Title: Vision therapy improves reading and oculomotor skills for 7-year-old boy after bilateral congenital cataract removal

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Abstract

Vision therapy improves oculomotor skills and binocular functioning in a 7-year-old patient with reading difficulties after bilateral congenital cataract removal.

I. Case History

- Patient demographics: 7-year-old Hispanic Male born with bilateral congenital cataracts presents to the SUNY University Eye Center (UEC).
- Chief complaint: Mother reports her son has difficulty reading and has frequent number and letter reversals. He is repeating the 1st grade due to academic delays.
  - Patient currently has bilateral PCIOLs and FT-35 bifocals for full-time wear.
- Ocular, medical history
  - In 2007, family pediatrician referred mother and 1-month-old son to the UEC due to lack of red pupillary reflex upon examination. Mother reports that the patient did not track faces or movement.
  - At age three months he underwent bilateral cataract extraction. High plus contact lenses were prescribed shortly after.
  - In 2012, bilateral PCIOL’s were implanted and the patient discontinued contact lens use.
  - In 2013, the right eye PCIOL subluxated secondary to trauma and was surgically repaired.
    - This was the first instance when constant right esotropia with diplopia was documented and a vision therapy evaluation was recommended.
  - In 2014, vision therapy evaluation found severe oculomotor dysfunction as well as constant right esotropia. Vision therapy was recommended to improve visual acuity, eye alignment, and eye movement skills.
  - No other significant medical history and normal birth history.
- Medications: None
- Other salient information: Mother and brother were both born with bilateral congenital cataracts

II. Pertinent findings

- Clinical (from vision therapy evaluations):
  - Post-surgical distance BCVA without correction: 20/60 OD+OS
  - Distance BCVA with PCIOLs and bifocal rx: 20/30 OD+OS
Near BCVA with PCIOLs and bifocal rx: 20/30 OD+OS

Distance cover test: 8PD CRET

Near cover test: 14 EP

OU pursuits: unstable, jerky eye movements

OU saccades: undershoot in all gazes

DEM: <1 percentile for age in horizontal, error, and ratio scores indicating severe oculomotor dysfunction

Right eye suppression during vergence testing

No stereopsis: (-)RDS, (-)Wirt circles

No eccentric fixation was noted

- Physical: N/A
- Laboratory studies: N/A
- Radiology studies: N/A
- Others

III. Differential diagnosis
- Primary/leading: Bilateral pseudophakia and oculomotor dysfunction
- Others: N/A

IV. Diagnosis and discussion
- Elaborate on the condition: Congenital cataracts are opacities of the crystalline lens at birth. Most are idiopathic while others can be hereditary (autosomal dominant) or from other conditions such as Rubella. Common symptoms are leukocoria, absent red pupillary reflex, nystagmus, and strabismus. Patients with bilateral cataracts may be visually inattentive.
  - Once removed, patients are typically placed on high plus contact lenses. PCIOLs are contraindicated early on due to the development and change in the eye as the baby grows. Once the PCIOLs are placed at an appropriate age, the patient can be given a spectacle prescription if needed, including bifocal or progressive lenses.
  - Oculomotor dysfunction is a condition in which the eyes have difficulties making smooth pursuit movements while following targets and also difficulties in making accurate saccadic eye movements from object to object. This can highly impact a patient’s ability to read and succeed in school.
  - Esotropia is a condition where one of the eyes turns inward
    - The patient has a form of sensory deprivation esotropia secondary to bilateral congenital cataracts. The prevalence of strabismus in patients with congenital cataracts is 24-84%. Hiles and Sheridan reported that early cataract surgery and optical rehabilitation did not appear to protect these children against strabismus. Furthermore, it was also reported that nystagmus and strabismus were observed in a large majority of patients.
- Expound on unique features: N/A
V. Treatment, management

- Treatment and response to treatment
  - Vision therapy has been shown to improve visual acuity in patients with pseudophakic amblyopia. Therapy programs should be designed to use a wide variety techniques and require active participation.
  - The patient had 24 sessions of vision therapy to improve oculomotor skills as well as binocularity. Upon retesting of the DEM after 17 sessions, oculomotor skills improved to the 80th percentile in horizontal score, 99th percentile in error score, and 65th percentile in ratio score, indicating a large improvement in oculomotor skills. As of the most recent vision therapy session, the mother reports the patient is doing much better in reading and is doing well in a normal classroom setting at school. Although the patient still has constant right esotropia at distance and no stereopsis, visual acuity is stabilized at 20/30 each eye.
  - The most important determinants of good long-term visual outcomes after IOL implantation are laterality, cataract type, age at the initial cataract extraction, compliance with amblyopia therapy, and refractive error. After the surgery, refractive prescription and therapy treatment are the only variables able to be manipulated.

- Refer to research where appropriate
- Bibliography, literature review encouraged

VI. Conclusion

- Clinical pearls, take away points if indicated
  - Early intervention for congenital cataracts is important to prevent pseudophakic amblyopia. With the appropriate optical correction,
vision therapy should be utilized to improve visual skills in young patients, especially those who are performing poorly in school.