Hct down 14 (34-20)
  - Intraoperative systemic hypotension
  - Facial edema (50%)

Posterior Ischemic Optic Neuropathy

2nd Study

- Retrospective chart review of 72 patients, 98 eyes (over 22 year period), meta-analysis
- Mean f/u: 4.1 years
- Results: 3 categories emerge
  1. Arteritic (6 patients)
  2. Non-arteritic, associated with systemic vascular disease (38 patients)
  3. Perioperative (28 patients)

Perioperative (28 patients)

- 14 patients (50%) following spinal surgery.
- 14 patients following other surgeries (i.e., ocular, cardiac, cerebrovascular, abdominal, orthopedic)
- Bilateral involvement was frequent (1/2 cases) with simultaneous involvement
- Poor visual outcomes
Typical PION

- 55yo obese male smoker with 7 hrs back surgery. Hypotensive (80/50) for one hr.
- Hct 21 (pre-op was 36%)
- 1d later, acute loss of vision bilaterally
- CF vision
  - Optic atrophy only occurs 6-9 weeks later
  - Often considered cortical blindness
- Sometimes considered functional
- Occasionally a lawsuit
Watershed Ischemia:

Oxygen in tissues =

- Oxygen in blood \times \text{blood into tissues}
- Oxygen in blood = \text{Hct} \times \text{Oxygen sat.}
- Blood into tissues = BP - \text{Tissue pressure}

Therefore ischemia starts with:

1) Low Hct
2) Low BP
3) High tissue pressure
Compartment Syndrome at:

- Optic canal = PION
- Scleral canal = AION

Vicious cycle of ischemia causing edema contributing to ischemia
Shock Induced ION

Risk Factors:

- Hypotension
- Anemia
- Systemic diseases affecting autoregulation (HTN, DM, smoking)
- Positioning, obesity and other factors that raise venous pressure
- Small Cup-to-disc -- specific for AION
PION and (SI)AION: Management

recovery

Connolly series:
- Volume and BP correction 2/2 Partial
- Whole blood transfusion 1/2 Partial

Jaben series:
- Whole blood transfusion 1/2 Partial

Prompt correction of hypovolemia and anemia
Summary

- Shock-induced optic neuropathy more commonly presents as PION, however may present as (SI)AION

- Take note of visual complaints following surgery, and consider ION following conditions of severe blood loss, hypotension, and anemia

- Prompt ophthalmologic consultation is warranted in these conditions and prompt correction may play a role in partial recovery of optic nerve function
References