Neuro- Optometric Vision Rehabilitation Management of Acquired Strabismus and Nystagmus Secondary to Arterial Venous Malformation

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Abstract:
This is a presentation of a 30 year old female who has experienced visual symptoms associated with a constant alternating exotropia and nystagmus secondary to intraoperative trauma secondary to an arterial venous malformation.

I. Case History

• 27 year old white female
• Chief Complaint:
  o severe balance issues and disequilibrium, gait instability, increasing in severity
  o exacerbated with eye movements, visual stimuli and peripheral movement of objects
  o double vision: awareness 20% of the time
  o everything in the world seems to be shaking all of the time
  o cannot focus on TV because there is too much stimuli
  o cannot read; too much visual stimuli and it becomes too confusing
  o progressively gotten worse over several years
• Medical History:
  o TBI/ABI ; Arterial venous malformation, age 17 with surgery; significant removal of left cerebellum
  o complications led to 3 craniotomies, right temporal shunt, 2 lumbar shunts
  o 5 months of in-patient rehab; 3 months of out-patient rehab
  o 2007: hydrocephalus with shunt
  o 2009: patient experienced gait disturbances that led to 8 falls, 3-4 of them were associated with head trauma; ocular manifestations became unbearable at this time
II. Pertinent Findings:

- DTC: 10-15^ CAXT; unstable and difficult to assess due to nystagmus; OD fixation preference >50% of the time
- NCT: CAXT; varying degrees; unstable and difficult to assess due to nystagmus; OD fixation preference >50% of the time
- 4^LHT
- Oculomotor Dysfunction:
  - Fixation (10 sec) left beat nystagmus OS>>OD (D &N)
  - Pursuits/EOMs: upbeat nystagmus increased in frequency and amplitude in all positions of gaze
- King Devick:
  - 1: 29 sec (2 additions)
  - 2: 29.15
  - 3: 40.34
  - Subjective difficulty c test, lines appeared curved
- Stereopsis: (-)RDS or Wirt Circles
- Accommodation:
  - MEM: +1.25 --> +1.75 LAG
  - Trial Frame: +1.25 --> clear NVA
- Refraction: over-refraction over contact lenses prescribed by an outside doctor
  - OD: -0.25 DS
  - OS: -0.25 DS
- Contact lenses:
  - OD: -3.00 sphere
  - OS: -3.00 sphere

III. Differential Diagnosis

- Primary:
  - CAXT (congenital vs acquired)
  - Nystagmus (congenital vs acquired)
  - Oscillopsia secondary to impaired cerebellum and subsequent nystagmus vs loss of VOR
- Others:
  - Pseudoexotropia
  - CNIII palsy
IV. Diagnosis and Discussion

1. Constant Alternating Exotropia 2\(^\wedge\) to surgical management of Arterial Venous Malformation and subsequent falls with associated head trauma
   - diplopia 2\(^\wedge\) exotropia
2. Nystagmus 2\(^\wedge\) cerebellar AVM and subsequent surgery
   - oscillopsia 2\(^\wedge\) nystagmus
   - patient educated on neuro-optometric rehabilitation
3. Oculomotor Dysfunction
   - 2\(^\wedge\) diplopia and oscillopsia

Arterial Venous Malformations are tangles of blood vessels, most commonly located in the central nervous system that bypass normal tissue and diverts the blood directly from the arteries to the veins. Patients with AVM’s can suffer from hemorrhages in their brain, seizures, pain, and difficulty with movement including that associated with speech and vision. An AVM can affect many different parts of the brain and spinal cord, but when it affects the cerebellum, the result is usually disruptive gait and balance, as well as the loss of other coordinated muscle movements, including eye movement. The constant alternating exotropia, upbeat nystagmus and associated oscillopsia in this case are associated with the AVM’s proximity to the anterior vermis of the cerebellum and subsequent surgery to remove the AVM. The falls that the patient experienced undoubtedly worsened her condition and exacerbated pre-existing visual symptoms.

V. Treatment and Management

- Neuro-optometric Rehabilitation Therapy
- trial 10 sessions: guarded Prognosis
- Goal of increasing binocular and oculomotor status and eliminating oscillopsia and dampening nystagmus

VI. Conclusion

Using a “top-down” approach to therapy, this patient learned how to move her eyes and head effectively in order to maintain single clear vision. She also learned how to incorporate the techniques she has learned into her everyday life in order to carry out activities of daily living. After many sessions over the course of two years of weekly in office Neuro-optometric vision therapy and rehabilitation, the nystagmus has been significantly dampened in primary gaze, eliminating the oscillopsia, and sustaining adequate oculomotor function allowing the patient to read efficiently for extended periods of time and function comfortably in society. She sustains a field of view of approximately 25-30 degrees in which she achieves fusion. Beyond that, she uses a very specific technique of using her nose to correctly orient her head and direct her eyes into the field of vision in which she achieves fusion. She is currently in the process of applying to college to pursue a degree in Social Work.

