Michelle Wong, OD  
Pediatric Optometry & Vision Therapy  
Southern College of Optometry

Abstract Title  
A tale of two turns: bilateral eccentric fixation in a pediatric patient

Abstract Text  
This case report outlines the unique presentation of a child with bilateral eccentric fixation in the absence of foveal pathology, discusses the use of electrodiagnostics in evaluating visual potential, and explores treatments for vision improvement.

I. Case History

- Patient demographics: 12yo African American female
- Chief complaint: distance blur OU since breaking glasses three months prior; improved with squinting, reducing working distance
- Ocular & medical history:
  - Herpes Simplex 1 infection (02/2005)
    - Presented to ophthalmology with a dendritic central ulcer OD and 1mm hypopyon. Oral and topic anti-viral treatment took place over the course of a month. Medical reports indicate constant eye closure OD x 1 month during course of infection.
    - Sequelae: corneal scar OD, irregular astigmatism OD, possible cause of chorioretinitis OU
  - Right esotropia (03/2005)
    - No history of patching, vision therapy, or ocular surgery
- Medications: topical cortisone for eczema
- Other salient information:
  - Seen at The Eye Center at Southern College of Optometry 2010-2011, lost to follow-up

II. Pertinent findings

- Clinical
  - Distance visual acuity without correction:
    OD: 20/356  
    OS: 20/50
  - Hirschberg:
    OD: corneal reflex displaced temporally, ~40 RET
    OS: corneal reflex displaced nasally, ~20 LXT
  - Cover test: no refixation by patient at distance or near with monocular occlusion
  - Visuosity:
    OD: inconsistent/unreliable responses
    OS: unsteady 2pd temporal EF
  - Refraction:
    OD:+3.75 -2.75 x 015  
    OS:-2.25 -2.50 x 155
Anterior segment:
OD: faint central stromal scar
OS: grossly normal findings

Posterior segment:
OD: Multiple small, focal, pigmented chorioretinal lesions scattered through midperipheral retina; no overlying vitritis
OS: 2 small, focal, pigmented chorioretinal lesions; one lesion located inferior to the macula and the other in the temporal peripheral retina, adjacent to a band of chorioretinal atrophy; no overlying vitritis

- Physical- N/A
- Laboratory studies- N/A
- Radiology studies- N/A
- Others
  - Follow-up (1 week):
    - Visual Evoked Potential (VEP) testing (Dr. Paul Harris)
      Interpretation: "No binocular summation. OD amplitudes lower than OS but OD is not consistently slower than the OS. The VEP does NOT explain the great variation in the VA's between the two eyes."

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- Optical Coherence Tomography (OCT)- macular scan
  OD: unable
  OS: Shallow foveal pit. All retinal layers intact centrally. Focal area of RPE disruption inferior to fovea, consistent with area of chorioretinal atrophy on fundus exam. Vitreous floaters.

III. Differential diagnosis
- OD:
  - Severe refractive amblyopia/sensory strabismus secondary to irregular astigmatism from corneal scar/HSV infection
  - Infantile ET/strabismicamblyopia
- OS:
  - Deprivation amblyopia secondary to resolved herpetic chorioretinitis
  - Mild refractive amblyopia
IV. Diagnosis and discussion

The first cases of bilateral eccentric fixation were presented by von Noorden in 1963. Since then, the incidence of bilateral eccentric fixation associated with amblyopia and strabismus has been reported as 10% (Hermann and Priestly, 1965; Malik et al, 1972). Hermann and Priestly hypothesized that bilateral eccentric fixation is a result of bifoveal instability, which prevents normal binocularity from developing and causes both eyes to have a minimal amount of amblyopia. They predicted that due to antagonism between the two eyes, strabismus or “unilateral” amblyopia may manifest in the presence of a “handicap.” Because of this foveal instability, they also report that the “normal eye” does not fixate centrally or steadily, and that 20/20 acuity is rarely reached. Other hypotheses that been proposed regarding the development of bilateral eccentric fixation include (Malik SRK et al, 1968):

- Subclinical organic macular lesion that depresses vision centrally, causing an adjacent retinal area with better resolution to be utilized for fixation
- Damage at higher levels in the visual pathway

Studies of pleoptic treatment for eccentric fixation have shown varied results, but have generally fallen out of favor.

This patient is unique due to the pattern of fixation being in opposite directions. In the cases presented by von Noorden, both eyes were convergent or divergent. Also, this patient’s history of asymmetric ocular herpetic infection further complicates the factors that may be contributing to her vision reduction. Ocular herpetic infections in the pediatric population may cause amblyopia due to corneal scarring and subsequent irregular astigmatism; infections during childhood are most detrimental since development of the visual pathway is still occurring. Because of the limited understanding of the basis of her vision loss and her visual potential, VEP testing was completed. The results of the VEP testing indicated the ability to resolve higher spatial frequencies than measured subjectively in her right eye, which is why further aggressive treatment is being pursued. This includes contact lenses to correct for irregular astigmatism secondary to corneal scarring and to reduce the aniseikonia produced from anisometropia. Occlusion and vision therapy are also being initiated in accordance with the current management recommendations for amblyopia.

V. Treatment, management

- Released prescription for full-time use.
- Discussed contact lenses due to irregular astigmatism OD and anisometropia/aniseikonia.
- Initiated patching OS 6hrs/day.
- Initiated vision therapy with the goals of improving fixation and acuity OU.
- Further testing considerations for future visits: evaluation of binocularity, anomalous retinal correspondence, updated topography.

VI. Conclusion

This patient is a diagnostic challenge due to the discontinuity of medical care and limited access to previous medical records. Although this patient presented with minimal visual complaints, further diagnostic testing was pursued due to the limited understanding of the factors contributing to her reduced vision and the uncertainty of her visual potential. As
with any amblyopic patient, the goal of acuity improvement centers on considerations of the patient’s future – from minimizing the impact of vision loss in the better seeing eye to increasing occupational opportunities for the patient. Based on the VEP results indicating higher visual potential than measured and OCT imaging ruling out obvious macular pathology that may limit visual potential, aggressive treatment with contact lenses, patching, and vision therapy are being sought out to improve fixation, acuity, and the overall quality of life of this young patient.

Bibliography


Available images:

- Corneal topography OD (08/2010)
- External photos OU (08/2016)
- Posterior segment photos OU (08/2016)
- Macular OCT OS (08/2016)
- Visual Evoked Potentials OU (08/2016)