Point-of-Care Ocular Sonography for the Emergency Department

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Topics in EM 2012

Case #1: 68 M with floaters OS
- Acute onset of “dark spots” in L eye 2 days prior
- VA (corrected) 20/60 OS, 20/40 OD
- Pupils, IOP, EOM, Visual Fields normal
- Anterior chamber normal
- Type 2 DM
- PVD, RD, VH?

Case #2: 34 F with 2 months of headache
- Otherwise healthy
- Gradual onset, no fevers or neck stiffness
- Occasional blurry vision
- Visual Acuity and Neurologic Exam normal
- CT Head normal
- ICP normal?

Case #3: 25 M with facial trauma
- Assaulted 2 hours prior
- Intoxicated, answers questions appropriately
- CT Head normal, + bilateral orbital fractures
- Pupils and Motility OK?
Background - Ophthalmic Ultrasound

• 1960s-70s: Experimental and Early Clinical Uses

• 1980s-90s: Routine Clinical Use

• 2000-present: Adoption by Emergency Medicine
Point-of-Care vs. Ophthalmology-Performed

• General purpose vs. specialized machine
• Transducer over closed lid vs. direct contact with globe
• Overview of posterior segment vs detailed assessment

Sonography is helpful when...

• Contraindications to mydriatics
• Hyphema, cataracts, vitreous hemorrhage
• You are not an Ophthalmologist

Technique: Patient Positioning

• Supine
• Gel over closed eyelid, small footprint linear transducer
• Horizontal Axial and Longitudinal Views
Technique

Normal eye

Case #1: 68 M with floaters OS

- Acute onset of “dark spots” in L eye 2 days prior
- VA (corrected) 20/60 OS, 20/40 OD
- Pupils, IOP, EOM, Visual Fields normal
- Anterior chamber normal
- Type 2 DM, poorly-controlled
- PVD, RD, VH?
Separation of the vitreous gel from the retinal surface

Due to age-related degeneration of vitreous gel (>60% by age 70)

Benign, but can progress to retinal detachment (1/90)

PVD - Sonographic Findings

- Thin, faint, linear echogenic membrane floating above posterior pole
- May need high gain
- Usually NOT attached to optic disk
- Significant movement/aftermovement ("swaying seaweed") with eye motion

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Dx: Acute Retinal Detachment

Retinal Detachment - Sonographic Findings

- Thick, highly reflective linear membrane
- Always tethered to optic disk
- Undulating, “taught bedsheets”
- Highly conspicuous at normal gain, where PVD is not
PVD vs RD

<table>
<thead>
<tr>
<th>Feature</th>
<th>Posterior Vitreous Detachment</th>
<th>Retinal Detachment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Echogenicity</td>
<td>Low-medium</td>
<td>High</td>
</tr>
<tr>
<td>Change with gain (dB)</td>
<td>Disappear with low gain</td>
<td>Visible with low gain</td>
</tr>
<tr>
<td>Mobility</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Optic disc attachment</td>
<td>Present or absent</td>
<td>Always present</td>
</tr>
</tbody>
</table>

Sharma et al; Ultrasound Clinics 2008
PVD with Retinal Tear and shallow RD

Vitreous Hemorrhage may mimic RD

- Fresh VH: Swirling, point-like, low level echoes within vitreous ("Snow Globe")
- Organized VH: Blood layers with time and forms pseudomembranes

PVD with Fresh VH and shallow RD x 2
• Case #2: 34 F with 2 months of headache

• Otherwise healthy

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Case Continued...

- LP OP = 55cm H20
- Dx: Pseudotumor Cerebri

Sonography vs OCT for Disk Swelling

Note: Normal Disks up to 0.6mm, abnormal > 1.0mm
“The role of the Emergency Physician in patients with orbital trauma is to determine that visual acuity, extraocular movements, and the fundus are normal.”


Summary

- Flashes and Floaters - PVD, RD, VH
- Headache - Rule out papilledema!
- Trauma - Confirm EOMI and pupillary light reflex
Thanks!