Cortical Visual Impairment

Cortical visual impairment (CVI) is a complex and heterogeneous condition in which the eyes and optic nerves appear healthy; yet, the patient does not have normal vision or normal visual perception. Indeed, as the name implies, CVI is not an eye condition but rather a brain condition. Previously, many eye doctors referred to such patients as "cortically blind" but it is now generally believed that many of these patients have useable, albeit abnormal, vision.

CVI results from a number of conditions that affect the brain and particularly the surface of the brain called the cortex. Intracranial bleeding, head trauma, birth defects, strokes, and seizures, among others can result in CVI. Typically diagnosed during infancy, CVI is also associated with prematurely or more accurately complications due to prematurely such as intracranial bleeding. Typical visual behaviors of an infant or child with CVI include:

- Momentary fixation - the child will look (fixate) on things only briefly, say about a second or less
- Variable vision - the child with CVI will seem to "see" at certain times and not at other times
- Selective attention - the child may look at some things that may be rather hard to see (e.g., small toy) but act unaware with very salient objects (e.g., faces)
- Avoidance - Some children with CVI will actively avoid (e.g., look away from) salient visual objects
- Prefer certain colors - Some children with CVI will attend to colored objects (e.g., yellow) but ignore black-white objects
- Moving objects - Some children with CVI will track or watch an object when it is moving (e.g., a small ball rolling across the floor) but ignore or exhibit "blind" behavior (using hands to locate a nearby object) to the same object when it is stationary
- Act blind but respond to objects - Some children with CVI will act as though they-re not able to see or identify an object but, at the same time, are able to locate and grab or actively avoid the object.
- Hemianopsia - Some children with CVI will be missing parts of their visual field and may prefer to fixate on objects by looking to the left or right of the object.

It helps to understand CVI in the context of brain centers for vision and vision information processing. Current research suggests that there are a lot of specialized cortical sites for vision; currently about 32 sites have been identified. Each of these cortical sites process a certain aspect of vision; for example, color, movement, object identification, object localization in 3D space, categorization, etc. There are also two main visual pathways known as the "What" and "Where" pathways in the brain. The What pathway is important for object identification and the Where pathway is important for object movement and localization in 3D space. As a consequence, all children with CVI are different; the visual problems that each child has may be dependent on the site or sites of damage.

For example, we recently saw a child that could run after a small ball rolling along the floor. Once the ball stopped moving, however, the child knelt-down in the general vicinity of the ball.
and reached-out with his hands and started to "pat" the floor until he located the ball. In this case the child could "see" the ball when it was moving but could not see the ball when it was stationary. The child's unusual visual behavior makes sense once one thinks about the different brain centers and pathways for vision. Apparently, the child's Where pathway was intact such that he could actively follow and see the ball while it was moving, however, once the ball stopped the child could no longer see the ball to localize it.

Because all children with CVI are different, no single rehabilitation technique or approach will work for all children. The most important thing is to find-out what the child can respond to and to tailor the rehabilitation to meet the child's needs. Here it is very important for parents to keep a list of what the child does and does not respond to. Share the list with the doctors and rehabilitation specialists.

Children with CVI may show significant improvement in vision with age. Other children with CVI may not be detected until they are older and even in school. The latter is particularly evident with children with perceptual problems - they may see 20/20 but they may not be able to use the visual information for particular tasks like categorizing objects (e.g., animal vs object). Also, in general, some of the best rehabilitation personnel are other children of the same age or slightly older age. Other children can stimulate, play with, tease and force the child with CVI to maximize his/her residual vision. The last thing a parent should do is be overprotective of the child - it will do more harm than good (within reason and when considering other medical conditions).