



DHA Falls Church, Virginia

Ocular and Vision Dysfunction Management Following Blast Exposure and Traumatic Brain Injury Edition 1: Version 1 2026

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Purpose

This DHA Practice Recommendation is intended to assist eye care providers (optometrists and ophthalmologists) in managing patients with ocular injuries and vision dysfunction related to traumatic brain injury (TBI) or blast exposure. It outlines evidence-based tests and procedures to support the screening, assessment of common ocular injuries, and vision dysfunctions resulting from or associated with TBI. The document provides guidance on evaluation, rehabilitation, and referral considerations for specific ocular conditions and TBI-related vision impairments. These recommendations are designed to complement—rather than replace—sound clinical judgement or established standards of care when treating patients with ocular or vision dysfunction following TBI or blast exposure.

Diagnosis

Explosive devices that are frequently used in armed training and conflict produce blast overpressure and blast waves, high velocity fragmentation of materials, and blunt force that can cause complex ocular trauma and structural damage to the eye, head, and body. Concomitant traumatic brain injury may further compromise visual function by disrupting neural pathways involved in all aspects of vision.¹⁻³ Over 518,116 new cases of TBI have been reported in U.S. forces from 2000 through Q1 2025.⁴ The resulting ocular and vision problems can have a significant impact on the lives of Service members and veterans.^{2,5,6} To improve patient outcomes, it is important to establish recommendations for the management of ocular injuries, and vision dysfunctions associated with TBI and blast exposure.¹

Clinical Management

History, Basic History, Basic Ocular and Vision Function Exam

For patients with a documented history of blast exposure or TBI, it is essential to obtain a comprehensive account of the injury circumstances and associated symptoms. The TBI History Questions List in Appendix A should be used to guide the provider's assessment and document any vision-related concerns that the patient may not readily recognize.⁷ In addition to subjective visual complaints, specific TBI-related questions can help identify subtle or delayed-onset visual dysfunctions commonly associated with blast or concussion injuries. Examples of such questions are presented in Appendix B.⁸ A comprehensive, dilated eye examination with the minimum post-TBI testing procedures listed on Appendix C should be performed.⁸

If the patient has not been clinically diagnosed with a concussion or mTBI then they must be referred for a TBI evaluation and formal diagnosis with their Primary Care Manager. At the point of TBI diagnosis, if they are suspected of having visual sequelae, a referral to an eye care provider must be made. If no comprehensive eye examination has been documented, a comprehensive eye examination should be performed first. If the patient has a history of blast exposure or TBI the patient may also self-refer to an eye care provider for a comprehensive eye examination. The recommendations in this document should not replace sound clinical judgment or standard practice when caring for a patient.

Medical and Traumatic Ocular Conditions Following Blast Exposure and TBI

A confirmed TBI may require additional evaluation for ocular injuries and vision impairment. Depending on the examination results and the possible presence of a traumatic injury or acute medical condition, the patient may require urgent care management. Chronic ocular medical conditions that necessitate ongoing or follow-up care may also be present. Table 1 lists ocular conditions that may require urgent management or immediate referral for specialized care. Table 2 lists non-urgent ocular conditions that may be chronic or require medical management over time. Table 3 includes most urgent and non-urgent neuro-ophthalmic conditions that may be associated with TBI.

Tables 1-3 also summarize testing, evaluation, and management procedures, along with referral considerations for specialty care that the eye care provider should address during treatment.

Urgent medical eye care management:

Conditions that may indicate ocular, cranial nerve, or structural brain injury, which could be sight or life-threatening. These require immediate evaluation and management by the eye care provider and/or referral for specialized care.

Non-urgent medical eye care management:

Chronic or potentially chronic ocular or visual conditions that may be managed by the eye care provider and/or referred for specialized care over time.

Table 1. Testing, Evaluation, Management, and Referral Considerations for Ocular Conditions That May Require Urgent Management

Condition/Presentation	Additional Testing and Evaluation Considerations	Management Considerations	Referral Considerations
Hyphema or Hypopyon (without evidence of corneal laceration or open globe)	• Determine extent of hyphema and document daily changes in size • Gonioscopy • IOP check	• Anterior chamber washout • Dilating drops • IOP control • Topical corticosteroid drops	• Cornea & external disease • Glaucoma
Ocular Surface Foreign Body (possibly penetrating)	• Eyelid eversion, fornix, and conjunctiva evaluation (defer if open globe injury) • Imaging (CT, MRI*) • Seidel test	• Bandage contact lens • Foreign body removal • Rigid corneal shield • Rust ring removal	• Cornea & external disease
Ocular Trauma (blunt, no open globe)	• 90 or 78 diopter lens slit lamp exam • Binocular indirect ophthalmoscopy Gonioscopy • Imaging (CT, MRI*) • IOP check • OCT • Ophthalmic ultrasound (contraindicated if open globe injury or corneal laceration exists) • Palpate orbital/periorbital area	• Observation (unless obvious injury present)	• Cornea & external disease • Glaucoma • Neuro-Ophthalmology • Vitreoretinal surgery
Ocular trauma (penetrating) • Cornea/globe laceration • Intraocular foreign body	• Imaging (CT, MRI*)	• Foreign body removal • Repair open cornea/globe • Rigid corneal shield	• Cornea & external disease • Glaucoma • Patients should be referred to the Emergency Department for immediate care (if no ophthalmologist is available on site). • Vitreoretinal surgery
Periocular Trauma • Facial laceration • Facial/orbital fracture • Lid laceration	• Eyelid function • Forced ductions • Imaging (CT, MRI*) • Palpate orbital/periorbital area • Probe/irrigate lacrimal system	• Eyelid/tear duct laceration repair • Facial laceration repair • Fracture repair • Orbital reconstruction • Probe/intubate tear system	• Ophthalmic plastic & reconstructive surgery • Oral and maxillofacial surgery • Otorhinolaryngology • Patients should be referred to the Emergency Department for immediate care (if no ophthalmologist is available on site). • Plastic surgery

**MRI contraindicated with suspected metallic intraocular foreign body*

Table 1. Testing, Evaluation, Management, and Referral Considerations for Ocular Conditions that May Require Urgent Management (cont.)

Condition/Presentation	Additional Testing and Evaluation Considerations	Management Considerations	Referral Considerations
Retinal Disorders • Retinal Break • Retinal Detachment • Retinal Hemorrhage • Retinal Hole • Retinoschisis	• Fluorescein angiography • Ophthalmic ultrasound (contraindicated if open globe injury or corneal laceration exists) • Peripheral retina exam/scleral depression • Pupillary responses test	• Argon laser treatment • Long-term follow-up care • Observation (if not referred to specialty care) • Retinal detachment repair • Vitrectomy	• Low Vision Rehabilitation (if treatment is unsuccessful) • Vitreoretinal Surgery
Soft Tissue Necrosis • Necrotizing fasciitis • Stevens-Johnson syndrome • Toxic epidermal necrolysis	• Blood work • Culture workup • Fluorescein dye • IOP check • Lagophthalmos • Orbicularis function	• Artificial tear ointments/gels/drops • Bandage therapeutic contact lens • Debridement • Hyperbaric oxygen • Probe/intubate tear system • Suture tarsorrhaphy • Symblepharon lysis • Symblepharon ring • Topical/systemic antibiotic	• Cornea & external disease • Ophthalmic plastic & reconstructive surgery • Patients should be referred to the Emergency Department for immediate care (if no ophthalmologist is available on site) • Plastic surgery
Vision and/or Visual Field Loss (sudden, unexplained)	• Angiography • Carotid doppler • CBC, platelet count, temporal artery biopsy • Dilated fundus exam/scleral depression • Echocardiogram • Imaging (CT, MRI*) • IOP check • OCT • Pupil evaluation • Visual fields	• Anterior chamber paracentesis • Hyperbaric oxygen therapy • IV tissue plasminogen activator • Retinal detachment repair • Selective intra-arterial thrombolytic therapy • Steroids • Vitrectomy	• Emergency Department • Interventional Radiology • Neuro-Ophthalmology • Vitreoretinal surgery
Vitreous Hemorrhage	• Ophthalmic ultrasound (contraindicated if open globe injury or corneal laceration exists) • Peripheral retina exam/scleral depression	• Argon laser treatment • Retinal detachment repair • Vitrectomy	• Vitreoretinal surgery
Abbreviations: CBC = complete blood count; CT = computed tomography; FTA-ABS = Fluorescent Treponemal Antibody Absorption test; IOL = intraocular lens; IOP = intraocular pressure; IV = intravenous; LASIK = Laser-Assisted In Situ Keratomileusis; MRI* = magnetic resonance imaging; NaCl = sodium chloride; OCT = optical coherence tomography; r/o = rule out; STS = serologic test for syphilis; VDRL = Venereal Disease Research Laboratory Test			

Table 2. Testing, Evaluation, Management, and Referral Considerations for Ocular Conditions that May Require Non-Urgent Medical Eye Care

Condition/ Presentation	Additional Testing and Evaluation Considerations	Management Considerations	Referral Considerations
Cataract	- Ocular biometry - Refraction	- Contact lenses - Lensectomy/IOL implantation - Prescription eyeglasses/spectacles	Ophthalmology
Corneal scarring	- Corneal topography - Refraction	- Contact lenses - Lamellar keratoplasty - Penetrating keratoplasty - Prescription eyeglasses/spectacles	- Cornea & external disease - Medical/therapeutic contact lens care
Iridodialysis	- Gonioscopy - IOP check - OCT	- Manage dislocated lens - Manage IOP - Surgical repair of iridodialysis	- Cornea & external disease - Glaucoma
Loss of Eye(s)	- Condition and size of prosthesis - Evaluation of eyelid position - Socket evaluation	- Clean and refit prosthesis - Patient education on prosthesis and socket care - Prescription eyeglasses with polycarbonate lenses - Prescription safety eye protection - Socket reconstruction	- Blind and low vision rehabilitation - Ophthalmic plastic & reconstructive surgery
Ocular Surface Disease - Dry eye syndrome - Lid margin disease - Trichiasis	- Eyelash evaluation - Eyelid margin evaluation - Fluorescein/Rose Bengal/lissamine green testing - Schirmer testing	- Epilation - Lid hygiene - Mucomimetic/artificial tear therapy - Nutritional therapy - Oral or topical antibiotics - Punctal plugs	Cornea & external disease
Ocular Surface Foreign Body (Non-Penetrating)	- Imaging (X-ray, CT) - Ophthalmic ultrasound - Seidel sign	- Bandage contact lens - Foreign body removal - Topical antibiotic eye drops	Cornea & external disease
Proptosis	- Axial length measurement - Dilated fundus exam - Exophthalmometry - Forced ductions - Imaging (CT, MRI*) - Refraction (hyperopic shift) - Thyroid function testing (r/o) - Ultrasonography	- Orbital decompression - Orbital reconstruction - Pseudoproptosis - Tumor removal	Ophthalmic plastic & reconstructive surgery
Abbreviations: CBC = complete blood count; CT = computed tomography; FTA-ABS = Fluorescent Treponemal Antibody Absorption test; IOL = intraocular lens; IOP = intraocular pressure; IV = intravenous; LASIK = Laser-Assisted In Situ Keratomileusis; MRI* = magnetic resonance imaging; NaCl = sodium chloride; OCT = optical coherence tomography; r/o = rule out; STS = serologic test for syphilis; VDRL = Venereal Disease Research Laboratory Test			

Table 3. Urgent and Non-urgent Neuro-Ophthalmic Conditions Associated with Traumatic Brain Injury

Condition/ Presentation	Urgency Status	Additional Testing and Evaluation Considerations	Management Considerations	Referral Considerations
Headache (Unremitting)	Urgent	• Angiography • Blood pressure check • CBC, platelet count, temporal artery biopsy • Imaging (CT, MRI*) • IOP check or gonioscopy • Lumbar puncture • Sinus evaluation	• Antibiotics • Filter evaluation • Glaucoma treatment and/or iridotomy • Treatment for high blood pressure	• Emergency Department • Glaucoma • Neuro-Ophthalmology • Neurosurgery • Otolaryngology
Afferent Pupillary Defect	Urgent	• Color vision testing • Imaging (CT, MRI*) • IOP check • OCT Platelet count, temporal artery biopsy • STS, FTA-ABS, VDRL (r/o syphilis)	• Observation (if not referred to neurological care) • Refer if abnormal testing/imaging • Steroids	• Neuro-Ophthalmology • Neurosurgery
Ptosis or Acute Ocular Motility Abnormality Cranial Nerve Palsy (CN III, IV, VI)	Urgent	• Cover testing in 9 positions of gaze • Eyelid function • Forced duction testing and active force generation testing • Ice pack test or Tensilon testing • Imaging (CT, MRI*) • Ocular motility • Parks 3-step test	• Botulinum toxin injection(s) • Fresnel prisms • Monocular occlusion to eliminate diplopia • Muscle surgery • Myasthenia gravis treatment • Near additional compensation for loss of accommodation • Ptosis correction • Ptosis crutch	• Emergency Department • Neuro-Ophthalmology • Neurosurgery • Ophthalmic plastic & reconstructive surgery • Pediatric ophthalmology and strabismus
Acute Nystagmus	Urgent	• Imaging (CT, MRI*) • Visual fields	• Botulinum toxin injection(s) • Muscle surgery • Prescription eyeglasses with prism	• Blind and low vision rehabilitation • Cornea & external disease • Neuro-Ophthalmology • Pediatric ophthalmology and strabismus • Vestibular/balance rehabilitation
Abbreviations: CBC = complete blood count; CT = computed tomography; FTA-ABS = Fluorescent Treponemal Antibody Absorption test; IOL = intraocular lens; IOP = intraocular pressure; IV = intravenous; LASIK = Laser-Assisted In Situ Keratomileusis; MRI* = magnetic resonance imaging; NaCl = sodium chloride; OCT = optical coherence tomography; r/o = rule out; STS = serologic test for syphilis; VDRL = Venereal Disease Research Laboratory Test				

Table 3. Urgent and Non-urgent Neuro-Ophthalmic Conditions Associated with Traumatic Brain Injury (cont.)

Condition/ Presentation	Urgency Status	Additional Testing and Evaluation Considerations	Management Considerations	Referral Considerations
Cranial Nerve VII (Facial) Palsy	Non-urgent	• Evaluation of facial muscles • Eyelid function • Ice pack test or Tensilon test • Imaging (CT, MRI*) • Lyme disease testing (r/o)	• Botulinum toxin injection(s) • Correction of lid retraction • Gold eyelid weights • Lid spring • Nerve transposition • Ocular lubrication • Tarsorrhaphy	• Ophthalmic plastic & reconstructive surgery • Neuro-Ophthalmology • Neurology
Cranial Nerve V (Trigeminal) Palsy	Non-urgent	• Electromyography • Imaging (CT, MRI*) • Motor testing: mastication, facial expressions • Observation: asymmetry, weakness • Sensory testing: touch, temperature, and corneal reflex	• Acupuncture • Injections • Medication • Surgery • Transcutaneous electrical nerve stimulation (TENS)	• Neurology • Neuro-Ophthalmology • Ophthalmic plastic & reconstructive surgery
Traumatic optic neuropathy	Non-urgent	• Color vision testing • Filter evaluation • Imaging (CT, MRI*) • Pupil evaluation • Visual fields	• Observation • Prescription lens filters/tints	• Neuro-Ophthalmology • Neurosurgery
Optic nerve pallor	Non-urgent	• Color vision testing • FTA-ABS, STS, VDRL (r/o syphilis) • Imaging (CT, MRI*) • IOP check • OCT • Visual fields	• Filter evaluation • Observation	• Glaucoma • Neuro-Ophthalmology
Optic neuritis	Non-urgent	• Blood analysis • Cerebrospinal fluid analysis • Electroretinography (ERG) • Fundoscopy • Imaging (MRI*) • OCT • Pupil reflex • Visual acuity • Visual Evoked Potential (VEP) • Visual field	• Disease-modifying therapies (DMTs) • Eye protection • Immunosuppressants • Pain management • Plasmapheresis • Steroids • Vision rehabilitation for visual impairment	• Neuro-Ophthalmology

Abbreviations: CBC = complete blood count; CT = computed tomography; FTA-ABS = Fluorescent Treponemal Antibody Absorption test; IOL = intraocular lens; IOP = intraocular pressure; IV = intravenous; LASIK = Laser-Assisted In Situ Keratomileusis; MRI = magnetic resonance imaging; NaCl = sodium chloride; OCT = optical coherence tomography; r/o = rule out; STS = serologic test for syphilis; VDRL = Venereal Disease Research Laboratory Test

Ocular Motor Dysfunctions Associated with TBI

Following the assessment of conditions requiring medical care (Tables 1- 3), eye care providers should conduct supplemental screening for TBI-related Ocular Motor Dysfunctions (OMDs) commonly observed after blast exposure or TBI. Because convergence insufficiency is the most common OMD associated with mTBI⁹, the Convergence Insufficiency Symptoms Survey (CISS) may assist in identifying TBI associated OMDs.¹⁰ The CISS questionnaire is provided in Appendix D.¹⁰ Table 4 details the minimal in-person testing recommended to guide supplemental management and care of OMDs.¹¹ Table 5 provides an overview of management and referral considerations for TBI-related OMDs. These recommendations assume that all existing medical conditions listed in Tables 1- 3 continue to be managed by the eye care provider, with referrals made as appropriate.

For further details about OMD, in-depth assessment and rehabilitative strategies are available in the Post-Concussion/Mild Traumatic Brain Injury (mTBI) Assessment and Management of Vision and Oculomotor Dysfunctions for Eye Care Providers Practice Recommendation⁷, and the Ocular Motor Rehabilitation Definition as Applied to the Defense Health Agency/Vision Center of Excellence Clinical and Practice Recommendations supplement. <https://health.mil/Reference-Center/Reports/2025/11/01/OMR-Definition-Report>

Table 4. Supplemental Testing for Ocular Motor Dysfunctions in the Basic Vision Function Examination by an Eye Care Provider

Distance cover test – unilateral and alternate†
Near cover test – unilateral and alternate
Versions (EOMs), saccades, and/or pursuits†
Accommodation†
Repeated Near Point of Convergence (any method) †
Vertical and horizontal vergence range
Horizontal Vergence facility at distance and near in free space
†If not already completed as part of basic eye/vision exam; may include amplitude and facility. ¹² It is recommended for best yield that these tests are performed in person and in free space (not behind a phoropter)

Table 5. Testing, Evaluation, Management, and Referral Considerations for Conditions that May Require Non-Urgent Care and/or Rehabilitation for Traumatic Brain Injury Related Visual Dysfunctions

Condition/ Presentation	Additional Testing and Evaluation Considerations	Management Considerations	Referral Considerations
Vision Impairment • Blindness • Low vision • Visual field loss • Visual neglect	• Foveal field testing • Glare and contrast sensitivity testing • Imaging (CT, MRI*) • Low vision assessment • Mobility assessment • Visual field testing • Visual neglect assessment	• Low vision aids and training • Mobility aids and training • Prescription eyeglasses/spectacles with or without prism • Prescription optical and electronic visual field expanders or enhancement devices • Prescription optical low vision devices	• Blind rehabilitation • Low vision rehabilitation
Photophobia/ Glare Sensitivity	• Cataract assessment • Corneal topography • Glare assessment • Tear film evaluation	• Pharmacotherapy • Prescription eyeglasses/spectacles with tints and anti-glare coatings • Special prescription lens filters/tints • Tinted prescription contact lenses	• Neuro-Ophthalmology • Neurology
Accommodative Dysfunction • Accommodative excess • Accommodative infacility • Accommodative insufficiency • Accommodative spasm	• Accommodative accuracy (monocular estimate method) testing • Accommodative amplitude testing • Accommodative facility testing	• Accommodative amplitude training • Prescription eyeglasses/spectacles with or without prism	• Ocular motor rehabilitation⁷

Abbreviations: CBC = complete blood count; CT = computed tomography; FTA-Abs = Fluorescent Treponemal Antibody Absorption test; IOL = intraocular lens; IOP = intraocular pressure; IV = intravenous; LASIK = Laser-Assisted In Situ Keratomileusis; MRI = magnetic resonance imaging; NaCl = sodium chloride; OCT = optical coherence tomography; r/o = rule out; STS = serologic test for syphilis; VDRL = Venereal Disease Research Laboratory Test

Table 5. Testing, Evaluation, Management, and Referral Considerations for Conditions that May Require Non-Urgent Care and/or Rehabilitation for Traumatic Brain Injury Related Visual Dysfunctions (cont.)

Condition/Presentation	Additional Testing and Evaluation Considerations	Management Considerations	Referral Considerations
Depth Perception Dysfunction Reduced stereoscopic vision	- Associated phoria/fixation disparity testing - Cyclophoria testing - Parks 3-step test - Stereopsis testing - Unilateral cover and alternate cover testing - Vergence test	- Prescription eyeglasses/spectacles with or without prism - Strabismus surgery - Vergence training	- Neuro-Ophthalmology - Ocular motor rehabilitation - Pediatric ophthalmology and strabismus
Eye Movement Dysfunction - Abnormal pursuits - Abnormal saccades - Nystagmus - Oscillopsia	- Developmental eye movement testing - Eye movement recording study - King-Devick test - Maddox rod test	- Botulinum toxin injection(s) - Oculomotor training - Prescription contact lenses - Prescription eyeglasses/spectacles with or without prism	- Cornea & external disease - Neuro-Ophthalmology - Ocular motor rehabilitation - Vestibular/Balance rehabilitation
Ocular Alignment Dysfunction - Convergence excess - Convergence insufficiency - Fusional vergence dysfunction - Other heterophoria - Strabismus (paretic and non-parietic)	- Cyclophoria testing - Forced ductions testing and active force generation testing - Imaging (CT, MRI*) - Parks 3-step test - Saccades testing - Unilateral cover and alternate cover testing - Vergence testing - Vertical deviation testing	- Botulinum toxin injection(s) - Occlusion - Prescription eyeglasses/spectacles with or without prism - Strabismus surgery - Vergence therapy	- Cornea & external disease - Neuro-Ophthalmology - Ocular motor rehabilitation - Pediatric and adult strabismus
Abbreviations: CBC = complete blood count; CT = computed tomography; FTA-ABS = Fluorescent Treponemal Antibody Absorption test; IOL = intraocular lens; IOP = intraocular pressure; IV = intravenous; LASIK = Laser-Assisted In Situ Keratomileusis; MRI = magnetic resonance imaging; NaCl = sodium chloride; OCT = optical coherence tomography; r/o = rule out; STS = serologic test for syphilis; VDRL = Venereal Disease Research Laboratory Test			

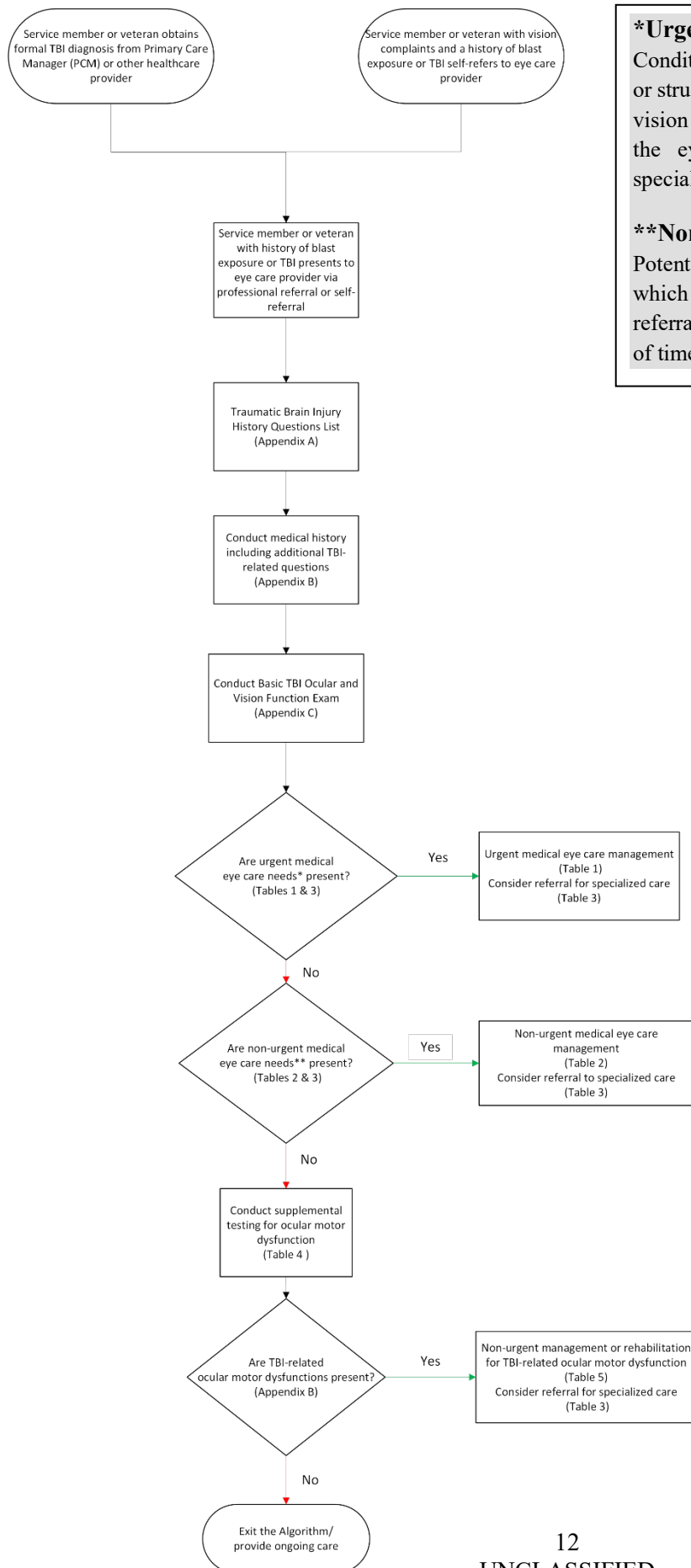
Algorithm

Summary of Algorithm for Ocular and Vision Dysfunction Care Following Blast Exposure and/or Possible Traumatic Brain Injury

The “Algorithm for Management of Ocular Injuries and Vision Dysfunction Following Blast Exposure and/or Traumatic Brain Injury” (Figure 1) is designed to guide eye care providers in the evaluation, management, and referral of patients presenting with ocular or vision function concerns following TBI or blast exposure. The process begins when a Service member or veteran is referred from another provider or presents through self-referral. The algorithm includes key screening questions to help identify a potential history of TBI and outlines the recommended ocular and vision assessments for a basic eye examination. It also includes references to lists of medical ocular conditions that may require urgent intervention, non-urgent management, or referral to specialty care. The algorithm provides evidence-based guidance on evaluation, treatment, and rehabilitation procedures during the initial eye care assessment.

Figure 12. Algorithm for Management of Ocular Injuries and Vision Dysfunction Following Blast Exposure and Traumatic Brain Injury

Patients who have not been clinically diagnosed with a concussion or mTBI must be referred for a TBI evaluation and formal diagnosis with their Primary Care Manager. At the point of TBI diagnosis, if they are suspected of having visual sequelae, a referral to an eye care provider must be made. If no comprehensive eye examination has been documented, a comprehensive eye examination should be performed first. The recommendations in this document should not replace sound clinical judgment or standard practice when caring for a patient.⁷



***Urgent medical eye care management:**

Conditions indicating possible ocular, cranial nerve, or structural brain injury with the potential to threaten vision or life, requiring immediate management by the eye care provider and/or referral to more specialized care.

****Non-urgent medical eye care management:**

Potentially chronic ocular or visual conditions for which management by the eye care provider or referral to a specialist may be addressed over a course of time.

Conclusion

This practice recommendation is based on a review of the literature and expert consensus. It is intended to guide eye care providers in assessment, management, rehabilitation, and referral of patients with medical eye conditions and visual dysfunctions associated with TBI. These recommendations do not replace existing guidance or clinical judgement. As with all clinical decisions, field, and operational circumstances may require deviation from these recommendations.

References

1. Merezhinskaya, N., Mallia, R. K., Park, D., Bryden, D. W., Mathur, K., & Barker, F. M., 2nd. (2019). Visual Deficits and Dysfunctions Associated with Traumatic Brain Injury: A Systematic Review and Meta-analysis. *Optometry and Vision Science*, 96(8), 542-555. <https://doi.org/10.1097/OPX.0000000000001407>
2. Barnett, B. P., & Singman, E. L. (2015). Vision concerns after mild traumatic brain injury. *Current Treatment Options in Neurology*, 17(2), 329. <https://doi.org/10.1007/s11940-014-0329-y>
3. Magone, M. T., Kwon, E., & Shin, S. Y. (2014). Chronic visual dysfunction after blast-induced mild traumatic brain injury. *Journal of Rehabilitation Research and Development*, 51(1), 71-80. <https://doi.org/10.1682/JRRD.2013.01.0008>
4. Defense Health Agency. (2025). *DOD TBI Worldwide Numbers*. Retrieved 09/27/2025. <https://www.health.mil/Military-Health-Topics/Centers-of-Excellence/Traumatic-Brain-Injury-Center-of-Excellence/DOD-TBI-Worldwide-Numbers>
5. Phipps, H., Mondello, S., Wilson, A., Dittmer, T., Rohde, N. N., Schroeder, P. J., Nichols, J., McGirt, C., Hoffman, J., Tanksley, K., Chohan, M., Heiderman, A., Abou Abbass, H., Kobeissy, F., & Hinds, S. (2020). Characteristics and Impact of U.S. Military Blast-Related Mild Traumatic Brain Injury: A Systematic Review. *Frontiers in Neurology*, 11, 559318. <https://doi.org/10.3389/fneur.2020.559318>
6. Hunfalvay, M., Murray, N. P., Creel, W. T., & Carrick, F. R. (2022). Long-Term Effects of Low-Level Blast Exposure and High-Caliber Weapons Use in Military Special Operators. *Brain Sciences*, 12(5), 679. <https://doi.org/10.3390/brainsci12050679>
7. Vision Center of Excellence. (2024). *Post-concussion/mild traumatic brain injury (mTBI) assessment and management of vision and oculomotor dysfunctions for eye care providers*. <https://www.health.mil/Reference-Center/Technical-Documents/2024/06/19/DHA-Practice-Recommendation-Post-Concussion-and-mTBI>
8. American Optometric Association. (2023). *Comprehensive adult eye and vision examination: Evidence-based clinical practice guideline*. Accessed 09/29/2025. <https://www.aoa.org/AOA/Documents/Practice%20Management/Clinical%20Guidelines/EBO%20Guidelines/Comprehensive%20Adult%20Eye%20and%20Vision%20Examination%2C%20Second%20Edition.pdf>
9. Devani K., Kapoor, N., & Ganti, L. (2024). Convergence insufficiency as a predictor of poor prognosis after acute mild traumatic brain injury. *International Journal of Emergency Medicine*, 17(1), 166. <https://doi.org/10.1186/s12245-024-00747-6>
10. Trbovich A. M., Sherry, N.K., Henley, J., Emami, K., & Kontos, A. P. (2019). The utility of the convergence insufficiency symptom survey (CISS) post-concussion. *Brain Injury*, 33(12), 1545-1551. <https://doi.org/10.1080/02699052.2019.1658131>
11. Goodrich, G. L., Martinsen, G. L., Flyg, H. M., Kirby, J., Asch, S. M., Brahm, K. D., Brand, J. M., Cajamarca, D., Cantrell, J. L., Chong, T., Dziadul, J. A., Hetrick, B. J., Huang, M. A., Ihrig, C., Ingalla, S. P., Meltzer, B. R., Rakoczy, C. M., Rone, A., Schwartz, E., Shea, J. E., ... U. S. Department of Veterans Affairs (2013). Development of a mild traumatic brain injury-specific vision screening protocol: a Delphi study. *Journal of Rehabilitation, Research and Development*, 50(6), 757-768. <https://doi.org/10.1682/JRRD.2012.10.0184>
12. Cockerham, G. C., Goodrich, G. L., Weichel, E. D., Orcutt, J. C., Rizzo, J. F., Bower, K. S., & Schuchard, R. A. (2009). Eye and visual function in traumatic brain injury. *Journal of Rehabilitation, Research and Development*, 46(6), 811-818. <https://doi.org/10.1682/jrrd.2008.08.0109>

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Statement of Authorship

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Potential Conflicts of Interest

The authors declare no conflicts of interest.

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Appendices

Appendix A. TBI History Questions List (Adapted from “Post-concussion/mild traumatic brain injury (mTBI) assessment and management of vision and oculomotor dysfunctions for eye care providers,” 2024.)⁷

When and where did the most recent injury occur (CONUS or OCONUS)?
What caused the concussion/mTBI (blast/blunt/both)?
Did you lose consciousness because of the concussion/mTBI? If so, how long?
Did you experience pre- or post-event amnesia (memory loss) after the concussion/mTBI? If so, for how long?
Were you confused or disoriented (alteration of consciousness) after the event? If so, for how long?
Have you had a concussion/TBI evaluation and/or diagnosis by a medical professional? If so, when?
Tell me about your vision and balance issues.
Since your last concussion/mTBI, have you had any of the following issues? • Headaches after reading or performing visual tasks • Dizziness, nausea, or a spinning feeling • Balance problems • Double vision • Light sensitivity • Trouble reading • Sensitivity to motion, or struggling in busy locations
Do your current vision issues negatively affect your ability to perform your duties?
What is your current duty status or disability rating?

Appendix B. TBI-Related Ocular and Vision Function History Questions

Were your eyes, eyelids, or the area around your eyes impacted by your injury? If yes, explain the ocular/peri-ocular injury.
Since your injury, have you experienced the following vision issues:
Do you bump into objects and walls more?
Do you cover or close one eye at times?
Have you noticed a change in your vision?
Are you more sensitive to light, either indoors or outdoors?
Have you had any double vision?
Have you noticed any changes in your peripheral vision?
Is your vision blurry at distance or near?
Questions regarding reading since your injury:
Have you noticed a change in your ability to read?
Are you having any new difficulty reading or do you lose your place while reading?
How long can you read continuously before your need to stop?
Do you get more or new headaches during or after reading?
Is it harder to remember what you have read? If so, how?

Appendix C. Suggested Minimum Testing for Post-TBI Basic Ocular and Vision Examination by an Eye Care Provider

Visual acuity at distance and near
External exam
Confrontation visual field testing
Extraocular muscle (EOM) testing/pursuits
Cover test (distance and near)
Refractive error measurement: retinoscopy and refraction*
Pupillary testing
Slit lamp biomicroscopy: anterior segment
Tonometry
Gonioscopy
Dilated slit lamp biomicroscopy: posterior segment and binocular indirect ophthalmoscopy (BIO) with scleral depression
Optical Coherence Tomography (OCT)
<i>*Accurate refraction, cycloplegic if warranted.</i>

Appendix D. Convergence Insufficiency Symptoms Survey (CISS)

Please answer the following questions about how your eyes feel when reading or doing close work

Name _____ Date ____/____/____

SYMPTOMS <i>(Please fill this out with your child)</i>	NEVER	INFREQUENTLY	SOMETIMES	FAIRLY OFTEN	ALWAYS
Do your eyes feel tired when reading or doing close work?					
Do your eyes feel uncomfortable when reading or doing close work?					
Do you have headaches when reading or doing close work?					
Do you feel sleepy when reading or doing close work?					
Do you lose concentration when reading or doing close work?					
Do you have trouble remembering what you have read?					
Do you see the words move, jump, swim, or appear to float on the page?					
Do you feel like you read slowly?					
Do your eyes ever hurt when reading or doing close work?					
Do you feel a pulling feeling around your eyes when reading or doing close work?					
Do you lose your place while reading or doing close work?					
Do you have to reread the same line of words when reading?					
TOTAL (Please add up each of the columns)					
MULTIPLY THE TOTAL BY THE FOLLOWING:	x0	x1	x2	x3	x4
SUBTOTAL					
GRAND TOTAL: (Sum of Subtotals)					

To score the survey, simply add check marks in each column and multiply the amount by the multiplier at the bottom of the survey. A score of 16 or more indicates the need for a binocular vision evaluation. This symptom survey is derived from the National Institute of Health's Convergence Insufficiency Treatment Trial.