Visual Impairments and the Effect on Development
Presented by Lisa Auwarter

Agenda

Overview of visual impairments – ROP, ONH, SOD, Muscle Imbalance, Optic Atrophy

DBVI services

Overview of Cortical Visual Impairments

The Effects on Infant Development

The Human Eye
Visual Acuity: how clearly we see things

Low Vision: 20/70-20/200 in best eye with best correction
Legally Blind: 20/200 or worse in best eye with correction
What is myopia?

Normal vision

Myopia or near sightedness

Hyperopia or far sightedness

Astigmatism
The Disease Process in Retinopathy of Prematurity

- Retina has not yet vascularized
- Growth stops for a while
- Then oxygen can cause them to grow wildly, tangle and grow into vitreous, not to edges
- Vessels hemorrhage, scar tissue forms and vitreous contracts, damaging retina and causing detachments

Stages of ROP

- **Stages 0-5**
  - 0-3 – may need glasses
  - 3, 3+, 4 – low vision
  - 5 – total detachment

ZONES
Other Disabilities and ROP

- Brain damage
- Cerebral Palsy
- Seizures
- Hearing Loss
- Learning disabilities
- Cortical/Cerebral
- Visual Impairment
- Sensory Issues

Nystagmus

- Can be neurological (damage to the brain) or due to other vision impairment (i.e., albinism, high myopia)
- Vertical, horizontal or rotary
- Slightly blurs vision, central vision decreased so holds objects closer
- May turn head slightly to use null point
- Increases with fatigue, stress, excitement
- May decrease with age

Have you worked with a child with nystagmus? Tell Us!
Random or Roving Eye Movements

- Sign of poor acuity; takes good acuity to fixate
- As if eyes are trying to find a target, but can’t quite focus on it well

The Optic Nerve

- Damaged optic nerve (hydrocephalus or IVH)

Optic Nerve Atrophy (ONA)

- Loss of blood supply to optic nerve with gradual vision loss
- Optic disc is pale
- Change in visual acuity and peripheral field may occur before change in the disc is evident;
- Degenerative condition following normal function
- Not normally diagnosed in infancy
Optic Nerve Hypoplasia (ONH)

- Small optic nerves with normal size blood vessels
- Varying degrees of visual acuity and field losses
- Associated with CNS anomalies – agenesis of corpus callosum (failure of two halves of brain to connect) – endocrine disorders
- Incidence increasing, used to be thought that it was a result of drugs, alcohol, tobacco use of mother before birth while pregnant but no longer true – could be environmental through the first trimester

Septo Optic Dysplasia

- A congenital malformation syndrome manifested by:
  - hypoplasia (underdevelopment) of the optic nerve
  - hypopituitarism
  - absence of the septum pellucidum (a midline part of the brain)
- In a severe case, this results in pituitary hormone deficiencies, blindness, and intellectual disability
- There are milder degrees of each of the three problems, and some children only have one or two of the three

Simulations

- Try each station’s activities with the simulators
### Delayed Visual Maturation

<table>
<thead>
<tr>
<th>Type I</th>
<th>Type II</th>
<th>Type III</th>
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<td>• by 3-6 months, child has a rapid improvement of vision to normal or near-normal levels.</td>
<td>• vision usually improves, but takes longer and there may be continued loss of vision.</td>
<td>• associated with other ocular disorders such as albinism, cataracts or aniridia; vision worse than expected mean age of recovery at 20 weeks; onset of nystagmus precedes recovery by 8 months; also depends on visual abilities and other characteristics of the child.</td>
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### Eye Muscle Imbalances

- or -

**Oculomotor Problems**

### Oculomotor problems?
What can I do?
Cortical Visual Impairment

What is Cortical Visual Impairment (CVI)?

Cortical Visual Impairment (CVI) is a temporary or permanent visual impairment caused by the disturbance of the posterior visual pathways and/or the occipital lobes of the brain. The degree of vision impairment can range from severe visual impairment to total blindness. The degree of neurological damage and visual impairment depends upon the time of onset, as well as the location and intensity of the insult. It is a condition that indicates that the visual systems of the brain do not consistently understand or interpret what the eyes see. The presence of CVI is not an indicator of the child’s cognitive ability.
Identification and Diagnosis

- Normal eye exam or eye condition that would not explain level of functioning
- Medical history that includes neurological problems
- Presence of unique visual and behavioral characteristics

Possible Causes

- Asphyxia and perinatal hypoxic-ischemic encephalopathy
- IVH (preemies are high risk) – bleeding into the ventricles
- PVL (periventricular leukomalacia)
- Cerebral Vascular Accident/Cerebral Artery Infarction (brain bleed)
- Infection (TORCH – toxo, rubella, cmv, herpes)
- Structural abnormalities(spina bifida, Dandy Walker, microcephaly, lissencephaly)
- Acquired CVI – TBI, acquired hypoxia, accidents

Unique Characteristics

- Visual latency
- Light gazing or nonpurposeful gaze
- Difficulty with distance and visual novelty
- Color preferences
- Attraction to movement
- Toy/object on solid background vs. patterned background
• Difficulty with visual and environmental complexity
– pairing senses, movements, display

What do you see?

See it now?
When a child with CVI needs to control his head, use his vision, and perform fine motor tasks, the effort can be compared to a neurologically intact adult learning to knit while walking a tightrope.

Why is it important to work as a team with children with cortical visual impairments in particular?
Hi Max!!

Sensory Development

- Hearing is the only distance sense available
- Input is inconsistent, discrete and unverified.
- Purposeful exploration is minimal – ear/hand required

At what age does EAR/HAND coordination develop?

- a) 3 months
- b) 6 months
- c) 12 months
- d) 2 years
At which age does eye/hand coordination develop?

a) 3 months  
b) 6 months  
c) 12 months  
d) 2 years

Motor Development

- Object Permanence delayed by up to 1 yr.
- Causal Relationship
- Constancy – position in space
- Classification – similarities
- Conservation – weight, volume, etc.
Social/Emotional Impact

• Fear – Isolation
• Lack of opportunity
• Safety
• Dependence

Impact on Language

Blind children need planned, systematic instruction

Language (con’t)

• REAL, CONCRETE INDEPENDENT EXPERIENCES
• Alternate structured play environment with down time – quiet is ok, stim is ok, choice is ok
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