REHABILITATION OF PATIENTS WITH VISUAL FIELD LOSS ASSOCIATED WITH TRAUMATIC OR ACQUIRED BRAIN INJURY

Introduction and Background

Several types of visual dysfunctions are important problems associated with traumatic or acquired brain injury (TBI/ABI). Blast injury, penetrating injuries and blunt trauma may cause either structural damage to the eye, or lesions or swelling in the brain that can interfere with the visual pathways. These often co-occurring injuries can lead to visual disturbances that can have a significant functional impact on the lives of Service members and Veterans with TBI.[1,2] Over 339,462 traumatic brain injuries have occurred in U.S. forces from 2000 through September 2015, with a significant percentage resulting in visual dysfunctions.[3] A common form of vision loss following TBI is visual field defect.[4,5,6] This recommendation is intended to improve the rehabilitation of Service members and Veterans through increased awareness of all aspects of visual field loss associated with blast injury, TBI and/or ABI and improved identification of all patients who may benefit from rehabilitation.

Clinical Recommendation

This clinical recommendation is designed to help guide the evaluation and rehabilitation of patients with visual field loss associated with TBI/ABI. Recommendations are provided for testing that can help eye care providers and rehabilitation specialists evaluate visual field loss associated with TBI/ABI. Functional testing is recommended to guide the design of the rehabilitation program.

Visual Field Loss Algorithm

The algorithm displayed in **Figure 1** outlines graphically the steps and clinical decision points in the eye care and rehabilitation process of patients with visual field loss associated with TBI/ABI. This clinical recommendation assumes that a comprehensive eye and vision examination has been performed* and that a variety of additional clinical and rehabilitation specialists may be involved on a continuing basis throughout the care and rehabilitation processes depending on the complexity of each patient's injury. The algorithm provides a flow sequence for care and rehabilitation, and refers to diagnostic test and rehabilitation procedures within the recommendation's tabular elements.

Disclaimer: This recommendation and its derivative products are provided as a clinical and rehabilitative aid and should not replace sound clinical judgement nor standard practice when caring for a patient.

* For additional details, see VCE Clinical Recommendation for the Eye Care Provider available at health.mil/vce

Figure 1: Algorithm for the Care and Rehabilitation of Patients with or suspected of Visual Field Loss associated with TBI/ABI.
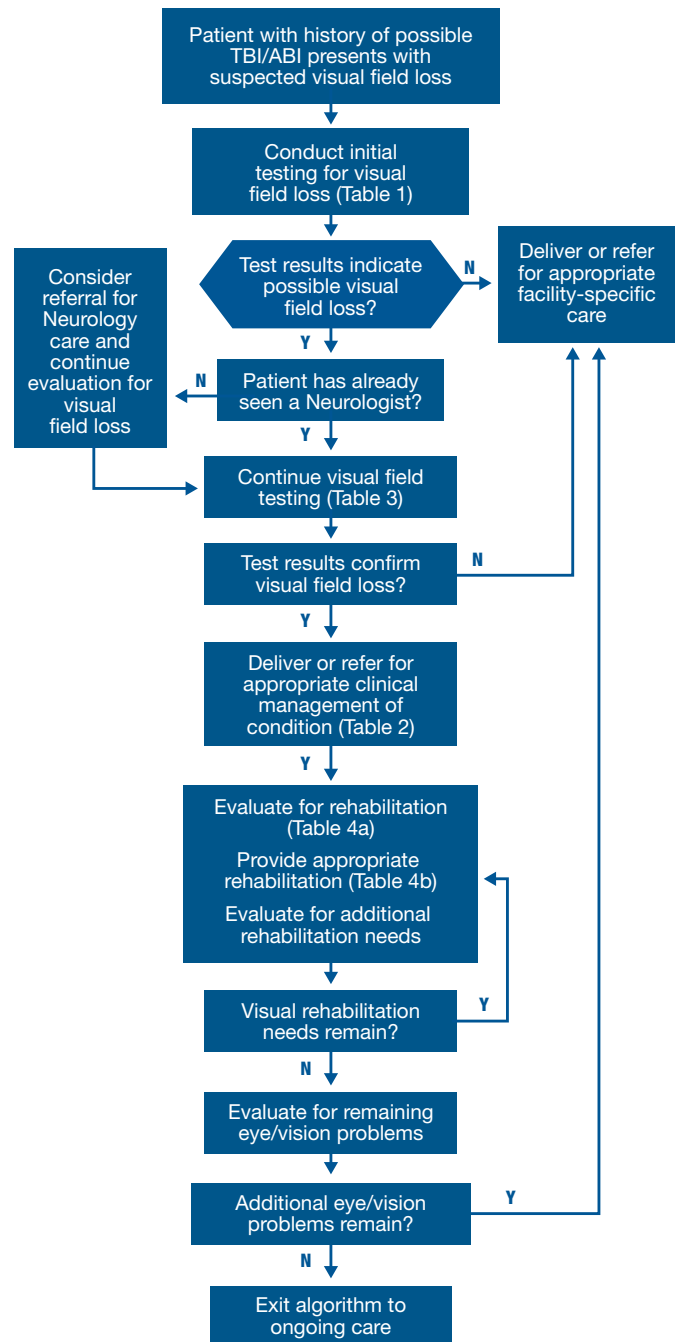
Initial Evaluation for Visual Field Loss

Table 1 outlines the initial tests recommended to evaluate the type of vision problem the patient may be experiencing. These tests will indicate whether the visual disturbance is related to possible visual field loss.

Table 1: Initial Testing for Visual Field Loss
• Confrontation field testing (non-seeing to seeing)* • Central visual acuity measurement • Amsler grid/facial testing: facial recognition testing

* If not already completed as part of a basic eye/vision exam

Facility-Specific Providers for Eye Care and Rehabilitation Associated with Visual Field Loss

The algorithm in **Figure 1** may involve multiple providers with various specialties and roles in the care and rehabilitation processes. The specific provider(s) recommended for the patient will depend upon the clinical management and rehabilitation required and may include those providers listed in **Table 2**. The exact provider will also depend upon the specific staff available at the each facility. **Table 2** also lists providers to whom the patient may be referred if the clinical condition(s) require additional specialized management.

Table 2: Providers for Clinical Management and Rehabilitation of Visual Field Loss and Related Conditions	
• Optometrist/Ophthalmologist • Neurologist/Neuro-Ophthalmologist • Occupational/Physical Therapist • Audiologist*	• Low Vision or Blind Rehabilitation Specialist (Veterans Affairs facilities) • Certified Driver Evaluation Specialist

* Hearing loss may compound spatial awareness difficulties caused by visual field loss

Visual Field Testing

If initial testing indicates that there may be visual field loss, three recommended visual field tests will help determine the type and extent of field loss. **Table 3** lists the three recommended tests to identify the type and quantify the extent of field loss and will also guide the rehabilitation plan.

Table 3: Visual Field Testing (Perimetery)	
• Humphrey/Humphrey Esterman	• Octopus • Goldmann

Types of Visual Field Loss

The following types of visual field loss and their extent can be measured using visual field testing (perimetry):

- **Hemianopia/Quadrantanopia:** Characterized by the complete loss of the left or right half of the field of vision, or a smaller segment due to injury within the visual projections of one hemisphere and that may impact patient mobility

- **Central Scotoma:** Characterized by a centrally located area or areas of vision loss that reduce visual acuity

- **Peripheral Scotoma:** Characterized by focal loss of portions of the peripheral field of vision, including hemianopia, quadrantanopia, ring scotoma and arcuate field defects that may impact patient mobility

- **Monocular Vision:** Characterized by the total loss of vision in one eye

Functional Visual Impact Tests

Functional task improvement is the primary goal of rehabilitation for visual field loss.[7] **Table 4a** lists functional visual impact tests, functional independence measures (FIM) and measures of quality of life (QOL), which will determine the most suitable type of rehabilitation. Functional tests will indicate whether the visual field loss is impacting a patient's ability to scan, visually attend, read (near vision) and/or visually perceive.

Table 4a: Functional Visual Impact Tests/Procedures

Functional Task	Visual Impact Test
Scanning	• biVABA (portion) • DEM (adult) • King-Devick
Visual Attention	• biVABA • Rivermead (will rule out presence or absence of neglect) • Dynavision • Wayne Fixation • Useful Field of View
Reading/Near Vision	• biVABA • Smith-Kettlewell Reading Test (SK Read) • Pepper Test • Minnesota Low-Vision Reading Test (MN Read) • Visagraph
Visual Perception	• Motor-Free Visual Perception Test (vertical is recommended but not always available) • Test of Visual Perceptual Skills (TVPS) • DVPT-Adult • Home Therapy System CPT Program
Functional Independence	• Functional Independence Measure (FIM)
Quality of Life (QOL)	• National Eye Institute Visual Functioning Questionnaire (NEI-VFQ-25) with 10 item Neuro-Ophthalmic Supplement • College of Optometrists in Vision Development (COVD) Quality of Life Assessment

biVABA = brain injury visual assessment battery for adults, *DEM* = developmental eye movement, *DVPT* = developmental visual perception test, *CPT* = computer perceptual therapy

Recommended Rehabilitation Techniques

Although visual field loss is a common visual disorder, there are currently no effective curative treatments. However, rehabilitative therapies can help improve patient functioning and quality of life by maximizing the use of each patient's remaining vision.

Table 4b: Rehabilitation of Visual Field Loss

Rehabilitation	Hemianopia/ Quadrantanopia	Central Scotoma	Peripheral Scotoma	Monocular Vision
Awareness/sensory integration	X	X	X	X
Environment training	X	X	X	X
Scanning	X	X	X	X
Reading strategies	X	X		
Compensatory aids	X	X	X	
Prisms	X			
Near optical aids (magnifiers)		X		
Telescopes		X		
Reverse telescopes			X	
Eccentric viewing	X	X		
Mobility training	X	X	X	X
Fitness to drive	X	X	X	X

Table 4b above shows specific rehabilitation techniques and strategies recommended for each type of visual field loss. Rehabilitation techniques for visual field loss can be categorized as either "optical management" (e.g., prisms, magnifiers, telescopes, reverse telescopes) or "compensatory strategies" (e.g., scanning, head movement, eye movement, awareness, mobility training). Compensatory strategies are often effective because these procedures help enable the individual to learn to better use their remaining vision to overcome their visual field loss.

Functional Outcomes

A patient's task performance can be affected by visual field loss, which can result in reduced independence in terms of self-care and increased emotional distress and risk of injury.[8] Since therapeutic interventions will not correct the underlying visual field defect, the goal of rehabilitation is to retain independence and to improve function and quality of life.[7] Therefore after rehabilitation it is important to reevaluate FIM, functional visual impact measures and QOL (**Table 4a**) to measure improvement.

Conclusion

This clinical recommendation is based on a review of the literature and consensus of expert opinion. It is intended to provide an algorithm of care and rehabilitation for patients with possible visual field loss due to TBI/ABI. Ongoing care for the patient includes periodic examination by an eye care provider and case management if available. This clinical recommendation may be used by eye care providers, specialty care providers and rehabilitation specialists who evaluate and provide rehabilitation for visual field loss. As with all clinical decisions, professional judgment should always be used.

References

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