Pediatric Anterior Segment: What ODs Need to Know

Marie I. Bodack, OD, FAAO, FCVOI, Dipl BVPO
Chief, Pediatric Primary Care @ Southern College of Optometry
mbodack@sco.edu

Nothing to Disclose

Course Goals

• To review commonly encountered pediatric anterior segment conditions and their treatment options.
• To become comfortable with FDA age guidelines and dosing for ophthalmic medications including orals
• To become comfortable in treating pediatric anterior segment disorders
• To instill clinical ‘pearls’ for examining children
Capillary Hemangioma

- Benign, Soft Tissue Tumor composed of blood vessels
  - Most common orbital tumor of childhood
  - 1/200 births
  - Females:Males 3:2
  - Location: palpebral conjunctiva, upper lid
- Bright red mass (superficial)
  - Blanch on pressure
  - May bleed spontaneously
  - When crying may enlarge

Capillary Hemangioma

- 30% present at birth, 100% by 6 months
- Rapid growth in first 5 years of life (about 3-6 months)
- Most spontaneously regress by age 5
  - 30% age 3
  - 60% age 4
  - 76% age 7
Capillary Hemangioma

• Concerns
  • Amblyopia 25-60%
    • Occlusion of visual axis by lid
    • Induced corneal astigmatism
      • Can remain

Capillary Hemangioma - Evaluation

• Retinoscopy
  • Astigmatism
  • If extensive facial dysmorphia = may be orbital
    • Cardiac/neurological workup & CT/MRI of orbit
    • Posterior fossa malformation
    • Hemangioma
    • Arterial anomalies
    • Cardiac defects
    • Eye abnormalities

Capillary Hemangioma - Treatment

• Correct refractive error
• Treat amblyopia
• Steroid injection
  • Regression in 2-4 weeks
• Oral Beta blocker (propanolol -1-2mg/kg/day)
  • Mechanism: vasoconstriction, reduction in pro-angiogenic signals
• Topical timolol maleate 0.25% bid
• Surgical excision
  • If severe (cosmesis), amblyopia

Ptosis

- Unilateral or bilateral
- Asymmetry in upper lid height
- Symmetrical lowering of both

Causes
- Congenital
- Acquired
  - CNIII Palsy – paretic levator
  - Systemic
  - Myasthenia Gravis
  - Trauma
  - Mechanical
  - Chalazion/Hordeolum
  - Hemangioma

Congenital Ptosis

- Signs
  - Poor levator function
  - Absence of upper eyelid fold

- Concerns
  - Amblyopia
  - Visual deprivation
  - Induced astigmatism
Horner Syndrome

- Ptosis and miosis on affected side
- Anisocoria greater in dim.
- Anhydrosis
- Etiology: disruption of sympathetic nerve supply
- Congenital
- Acquired
  - Neuroblastoma (children)
  - Pancost tumor of lung (adults)

Neuroblastoma

- Most common extracranial solid tumor in infants/children
- 8-10% childhood cancers
- Overall incidence 14/100,000
- 85% < age 5
- Abdomen
  - Adrenal gland
  - Can metastasize
Ptosis

- Observation
  - Frontalis to elevate
  - Chin up head position
- Work Up
  - Palpebral aperture
  - Upper lid fold
  - Pupils
    - Pearl: Direct ophthalmoscope
    - Iris color
      - Lighter in Congenital Horner’s

Ptosis - Treatment

- Congenital
  - Amblyopia
  - If vision deprivation or cosmetic concerns
    - Surgical correction
- Acquired – Rule Out
  - Myasthenia
    - Variable and worse when tired
    - Ice-pack test
      - 2 and 2
  - Neuroblastoma
    - Imaging (MRI abdomen)
Chalazion/Hordeolum

- Inflammation of blocked Meibomian Gland
- Signs
  - Swollen lid
  - Oily Meibomian Glands
  - Can be recurrent
- Treatment
  - Hot Compresses
    - Frequency?
    - Problems?
  - Topical Medications

Steroid Antibiotic Combination

- TobraDex (Dexamethasone 0.1%, Tobramycin 0.3%)
  - Ages 2+
  - gtts (generic) and ung
- TobraDex ST (Dexamethasone 0.3%, Tobramycin 0.05%)
  - Ages 2+
- Zylet (Loteprednol 0.5%, Tobramycin 0.3%)
  - Blepharitis and lid inflammation 0-6 years
- Maxitrol (Dexamethasone 0.1%, Neomycin, Polymixin B)
  - Ages 2+
  - gtts and ung

Chalazion/Hordeolum

- Treatment
  - Surgery?
    - Size
    - Duration
    - Risk of occlusion amblyopia
    - Concern from anesthesia
  - Oral Antibiotics?
Oral Antibiotics

- Erythromycin Ethylsuccinate (EES)
  - 30-50mg/kg/day q 6 h
  - Formulations: 200/400 mg/5ml
- Dicloxacillin
  - 12.5-50mg/kg/day q 6 h
- Amoxicillin
  - 25-45mg/kg/day q12 h
  - 20-40 mg/kg/day q8h
  - Formulations: 125/200/250/400 mg/5ml
- Tetracycline (Ages 8+)
  - 250 mg qid

Chronic Treatment

- Omega 3
  - Adult dose 2-1000 mg tid
- Pediatric Availability
  - Chewable daily

Preseptal Cellulitis

- 5x more common than orbital
- Causes
  - Lid/cutaneous infections
  - Hordeolum/Impetigo
  - HSV/HZV
  - URI/Sinusitis
- Differentials
  - Allergic
  - Adenovirus (16%)

Oral Antibiotics

- Amoxicillin, Clavulanate (Augmentin)
  - 20-40mg/kg/day q 8h
  - Formulations: 125/200/250/400mg/5ml
- Cephalexin (Keflex) – 1st gen
  - 15-50mg/kg/day q 6h
  - Formulations: 125/250/500 mg/5ml
- Cefaclor (Ceclor) – 2nd gen
  - 20-40mg/kg/day q 8h
  - Formulations: 125/187/250/375 mg/5ml
- Cefdinir (Omnicef) – 3rd gen
  - 7 mg/kg/day q 12 hr
  - Formulations: 125/250 mg/5ml
- Trimethoprim/Sulfamethaxole (Bactrim)
  - 8-12/40-60mg/kg/day q12h

Oral Antibiotics

- PCN Allergy Precautions
  - Cross-reactive to cephalosporins (1st gen)?
- Sulfa Allergy Precautions
- No tetracycline < 8 years
Dosing

• Follow FDA Guidelines
• Need to know
  • Child’s weight in kg
  • Formulations of medication
  • 1 tsp = 5ml

Example 5 y/o preseptal:

• 40 lbs = 18.14 kg
• Augmentin
  • 20-40mg/kg/day tid
  • Formulations 125/200/250/400mg for 5 ml
• Determine min and max mg/kg
  • 362.8 to 725.6 mg/day
• Therefore:
  • Can do 125 (375 daily) or 200 (600 daily)
• On Rx:
  • Giving 5ml tid (15ml/day) for 10 days so dispense 150 ml

Example 9 y/o preseptal:

• 61 lbs - 27.7 kg
• Cephalexin (Keflex)
  • 50-100mg/kg/day qid
  • Formulations 125, 250, 500 mg/5ml
• Determine min and max mg/day
  • 1385 to 2770 mg/day
• Therefore:
  • Can do 125 – 5mLx3 (15ml) qid (1500mg daily)
  • Can do 250 – 5mLx2 (10ml) qid (2000mg daily)
  • Can do 500 – 5mL qid (2000mg daily)
• On Rx:
  • Giving 15ml qid (60ml) day for 10 days so dispense 600 ml
  • Giving 10ml qid (40ml) day for 10 days so dispense 400 ml
Dermoid Cyst

- Choristomas
  - Benign tissue in abnormal location
- Congenital
  - Limited potential for growth
- Location:
  - Conjunctiva = Limbal dermoid
  - Firm
  - Color: variable
  - Concern:
    - Induced astigmatism
    - Lateral Canthus = Dermolipoma
      - Can be deeper
      - Dx: prolapsed fat

Dermoid Cyst - Treatment

- Monitor
- Correct astigmatism
- Amblyopia treatment
- Referral to oculoplastics for possible surgical excision
  - Dermolipoma
Allergic Conjunctivitis

- Immediate hypersensitivity Type I reaction
  - Mast cell degranulation
  - Histamine and leukotriene release
  - Increased vascular permeability
    - Eosinophil and neutrophil migration
    - Vasodilation
    - Hyperemia
    - Itching
    - Chemosis
- Seasonal
  - Pollen, Molds
- Year round (Perennial)
  - Dander, Dust

Allergic Conjunctivitis

- Signs:
  - Bilateral injection
  - Papillary reaction – bulbar conjunctiva
  - Tearing
  - “Allergic shiner”

- Symptoms:
  - Itch
### Ocular Allergy – Antihistamines, Mast Cell Stablizers, & Combination – OTC

- **Ketitofen 0.025%**
  - **Zaditor**
  - **Alaway**
  - Ages 3+
  - bid

### Antiallergy - Rx

- **Azelastine 0.05% (Optivar)**
- **Olopatadine 0.1% (Patanol)**
- **Olopatadine 0.2% (Pataday)**
  - Daily
  - Ages 2+
  - **Olopatadine 0.7% (Pazeo)**
  - Daily
  - Ages 2+
  - **Epinaistine 0.05% (Elestat)**
  - **Ages 2+**
  - **Bepotastine 1.5% (Bepreve)**
    - Ages 2+
  - **Alcaftadine 0.25% (Lastacaft)**
    - Daily
    - Ages 2+
  - **Emedastine 0.05% (Emadine)**
    - Up to qid

- **Cromolyn Sodium 4% (Crolom)**
  - Ages 4+
  - 4-6 times/day
  - Vernal

- **Lodoxamide 0.1% (Alomide)**
  - Ages 2+
  - 2-4 times a day up to 3 months
  - Vernal

### Antiallergy - Rx

- **Loteprednol etabonate 0.2% (Alrex)**
  - Safety information in pediatric patients has not been established
  - Dosing: qid
Allergies (Allergic Rhinitis)

- Fluticasone (Flonase, Veramyst) - OTC
  - ADR: watery eyes
  - ADR: glaucoma, cataracts
- Triamcinolone (Nasocort)
  - Ask doctor before use if you have or had glaucoma or cataracts
- Nometasone (Nasonex)
  - ADR: redness to eye/lid, H/A
- Budesonide (Rhinocort)
- Ciclesonide (Omnaris)
  - Eye problems

Steroids in Children

  - 3% Cortical Changes, 0 with PSC
  - IOP 11-20 (avg 16)
  - No cataract, glc, increased IOP
- Childhood Asthma Management Program (CAMP)
- Allergy Clin Immunol 2010;126:389-92
  - 5.2% prevalence - cataract
  - 1/232 required surgery

Allergies (Allergic Rhinitis)

- 1st generation (ages 6+)
  - Diphenhydramine (Benadryl)
- 2nd generation (ages 2+)
  - Loratadine (Claritin)
  - Cetirizine (Zyrtec)
  - Fexofenadine (Allegra)
- Decongestants (ages 4+)
  - Pseudoephedrine (Sudafed)
  - Phenylephrine HCl (PE)
- Combination
Vernal Conjunctivitis (VKC)

- More complex immunological basis
- Association: asthma, eczema, seasonal allergic rhinitis
- Males>Females (2-3:1)
  - Onset <10 years (5-6 years)
- Spring
- Symptoms
  - Itch
  - Photophobia

Vernal Conjunctivitis (VKC)

- Signs
  - Ropy mucus discharge
  - Injection
  - Evert lids - Cobblestone Papillae
  - Cornea
    - Trantas dots
    - Eosinophils
    - Shield ulcer (5%)
    - Oval
    - Superior
Vernal Conjunctivitis - Treatment

- Cobblestone Papillae
- Mast Cell Stabilizer
  - tid to qid
- Trantas Dots
- Steroid
- Shield Ulcer
  - Antibiotic drops

Steroids

- Lotoprednol etabonate 0.2% (Alrex)
- Lotoprednol etabonate 0.5% (Lotemax)
  - Drops, ointment and gel
  - QID
- Fluromethalone 0.1% (FML)
- Fluromethalone 0.25% (FML Forte)
  - Ages 2+
  - bid to qid
- Prednisolone Acetate 1% (Pred Forte)
- Difluprednate (Durezol)

Unless stated, no safety information for pediatric patients
Bacterial Conjunctivitis

- 50% of cases of acute conjunctivitis
  - Gigliotti. 1981 J. Pediatrics
- Pathogens
  - Haemophilus influenzae
  - Streptococcus pneumoniae
- 39% concurrent ear infection
  - < 5 years old
  - H flu

Bacterial Conjunctivitis

- Symptoms
  - Not much pain
- Signs
  - Bulbar and tarsal conjunctival injection
    - Hemorrhagic with H. flu
  - Mucopurulent discharge
- Treatment
  - Culture not routine in postneonatal – toddler
    - Infant, CL wearer

Ointments vs. Drops?

- Ointment:
  - Easier Installation
  - Longer lasting
  - Blurry vision
  - Better for infants
- Drops:
  - No blur
  - More options
  - May sting
  - Taste in mouth
**Antibiotics - Ointments**

- **Erythromycin 0.5% (Ilotycin)**
  - Neonatal prophylaxis
  - Up to 6 times/day

- **Bacitracin (Ak-Tracin, Bacticin)**
  - Safety in pediatrics not established
  - 1-3 times/day

- **Tobramycin 0.3% (Tobrex)**
  - 2+ mos
  - 2-3 times/day

- **Gentamicin 0.3% (Gentak)**
  - Safety in neonates not established
  - 2-3 times/day
  - More toxic to cornea

- **Ciprofloxacin 0.3% (Ciloxan)**
  - 2+ years
  - tid x 2 days then bid x 5 days

- **Sulfacetamide 10%, 15%**
  - Rarely used

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**Antibiotics - Drops**

- **Polymyxin B+ Trimethoprim (Polytrim)**
  - 2+ mos
  - Dose q3h (6x day)
  - Stings

- **Aminoclycosides**
  - Tobramycin 0.3%
  - Gentamicin 0.3%

- **Sulfacetamide 10%, 15%**
  - Rarely used

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**Stevens-Johnson**

- Life-Threatening Skin Condition
- Mucus Membranes
- Etiology: Hypersensitivity to medications
### Antibiotic Drops - Fluroquinolones

- **Ages (1+)**
  - Q2h x 2 days then qid x 5 days unless stated
  - Ciprofloxacin 0.3% (Ciloxan)
  - Difloxacin 0.3% (Ocuflox)
  - Levofloxacin 0.5% (Quixin)
  - Levofloxacin 1.5% (Iquix) – age 6+
  - Gatifloxacin 0.3% (Zymar)
  - Gatifloxacin 0.5% (Zymaxid)
  - Moxifloxacin 0.5% (Vigamox)
  - Moxifloxacin 0.5% (Moxeza) *4+mos
  - tid x 7 days
  - Besifloxacin (Besivance)
  - tid x 7 days
  - Resistance!


### Antibiotics–Azithromycin (AzaSite)

- FDA 1+ year old
- FDA bacterial conjunctivitis
- Unique dosing
  - Bid x 2 days then qd x 5 days
- Off label use
  - Blepharoconjunctivitis
    - Lid margin hyperemic
    - Conjunctival inflammation/injection
    - Sub-epithelial infiltrates
    - Daily x 1 month; hot compresses

Viral Conjunctivitis

- 20% cases acute conjunctivitis (adenovirus)
- Signs
  - Conjunctival injection
  - Unilateral to start
  - Tearing
  - Positive PAN

Viral Conjunctivitis

- Epidemic Keratoconjunctivitis (EKC)
  - Cornea
    - Keratitis
    - Subepithelial infiltrates
      - Months to resolve
  - Lids
    - Edema possible
  - Extremely contagious
    - 2 weeks after onset

Viral Conjunctivitis - Treatment

- Mild cases
  - Tears
  - Antibiotic Steroid
  - Hygiene
- EKC
  - Subepithelial infiltrates
    - Steroid
    - Isolation
    - Hygiene!
Corneal Abrasion

- Etiology:
  - Trauma
  - History
- Exam pearl:
  - Work quickly
  - Get the information you need
Bear Hug

Corneal Abrasion Treatment
• Topical Antibiotics
• Pain medication (oral)
• Cycloplegic
• Bandage Contact Lens
• Fox Shield
• Follow Up
  • Daily

7 year old playing in a tree
• Local ER same day
  • Dx: Corneal abrasion
  • Rx: Polytrim qid
• ER 3 days later
  • Drainage
  • Swelling
  • Mom “removed twig”
• Unable to open eye patient, mom, MD, RN
  • Sent to Eye Clinic
Exam Under Anesthesia

- Tree Branch remnant in inferior fornix
- 2mm Ulcer 20% depth
- Treatment:
  - Ambisome 1% q 1h
  - Ceftazidime 50mg/ml q1h
  - Vancomycin 25 mg/ml q1h

Pearl

- You should be able to open the eyelid of a child with an abrasion. If you can’t, further evaluation needed!
Herpes Simplex Virus (HSV)

- Type 1
- Signs
  - Vesicular lesions on the lid
  - Epithelial defect
  - Conjunctival injection
  - Stromal opacities
  - Iritis

Is HSV Different in Children?

- 48% of children - recurrence within 15 months
- 61% epithelial/stromal disease developed recurrent stromal disease
  - Epithelial disease only?
- Stromal scarring (48%)
  - Amblyopia
- 26% both eyes - concomitant or sequential
- Misdiagnosis

Is HSV Different in Children?

- Oral Acyclovir indicated
  - Greater inflammatory response
  - Risk of Amblyopia
  - Effective for epithelial disease
  - Effective as prophylaxis for recurrences
  - Prevent infectious disease if on steroid for chronic stromal disease


HSV Treatment in Pediatrics

- Lid lesions: antibiotic ointment
- Corneal dendrites: antiviral
- Stromal disease: steroid
  - Taper PF to FML to Lotemax
  - Threshold dose
- Oral Acyclovir
  - tid when active then bid

Topical Antivirals

- Trifluorothymidine (Viroptic)
  - FDA ages 6+
  - Dosing: q2h up to 9 times/day
- Ganciclovir (Zirgan)
  - FDA ages 2+
  - Dosing 5 times/day until heals then tid for 7 days
Antivirals (oral)

- Acyclovir
- Ages ≥2
  - (10-20) to (40-80) mg/kg/day in 3 doses
- Alternate dose all tid
  - 18 mos – 3 years: 200mg (5ml)
  - 3-5 years: 300mg (7.5ml)
  - 6+ years: 400mg (10ml)

Herpes and Amblyopia

- Risk of corneal scarring/amblyopia
- Amblyopia Treatment
  - PATCH
  - Protective lenses

Recurrent Red Eye

- 8 WF referred by PCP for evaluation of red eye
  - Saw PCP with 2 day hx of red eye
  - Rx ciprofloxacin ophthalmic qid
  - 3 days later increased redness, light sensitive, unable to open eye
Examination

• VA 20/20- each eye
• Slit lamp OD
  • L/L: Lesion on lower lid
• Conj: 2+ injection
• K: dendrite

Diagnosis/Treatment

• HSV
• Viroptic 9x a day
• Pred Forte qid
• Erythromycin ointment to lid tid

Follow Up

• Tapered Pred over 8 weeks
• 2 weeks after stopping Pred, redness returned
• Slower taper of Pred
  • Over 4 months
2 weeks after stopping Pred

• Noted eye pain, redness, photophobia and went to ER
• Diagnosed with HSV keratitis
• Tx: Acyclovir 200mg/5ml qid x 2 weeks
• Follow up in clinic
  • Longer taper
  • Recurrence
  • Corneal consult

HSV Case Continued

• Patient tapered to FML and eventually off all drops in 1.5 years
• Still on acyclovir (weight adjusted)
• On vacation in North Carolina....
HSV Case Continued

- Restarted Pred Forte qid.
- Able to wean down every 2 months.
- Key Point:
  - You can get flare ups!
Uveitis

- 5-10% of iritis cases at referral centers
  - Cunningham 2000 Ocular Immunol Inflammation
- Etiology
  - Trauma
  - Idiopathic
  - Systemic disease
- Sequelae:
  - Cataract
  - Glaucoma
- Acute cases
  - Injection
  - Pain
  - Photophobia
- Chronic cases
  - White & quiet eye
  - No pain
  - Asymptomatic

Uveitis Treatment

- Cycloplegia
- Topical Steroid
  - Aggressive to start
  - Taper
- Work Up
  - Blood tests
    - ANA
    - RF
    - HLA-B27
- Referral to rheumatology
  - Systemic treatment
    - NSAIDs
    - Methotrexate
    - TNF inhibitors/Biologics
    - Adalimumab (Humira)
    - Abatacept (Orencia)
    - Etanercept (Enbrel)
    - Infliximab (Remicade)

Topical Steroids

- Prednisolone Acetate 1% (Pred Forte)
- Difluprednate
  - Effective for uveitis
    - 88% improvement in cells
  - 50% eyes, 50% patients:
    - IOP increase (≥10 mmHg & ≥24 mmHg)
  - 39% eyes, 43% patients
    - Cataract formation/progression

Eye Examinations / Slit Lamp

- Risk for iritis:
  - ANA (+)
    - 65-90% of cases
  - Duration
    - <4 years
  - Age
    - Less than 6 at time of dx
- Slit lamp exams every 3,6 or 12 months


JIA Screening Guidelines

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<th>Type</th>
<th>ANA</th>
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<th>Duration of Disease, y</th>
<th>Risk Category</th>
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<td>NA</td>
<td>NA</td>
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Ocular Steroids

- Treat as you do in adult
- Don’t under treat!
- Monitor IOP
- Steroid responders
- If increase IOP add glaucoma drop (e.g. Timoptic 0.25% or 0.5%)
- Contraindications
- Wean off
Hyphema

- Blood in the anterior chamber
- Incidence 2 per 10,000 per year
- Causes
  - Traumatic
  - Disease
    - Retinoblastoma
    - Sickle Cell*

Traumatic Hyphema Exam

- VA
- Cornea
  - Abrasion
  - Blood staining
- AC
  - Cells
  - Iris
    - Sphincter Tear
- Lens
  - Cataract
- IOP
- Retina
  - Hemorrhages
  - Commotio retinae
- B scan?
- Gonio?
Hyphema Treatment

• Bed rest!
  • Or Lazy Boy Chair
  • Head elevated 30deg
• No ASA or Ibuprofen
• Fox shield

Hyphema Treatment

• Cycloplegic
  • Atropine 1% bid
  • Daily when clot resorbs
• Steroids
  • Pred Forte
    • q1h or q2h initially
  • Monitor IOP
    • Steroid responders v. Traumatic Glaucoma
    • If increase IOP (>26-30) taper and add glaucoma drop

Glaucoma

• Beta Blockers
  — Timolol maleate 0.25, 0.5% (Timoptic, Timoptic XE, Ista)l)
  — Betaxolol 0.25% (Beoptic S)
    • “Safe for pediatrics patients”
• Alpha Adrenergic Agonists
  — Brimonidine 0.2% (Alphagan/P)
    • Ages 2+
    • Extreme sleepiness (50-83%) ages 2-6, 25% 7+
• Carbonic Anhydrase Inhibitors
  — Brinzolamide 1% (Azopt)
  — Dorzolamide 2% (Trusopt)
    • “Safe in pediatric patients”
Glaucoma

• Prostaglandin analogs
  • Ages 16*
  • Brimatoprost 0.01/0.03% (Lumigan)*
  • Travoprost 0.004% (Travatan/Z)*
  • Tafluprost 0.0015% (Zioptan)*
    - Not recommended in pediatric patients
  • Lantanoprost 0.005% (Xalatan)
    - No pediatric information
    - *Pigmentation changes

Glaucoma Combination Drugs

• Brimonidine 0.2%, Timolol 0.5%
  (Combigan)
  • Ages 2+
• Brinzolamide 1%, Brimonidine 0.2%
  (Simbrinza)
  • Ages 2+
• Dorzolamide 2%, Timolol 0.5%
  (Cosopt/PF)
  • Ages 2+

Hyphema Treatment

• If rebleed
  • R/O sickle cell
• Admit to hospital
  • Compliance
  • Vomiting
  • Rebleed
  • Systemic
Follow up
• Daily until clot resorbed
• Then once a week until microhyphema resolved
• As needed for other problems
• Gonio 6-8 weeks after injury

Lawnmower injury
• 12 y/o WM mowing lawn and injured OS
• Went to ER
• Dx: Corneal Abrasion, Hyphema, Borderline IOP

Lawnmower injury
• Initial treatment
  • PF q1h, Alphagan tid, Vigamox qid
• 3 days after injury
  • IOP 30
  • MD added Cosopt bid
• 5 days after injury
  • Presented with nausea, photophobia, malaise
  • IOP spike to 44
• Admit to hospital for IV Diamox
  • Vomiting
  • IOP still elevated
### Baseball Injury

- 17 year old male foul tip off bat
- Seen in ED
  - Hyphema 50%
  - Orbital floor fracture (tripod fracture)
- Treatment
  - Atropine bid
  - Pred q2h
  - No nose blowing
  - Plastic surgery consult

### Day 1 Follow up

- VA HM
- No motility restrictions
- No RAPD (by reversal)
- Clot 90% of AC
  - Blood on endothelium
- Sphincter Tear
- IOP
  - 12,13

### Day 2 Follow Up

- AC Stable
- IOP 4
- Suspect scleral show (brown coloration to nasal conjunctiva)
- Exploratory Surgery
  - Scleral rupture with uveal prolapse 15mm “L” shape starting near inferior limbus extending to the medial rectus insertion
Additional Follow Up

• Orbital floor surgery deferred
• Meds:
  • Added Keflex 500 mg po qid
  • Prednisone po taper
  • Percocet prn
  • Retinal consult

Pearl

• There can be an open globe without a Seidel Sign
  • IOP
  • Conjunctival changes
Iris Coloboma

• Failure of emrionic fetal tissue to close
• Other areas
  • Optic nerve
  • Retina
  • Chorioid
• Other signs
  • Nystagmus
  • Microphthalmia

Iris Coloboma

• Isolated or or part of a syndrome
  • Coloboma
  • Heart Defects
  • Atresia of chonae
  • Retarded growth
  • Genital hypoplasia
  • Ear malformations/hearing loss
• Treatment
  • Glare
  • Refractive error
### Iris Lisch Nodules
- Discrete lesions on anterior iris surface
- Color
- Round
- Bilateral
- Varying size
- Associated with Neurofibromatosis I (NF1)
  - 5% < 3 year old
  - 42% 3-4 year olds
  - 55% 5-6 year olds
  - About 100% over 21 year olds

### Neurofibromatosis (NF1)
- Neurocutaneous disorder (Phakomatoses)
  - Von Recklinghausen’s Disease
- Incidence: 1/3,000 people
- Genetics
  - AD but spontaneous mutations
- Other associations
  - Cognitive Impairment
  - Seizures
  - Hydrocephalus

### Diagnostic Criteria NF-1
- 6+ café au lait macules > 5 mm pre-/15 mm post pubertal
  - Flat, pigmented cutaneous lesions
- 2+ neurofibromas
  - Plexiform neurofibroma – S shaped upper eyelid
- Freckling in axillary or inguinal regions
- Distinct osseus lesion
- First degree relative with NF-1
- **Optic nerve glioma**
  - 15-19% with NF1
- 2+ iris Lisch nodules
Pediatric Cataracts

• Opacities of crystalline lens
  • Size
  • Shape
  • Location
• Incidence
  • 3/10,000 (<1 year)
  • 4.5/10,000 (>1 year)
• Visual development

Pediatric Cataract - Bilateral

• Idiopathic (60%)
• Hereditary without systemic disease (30%)
• Genetic, metabolic, systemic disease (5%)
  • Galactosemia, Down Syndrome, DM, Lowe’s syndrome
• Maternal infection (3%)
  • Rubella (50%), CMV, Syphilis
  • Retinopathy possible
• Ocular anomalies (2%)
  • Aniridia, Anterior segment dysgenesis
• Medications
  • Corticosteroids
**Pediatric Cataracts - Unilateral**

- Idiopathic (80%)
- Ocular anomalies (10%)
- Traumatic (10%)
  - Presentation cortical to hypermature
  - Rule out abuse

**Pediatric Cataract - Evaluation**

- VA & Slit lamp
- Unilateral
  - History and physical
  - TORCH Titers
- Bilateral cataracts
  - Urine for reducing substances - galactosemia
  - Urine for amino acids (Lowe’s syndrome – glc, cat, dev delay)
  - VDRL & TORCH Titers
- CBC
- BUN
- Calcium, Phosphorus – metabolic disorders

**Pediatric Cataracts - Congenital**

- Treatment
  - Visually significant (> 3mm, pupillary axis)
    - Removal by 2 months
  - Infant Aphakia Treatment Study (2010)
    - IOL v. CL
    - VA similar at 1 year
  - Second procedure
    - 12% CL group
    - 63% IOL
- If 8 + years and no treatment: poor prognosis
Pediatric Cataracts - Acquired

- More conservative
- Reduced VA
  - Correct refractive error
  - Patching and dilate pupil for improvement
    - PEP 2.5%

Pediatric Cataract Treatment

- Post-surgery
  - Monitor VA
  - Amblyopia treatment especially if unilateral
  - Monitor for glaucoma
    - Due to cataract?
    - Due to surgery technique?
    - Due to genetics?

Photo courtesy of Daniele Saltarelli, OD
Ectopia Lentis

- Due to disorders that disrupt the microfibrils of the zonules
  - Marfan’s Disorder
  - Homocystinuria
- Usually zonules remain attached, but can detach
- Signs:
  - Lens dislocation (dilated exam)
  - Reduced VA

Marfan’s Syndrome

- Mutations in gene for fibrillin-1 (FBN1)
- Systemic
  - Tall stature
  - Aortic root dilatation
  - Mitral valve prolapse
- Complications: cardiac
- Criteria:
  - Myopia >-3.00
  - Ectopia lentis (non-progressive)
  - Family history
  - (+) Genetic testing
- Treatment

Homocystinuria

- Disorder of methionine catabolism
- Autosomal recessive
- Systemic
  - Failure to thrive/ Developmental delays
  - Blood clots
- Ectopia lentis
  - Progressive
  - Broken zonules
  - Complications: pupil block glaucoma
- Test
  - Urine testing for homocysteine
- Treatment: Vitamin B6, diet changes
Ectopia Lentis

- Optometric Treatment
- Appropriate MD referral if no prior diagnosis
- Protective glasses for sports
- No contact sports if severe subluxation
- Accurate refraction
- Referral for surgery if poor VA due to subluxation

Summary

- Get the information you need
- Kids can have same problems as adults
- Sometimes eye findings indicate a systemic disease
- Thank You