

# Article

## Issues Concerning the Evaluation of the Closed Head Injury Patient

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### CASE HISTORY

To ensure the most efficient use of examination time, past records should be requested before seeing the patient. A case history form is completed at the time of the examination either by the patient or with assistance.

### ENTRANCE SKILLS

The patient is seated before a rotary examination table, and various instruments are moved before him. Note, the diagnostic evaluation can run the full gamut or may be limited to a minimum of tests depending upon the patient's capability and visual status. The tests listed below are those most often run on this population.

- [1] autorefraction
- [2] autokeratometry
- [3] color vision
- [4] evaluation of first and second degree fusion
- [5] stereopsis
- [6] tonometry
- [7] full field visual field screening (Digilab 750 autoperimeter)

### EXAMINATION

The patient is then seated in the examination room, either in the standard evaluation chair or in their wheel chair, when necessary.

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### CASE HISTORY

The case history is then reviewed with specific emphasis on the areas listed below. Again, this is not meant to be a complete list, but rather a sampling of the kind of information that might be useful.

- [1] date of injury
- [2] how injury occurred
- [3] sequence of events following the injury
- [4] type of ongoing care (i.e., other professionals involved)
- [5] frequency of visits with other professionals
- [6] if necessary, who assists the patient with daily needs
- [7] physical difficulties encountered
- [8] cognitive difficulties (i.e., memory)
- [9] auditory, language, or reading difficulties experienced
- [10] writing or other visual motor difficulties
- [11] stability of the condition, prognosis for change
- [12] improvements noticed, time frame
- [13] family structure of patient and family support system
- [14] patient's occupation or hobbies
- [15] best posture for the patient during testing
- [16] augmentative devices used (e.g., communicative devices)
- [17] how visual performance is affected by:
  - [a] clarity of sight (far or near)
  - [b] field restrictions
  - [c] double vision
  - [d] loss of place during reading

[e] poor ability to sustain attention (far/near)

[18] medications taken

[19] anything that should be avoided during the examination

[20] what patient thinks is visually restricting them from achieving more (patient's perception of visual restrictions to achievement)

During this questioning, the patient's emotional attitude is assessed informally.

## EXTERNAL EXAMINATION

Pupils, corneas, lids, anterior chamber, lens, etc., are checked through a slit lamp exam; and keratometry, checked manually.

## INTERNAL OCULAR HEALTH

Dilated fundus evaluation is typically utilized for this diagnostic assessment.

## VISUAL FIELDS

Confrontation fields (when required).

## VISUAL ACUITY

Sight levels are measured under monocular and binocular conditions at various working distances utilizing response to letters, numbers, pictures, matching of symbols, pointing, dot discrimination, preferential looking at grating and other stimuli, and spatial sweep vision evoked potentials.

## OCULAR MOTILITY

Pursuit tracking skills are evaluated monocularly and binocularly to light, picture and/or letter targets. No head movement is requested but tracking with and without head movement is compared. Fixation and saccadic eye movement skills are evaluated using two separate lights or cognitive targets. These targets are positioned a few inches apart in horizontal and diagonal orientations. Fixation with stabilized head movement (when required) and habitual head movement is compared.

## REFRACTIVE EVALUATION

Retinoscopy and a subjective refraction are done at far and near. The phoropter and/or a

trial frame are utilized for this analysis. Acuties are retested with these lenses.

## BINOCULAR FUNCTION

[1] Cover tests are administered (cover/uncover and alternating) at far and near and at various fields of gaze.

[2] Version movements are evaluated in all fields of gaze for an analysis of concomitancy, and these observations are compared to ocular motilities.

[3] Anaglyphic (red/green) glasses are utilized with a penlight target to evaluate suppression, diplopia and/or fusional fields at far, near and all fields of gaze.

[4] A Risley prism is used to assess fusional ranges outside the phoropter.

[5] Near point of convergence is evaluated using an accommodative target and the tip of a pointer. The patient is asked to touch the pointer tip with his finger or another pointer to further stimulate the convergence response through proprioceptive feedback.

[6] As much of the OEP 21pt examination is completed as possible.

[7] If accommodation cannot be assessed subjectively, near point retinoscopy is utilized instead (i.e., MEM).

Upon completion of the initial evaluation, additional tests may be ordered for further diagnostic assessment:

[1] cycloplegic evaluation

[2] vision evoked response

[3] contract sensitivity analysis

[4] threshold visual fields

[5] electro-oculographic recordings of eye movements

[6] strabismus evaluation

[7] standardized fixation and/or tracking tests

[8] response to prisms in relation to field enhancement and/or postural issues

[9] visual perceptual evaluation in relation to the potential for cognitive rehabilitation

[10] low vision evaluation

[11] tests of visual motion sensitivity

## Visual Field Testing

Ideally, the patient is able to respond to automated perimetry testing. This is ideal be-

cause the printout serves as very credible evidence of a field deficit.

Confrontation testing can be made more standardized by using a portable arc perimeter. Here, the smallest target that can be detected from the periphery can be used while the patient maintains fixation with the tester's eye. The field can then be quantified in degrees.

The Tangent Screen or Goldman Perimeter presentation are other useful alternatives for patients who need to be coached through the test, and also results in quantifiable field measurement.

### **Field Neglect**

Patients with or without homonymous hemianopic field loss may show hemiattention or neglect of the left or right half of the visual field. A number of tests have been developed to measure the severity of the neglect.

Common examples are the line bisection test, trail paths, cancel e's, Acuvision Test, or the Wayne Saccadic Fixation Board. The line bisection test is standardized if presented according to the original research design. The Acuvision can measure the number of accurate responses and the time taken. A printout of responses is also optional. Cancel e's can be rated according to the percentage of e's crossed out versus the total. It is appropriate to test the patient with a number of tests to grade the severity of the neglect.

### **Oculomotor**

Screening for voluntary fixations and tracking can be done using tongue depressors with and without cognitive demand.

Standardized tests are: The Developmental Eye Movement Test, King-Devick Saccadic Fixation Test, and Groffman Visual Tracing Test. The OBER eye movement system, using infra red goggles to track eye movements, serves as a very credible measure of eye movement by providing a hard copy printout of eye tracings. A computerized analysis of eye movements on paragraph reading provides a standardized rating of eye movement accuracy and speed relative to word recognition level. Evaluation of a single ocular saccade can also

provide valuable information on the speed of the motor response.

### **Vision Evoked Response**

(Objective, non-invasive evaluation of the visual pathway)

- [1] Luminance VER
- [2] Form VER (P-100, multiple spatial frequencies)
- [3] Spatial Sweep VER (grating acuity assessment)
- [4] Event Related Potentials/Cognitive Evoked Potentials (P-300)
- [5] Contrast Sweep VER (objective assessment to static or dynamic stimuli)
- [6] Fatigue response to consecutive VER analysis (the same stimuli)
- [7] Subsystems
  - [a] On-Off neural responses
  - [b] Lateral Interactions
  - [c] Magno-Cellular (transient) visual functions Parvo-Cellular (sustained) visual functions

### **Contrast Sensitivity Analysis**

Subjective Tests of static CSF (Vistech Plates; Functional Acuity Contrast Test (FACT); Pelli-Robson CSF Test; CSF-1000; Mentor CSF system).

Subjective Tests of Dynamic Tests of CSF (Neuroscientific—Infant/Venus; Nicolet—Optronix; Cadwell).

Objective Tests: Contrast Sweep VER analysis (Neuroscientific—Infant/Venus).

### **Vision Perception**

Laterality and Directionality

Visual Motor Integration

Visual Reaction Time

Motor Free Visual Perception

Visual Memory

Visual Sequential Memory

Form Constancy

Visual Spatial Relations

Figure Ground

Visual Discrimination

Using this complete battery allows for differential diagnosis of functional deficits as related to vision skills, vision perception or not to vision.