Look Into My Eyes: Practical Tips to Measuring Intraocular Pressure and Using the Slit Lamp Exam in Children

The ophthalmologic exam in young children can be a challenge in the ED. Measuring pressures and using the slit lamp are critical skills yet are difficult to perform in the uncooperative child. This expert lecturer will provide advanced tips and techniques for use of devices to measure ocular pressure and to complete a slit lamp exam.

OBJECTIVES
- Describe tools available to the emergency practitioner to measure ocular pressures and to perform a slit lamp exam (including portable slit lamp devices)
- Illustrate tips and techniques for the ophthalmologic exam in children in the ED

3/25/2015
9:15 AM-9:45 AM
Grand Ballroom
WE-12

DISCLOSURES:
(+) No significant financial relationships to disclose
Tips for Using the Slit Lamp Microscope and Measuring IOP in Children

Gil Binenbaum MD MSCE
Children’s Hospital of Philadelphia

No Financial Disclosures
Medial Canthus: Conjunction (transparent) & Sclera (white)

Lateral Canthus

Upper Lid

Lower Lid
Slit lamp

- High-intensity light source focused to shine as a slit, in conjunction with a microscope can see anterior (and posterior) segment structures of eye
  - Cataract
  - Corneal diseases
  - Uveitis
  - Infections
  - Trauma

Portable slit lamp

Magnification
Slit lamp exam

- Lids and lashes
- Conjunctiva and sclera
- Cornea
- Anterior chamber
- Iris
- Lens
- Vitreous
- Optic nerve and retina (need 78D, 90D lens)

Visualize transparent structures

- Adjust thickness of slit of light
- Aim from different directions
- See cross sections of structures
Cornea
Anterior chamber

Between the Cornea and the Iris
Collapsed in open globe injury
RBC, WBC, pigment, neoplasm
Alternative source of slit beam (and of a blue light)
Lens

Behind the iris
Opacity = cataract
Congenital - familial, syndromic, metabolic, sporadic
Steroids, trauma, DM, age, sun
Retroillumination

(=Red reflex)
Aim slit of light directly in

• EXTREMELY USEFUL TEST – EVERY KID
• “Bruckner method” is best:
  – Test both eyes together first
  – Stand far enough away to look at both eyes
  – Child can look right at you
  – Turn dial on direct ophthalmoscope until in focus
  – Examine reflexes
• Can then come in closer to look at each eye
• Urgently refer any asymmetry (brightness, color, etc.) or abnormality
Leukocoria & Abnormal red reflex
URGENT REFERRAL

- DDx
  - Cataract
  - Retinoblastoma
  - Coats disease
  - Retinal detachment
  - Uveitis
  - Infection
  - PHPV
  - Strabismus
  - High refractive errors
  - Etc
Retroillumination

(=Red reflex)
Aim slit of light directly in
Practical exam tips
Positioning

• Focus of oculars is set in place
  – Change focus moving the joystick back and forth
  – Patient has to be all the way forward

• Child forward to edge of chair
• Move slit lamp down / Move child up
• Chin DOWN onto rest & FOREHEAD AGAINST BAR
• Line up eyes with black line on side pole
Controls

- Light intensity switch
- Light intensity dial
- Width of beam
- Height of beam
- Low-high magnification switch
- Beam color - best fluorescein exam is with slit lamp
Fluorescein

• **Blue light** (vs UV) and magnification
• Multiple uses: corneal abrasion, corneal laceration & ruptured globe, exposure keratopathy, etc.
HSV keratitis

http://cmj.ac.kr/Articleimage/0057CMJ/cmj-44-151-g002-l.jpg
SEIDEL TEST
1. Use blue light at slit lamp
2. Paint wound with fluorescein
3. Look for “flow of inverse staining”

More controls

• Joystick
  — Left/right
  — TWIST for up/down
  — FOCUS is forward/backward

• Oculars
  — Adjust separation to align with your eyes
  — Be sure the eye piece focus is “neutral”

• Swing light in arc from one side to other
  — Can line light up directly into eye to retroilluminate
Slit lamp exam

- Lids and lashes
- Conjunctiva and sclera
- Cornea
- Anterior chamber
- Iris
- Lens
- Vitreous
- Optic nerve and retina (need 78D, 90D lens)

Examination

- Focus on each structure individually
  - Lids, conjunctiva, sclera, cornea, A/C, iris, lens
- Vary angle to illuminate obliquely or directly
- To see CELL
  - Highest intensity
  - Highest magnification
  - SHORT WIDE beam
  - Angle across pupil
  - Focus on cornea and push joystick forward slightly
  - OR Focus on iris and pull backward slightly
Fundoscopy

Can see retina and optic nerve using special lenses (contact and non-contact) at slit lamp

http://upload.wikimedia.org/wikipedia/commons/6/64/3_mirror_glass_to_diagnose_retinal_detachment.jpg
Intraocular pressure
Goldmann tonometry

Golmann tonometry
Intraocular pressure (IOP)

- Finger
  - Normal is like tip of your nose

- Tonopen or Rebound tonometer (iCare)
  - Normal is 10-21 mm Hg

- Goldmann applanation tonometry

---

**Tonopen**

- Use Proparacaine
- Try a bottle, TV, demonstrate doesn’t hurt
- Sedation
- Don’t check if crying and squeezing eyes
- Don’t store without cover on tip
- Alternative . . .
Rebound (iCare) Tonometer

- NO propracaine
- Upright (or sideways) child
- Works like a charm (in my opinion)!
When to think about IOP

• Congenital glaucoma
  – Cloudy corneas, large eyes, tearing, blepharospasm
• Eye pain
• Vision loss
• Hyphema – from presentation to 5 days
• Retrobulbar hematoma/compartment syndrome

• NOT if crying/squeezing lids, open globe injury
General Tips

- Distraction and speed
- Don’t direct to look at things – just show them
- Don’t ask permission – make noises, sing!
- Proparacaine – can use multiple times
- Motility, pupils, red reflex, etc., first
- Then hold down if necessary (if everything ready)
- But think of next examiner
- Sedation, exam under anesthesia

Thank you