

FUNCTIONAL VISUAL FIELDS AND DURAL TORQUE

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Abstract:

This article discusses the measurement of a functional visual field, signs and symptoms of restricted fields, the physiological blind spot and the re-positioning found with some individuals who have had a closed head injury. Dural torque is a condition that occurs when the plotted physiological blind spot is shifted from the normal expected position. Signs and symptoms of dural torque are also discussed

Key words:

threshold field, functional visual field, physiological blind spot, dural torque, edema, visual processing

What is meant by a functional visual field?

The functional visual field is a measure of the usable area that an individual can process fixating a central target, while a mobile (or kinetic) target is moved in from the periphery from invisible to visible.

The threshold field is a measure of the ability of the eyes to react to a light flashed in the periphery. These fields relate to the absolute threshold of the eyes' ability to see and is therefore useful in determining pathology such as glaucoma, tumors, cerebral vascular accidents, etc.

Just as there are different types of visual fields, there are different ways to determine the functional visual fields.

Ways to determine the functional visual field are as follows:

1. Campimetry measures the functional visual field as the patient fixates a central target, through plus lenses for a working distance of eight inches, and reports when the 5mm white target first appears to be white in the eight principal meridians. This is the size of the patient's functional visual field.
2. Frequency doubling technology [FDT] is a new technique that has been designed for rapid and effective detection of

visual field loss. The results of PDT closely mirrors the results found by campimetry as reported by Dr. Larry Wallace and Dr John Searfoss at the 1999 Conference of Syntonic Optometry.

3. Tangent screen testing at a one or two-meter testing distance measures the functional visual fields similar to the campimeter, except that the results are transposed onto a recording sheet.
4. Arc-perimeter as recommended by Dr. Charles MacQuarrie. Similar to the campimeter, except that there is an arc with an 18 inch fixation distance, and form targets are brought in from the periphery until they can be correctly identified in the eight principal meridians. This form field corresponds closely to the functional fields found by campimetry.
5. Other instruments one could use to evaluate the functional visual fields are: the B&L autoplott and the Goldman perimeter.
6. Confrontation testing: comparing the field of the patient with that of the practitioner using a pencil or "finger" as a target. This is a quick inexpensive technique ideal for screening children for functional field restrictions. Also accomplished by waving your whole hand in from the side to determine the patient's form field, then holding up a certain number of fingers and coming in until the patient can correctly identify the correct number of fingers being held up. This is the size of the patient's functional reading field.

7. Suppression field: Using a Brock string to determine the eye movement field in which binocular vision is present. This appears to approximate the same area as the confrontation field. This test also indicates the near point to which binocular vision is present. The greater the distance from the nose, the more restricted the field.
8. Simple clipboard chart in white or black with opposite colored target. Quick inexpensive technique ideal for screening children for functional field restrictions.
9. Alpha Omega Pupil: The quicker the return to dilation following constriction when a light is shone on and maintained on the pupil, the greater the likelihood of smaller fields (sympathetic nervous system overload adrenal exhaustion). A lack of constriction can indicate a blind eye or one with an extremely small field, less than three degrees.
10. Form field testing: Using MacDonald's or a similar form field chart, measures the amount of information that the patient can process simultaneously.
11. Color fields (blue, red, green): A dynamic field measuring technique that gives more information on the brain's abilities to process visual information. Can relate to health and functional problems.
12. Observation of parent: To get an idea of how a restricted field affects an individual, ask the parent to stand about 10 feet away. Ask the child to look at the parent's nose and observe how much of their parent they can observe, e.g., can you see all of the head, neck, shoulders, waist, etc.
13. Automated Campimetry by OIC Systems is currently in a beta development This will yield a percentage of function of each of the three types of visual field processing and the amount of enlargement of the blind spot

Because these tests measure different aspects of vision, they will give different results. However, an understanding of these different methods gives the practitioner useful information on how visual information is being processed.

"In this study, an instrument called the campimeter was used to evaluate the functional use of the peripheral visual fields and the physiological normal blind spots.

It is recommended that a 5mm white target with a solid black ring surrounding the white circle be used as the target for the following three levels. The target is brought in from the periphery from invisible to visible.

The first level of testing is the AVAILABLE level of visual processing. This is the amount of potential information that can be processed from the retina to the brain. Available visual processing is like a neurological hookup or the number of connections to the brain. Just because the retina is "wired up" a person cannot necessarily utilize, process or understand information that is seen.

The second level of processing is the AWARENESS level. This is the awareness of the black ring around the white dot. The test measures the amount of visual information a person normally uses day to day for non-demanding tasks. (This is the space around you that you use while walking.)

The third level of testing is the ACTIVATION level. This measures the ability to see the complete solid black ring around the whole white target. This is the degree to which the patient is processing absolute information and understanding that information. This is the demand level that reading, comprehension and detailed understanding is using.

SIGNS AND SYMPTOMS OF RESTRICTED FUNCTIONAL FIELDS

1. Reduced or variable VA's (20/25 to 20/40)
2. Large pupil
3. "Vacant appearance"
4. Poor constriction of pupil at near
5. Intelligent person not achieving to potential for no apparent reason
6. Normal light response of pupil but cannot maintain constriction while light still on eye (Alpha Omega Pupil)
7. Variable refraction particularly low minus (even + 1.00 fog balance technique may be variable)
8. VA can improve briefly by "relaxation breathing" - can sometimes improve 2 or 3 lines
9. Accommodation can be very low which can improve dramatically with 2 base down yoked prism
10. Symptoms can be vague - difficulty seeing, no particular distance, it can be distance, near or intermediate
- II. Reading near letter chart difficult down to 20/30 or 20/40 and patient not aware that this is a problem. Reading aids do not make much difference. However, low plus or yoked prism can make a substantial improvement
12. Poor accommodative facility; a use of flippers may not do anything to improve the situation
13. Pursuit tracking may prove difficult without exhibiting head and/or body movements, jerky eye movements and loss of fixation
14. Saccadic eye movement assessment with Wolff wands may prove difficult
15. Convergence can be low
16. Confrontation testing using a hand and fingers reveals a very small field
17. Emotional stress may be a major factor; shutting the world out to protect oneself
18. Two holes in space surrounded by a dark field can be demonstrated by holding a one and one half inch diameter tube of about five inches in length in front of each eye. This happens frequently when the functional visual fields are 20 degrees in diameter or less.
19. Difficulty identifying the numbers of the Ishihara Color tests when fields are very small

Some studies show that up to 40%» of the individuals

diagnosed with some sort of specific learning difficulty exhibited restricted functional fields.

Brombach, as far back as the 30's was finding that 9% of the general school age population had a constriction of the visual field, of which 87% were failing one or more subjects.

How can we remedy the effects of functional field loss?

1. Low plus and/or yoked prisms
2. Vision therapy
3. Syntonic phototherapy
4. The use of chiropractic, osteopathy or kinesiology to expand fields and to normalize the physiological blind spots

The Physiological Normal Blind Spot and Dural Torque:

To measure the physiological normal blind spot, a 1mm white target was used to plot from visible to invisible, then plot the blind spot from invisible to visible. The resulting blind spot tells us if we have a normal blind spot, dural torque, enlarged blind spot, or a constricted blind spot

Dural torque is a condition where the plotted blind spot is shifted from the normal expected position, either nasally, temporally, superiorly or inferiorly. The outer covering of the spinal column, brain stem, brain and optic nerve is referred to as the dura mater. Dural torque is normally associated with the pulling of the dura mater. This change is represented by an actual shift of the physical position of the blind spot. This position should be anatomically stable in the eye. Under circumstances of trauma, there is often a misalignment of the skull, atlas, and axis junction plus misalignment of cranial bones junctions, which is often associated with a malposition of the spine, which in turn causes a pulling on the dura mater. This results in a shifting of the plotted blind spot. Another explanation is the finding of muscles from the wings of the atlas vertebra and attaching to the dura mater above the atlas. An appropriate referral is in order to a chiropractor or osteopath who has received advanced postgraduate work in the field of National Upper Cervical Chiropractic Association (NUCCA) or craniopathy. The plotting of the anatomical position of the blind spot will indicate when the appropriate adjustments and proper cranial functions are again in balance.

The authors, who have been involved for many years using syntonic phototherapy and having measured functional visual fields as described above on many patients, became aware that there appeared to be a misplacement of the physiological blind spot in a number of cases. Association with chiropractors with NUCCA and craniopathy training indicated that the problem was due to dural torque and could be rectified with NUCCA adjustments and/or cranial manipulations.

Some common signs of possible dural torque or the skull, atlas, and axis being out of alignment are:

1. Unequal pupil size
2. Unequal palpebral fissure size

3. One eye looks higher than the other.
4. Unequal shoulder height
5. Unequal hip height
6. Leg length unequal
7. High breathing center

Note 1. An enlarged blind spot is often found in individuals with learning problems, and it has been suggested that this is due to edema in the optic nerve head. During syntonic phototherapy, as this edema reduces, the blind spot reverts to normal.

Note 2. Some individuals may have functional fields so small that blind spot evaluation is not possible until some therapy has been experienced. Frequently both constricted fields and dural torque are found in the same individual.

Reduced visual fields and Dural Torque are a major source of difficulties with individuals with learning difficulties and/or head trauma, or scoliosis of the spine.

Some types of Chiropractic care or craniopathies that may be beneficial in remediating the dural torque are:

1. NUCCA is the National Upper Cervical Chiropractic Association. To locate a NUCCA practitioner, contact: NUCCA, 217 West Second Street, Monroe, Michigan 48161 or 121 W. Locust St., Suite 208, Davenport, Iowa 52803, phone 319-322-7486
2. Toftness as developed by Dr. IN. Toftness
To locate a Toftness practitioner, contact: Toftness Post-Graduate School of Chiropractic, mc at 1-715-268-7500.
3. SOT = Sacral Occipital Technique.
 - NCR = Neuro-Cranial Restructuring as refined by Dr. Dean Howell of Everett, Washington. 1-800-670-6380.
 - NOT = Neural Organization Technique developed by chiropractor, Dr. Carl Ferreri.
 - CST = Cranial Sacral Therapy developed by Dr. William Sutherland; Dr. John Upledger is the leading authority on CST.
 - Chiropractic Biophysics Practitioners Referral List 1-256-721-0703.

Sample campimetry chartings of patients with dural torque:

Patient 1. See fig. 1. Charting of a 20-year-old female who had received a whiplash when her car was rear-ended by another car. Figure 2 is a charting one week after NUCCA therapy. This patient had received 20 sessions of neuro-optometric rehabilitation therapy, including syntonics, before the NUCCA therapy.