Boost your Baby Brain: A Review on InfantSEE and Infant Eye Exams

1. What are we looking for?
    a. Is there a specific concern?
    b. Can the baby see well?
    c. Are the eyes straight?
    d. Are the eyes healthy?
    e. Is treatment necessary?

2. Brief review of main conditions to look for through the course of the exam

    a. Strabismus
        i. Esotropia
            1. Congenital
            2. Pseudo
                a. Review research study: Silbert AL, Matta NS, Silbert DI. Incidence of strabismus and amblyopia in preverbal children previously diagnosed with pseudoesotropia. *J AAPOS* 2012;16:118-119.
        ii. Exotropia
            1. Intermittent
                a. Review research study: Mohney BG, Cotter SA, Chandler DL, Holmes JM, Chen AM, Melia M, Donahue SP, Wallace DK, Kraker RT, Christian ML, Suh DW, on behalf of the Pediatric Eye Disease Investigator Group**.** A randomized trial comparing part-time patching with observation for intermittent exotropia in children 12 to 35 months of age. *Ophthalmology* 2015;122(8):1718-25.

                b. Review research study: Cotter SA, Mohney BG, Chandler DL, Holmes JM, Wallace DK, Melia BM, Wu R, Kraker RT, Superstein R, Crouch ER, Paysee EA, on behalf of the Pediatric Eye Disease Investigator Group. Three-year observation of children 12 to 35 months old with untreated intermittent exotropia. *Ophthalmic Physiol Opt* 2020;40:202-215.

    b. Amblyogenic refractive errors
        i. Isoametropia
        ii. Anisometropia
        iii. Review amblyogenic refractive error criteria for hyperopia, myopia and astigmatism

iv. Review how treatment and management for refractive errors may change if a patient has or is at risk for amblyopia

c. Ocular pathology

i. Review the more common as well as the more concerning anterior and posterior segment conditions found in the infant population

3. Tests to be done in the comprehensive eye examination

a. Visual acuity

i. Fix and follow
   1. Test monocular
   2. Determine if patient can maintain fixation in various gazes

ii. Teller/Keeler acuity cards
   1. Test binocular first, then attempt monocular
   2. Fan cards to blow air at patient's face to engage in the test

iii. 10Δ vertical prism test
   1. Test binocular
   2. Hold vertical prism over one eye while patient fixates an engaging target
   3. Can change orientation of prism (BU to BD or vice versa) or hold prism over the other eye to double check findings
   4. Determine if there is spontaneous alternation between both eyes or if patient has a fixation preference

iv. Resistance to occlusion
   1. See if patient becomes agitated/fussy if a particular eye is covered

b. Entrance Testing

i. Extraocular muscles
   1. Move engaging target in different positions of gaze
   2. "Dolls Head Reflex": Rotate patient's head side to side & up and down to see if eyes move in opposite direction of head movement

ii. Pupils

iii. Visual fields
   1. Test binocular
   2. Move target from non-seeing to seeing field

c. Binocularity Testing

i. Near point of convergence
   1. Determine if gross convergence is intact

ii. Hirschberg/Kappa

1. Objective assessment
2. 1 mm corneal reflex displacement ≈ 22 Δ
3. Direction of displacement determines type of strabismus
    a. Nasal = (+) = Exotropia
    b. Temporal = (-) = Esotropia
    c. Superior = (↑) = Hypotropia
    d. Inferior = (↓) = Hypertropia
4. *Hirschberg*
    a. Done under binocular conditions
    b. Ask patient to fixate a light; determine location of corneal reflexes in relation to center of pupils
    c. Grossly determines if strabismus is present and laterality, direction, and magnitude of strabismus
5. *Kappa*
    a. Done under monocular conditions
    b. Ask patient to fixate a light; determine location of corneal reflex in relation to center of pupil
    c. Corneal reflexes in non-strabismic eye will be the same under binocular and monocular conditions

iii. Brückner
1. Detects anisocoria, anisometropia, strabismus, media opacity
2. Simultaneously illuminate both eyes with direct ophthalmoscope
3. Whiter/brighter reflex = suspect eye

d. Refractive Error
- **i.** Dry + Wet Retinoscopy
- **ii.** Determine presence or absence of amblyogenic refractive errors
- **iii.** Lens bar vs loose lenses
- **iv.** Play favorite movie/song on distance screen or hand-held electronic device (have parent hold device at end of room)
- **v.** Simultaneously scope vertical meridians of both eyes to check for anisometropia

e. Anterior Segment
- **i.** Gross assessment of anterior segment w/ 20 D lens + Transilluminator

f. Intraocular Pressure
- **i.** Digital pressures
- **ii.** Tonopen, icare

g. Instilling Drops
- **i.** 2 gtts 1% Cyclopentolate + 1 gtt 1% Tropicamide

ii. If patient is lying in parent's lap, instill drops in eye closer to parent's body; After instillation, patient's reflex will be to turn towards parent, thus exposing the other eye
iii. If possible, have baby fall asleep while waiting for eyes to dilate
    1. Very easy and preferable to do posterior segment assessment and wet retinoscopy while infant is sleeping (simply hold open eyelids during testing)

h. Posterior Segment
i. Have baby drink from bottle or have toddler eat a snack to distract from testing
ii. Direct ophthalmoscopy
iii. Binocular indirect ophthalmoscopy

i. Treatment and management options
i. Refractive Error (Emmetropization)/Amblyopia
ii. Strabismus
iii. Ocular Pathology

j. Review clinical cases
i. Is a prescription indicated? What do we take into account when deciding whether or not to prescribe for an infant? Signs/symptoms? Emmetropization? Amblyopia? Strabismus?
ii. If prescribing, how do we decide how much to finalize? Prescribe full plus or cut the prescription?
iii. What is the recommended follow up schedule?
iv. Review research study: Kulp MT, Holmes JM, Dean TW, Suh DW, Kraker RT, Petersen DB, Cotter SA, Manny RE, Superstein R, Roberts TL, Avallone JM, Fishman DR, Erzurum SA, Leske DA, Christoff A, on behalf of the Pediatric Eye Disease Investigator Group. A randomized clinical trial of immediate versus delayed glasses for moderate hyperopia in 1- and 2-year-olds. *Ophthalmology* 2019;126(6):876-887.

k. Tips, tricks and clinical pearls for working with infants will be shared throughout the entire presentation.

l. InfantSEE
i. Public health program
ii. Practice management
iii. www.infantsee.org