

# Recovering Ego-center Post Blast Injury: “Did you really just compare me to a puppy learning to walk?”



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## Abstract

**BACKGROUND:** Repetitive concussive injury can lead to a variety of systemic findings. Significant overlays have been found between Traumatic Brain Injury (TBI) and Post Traumatic Stress Disorder (PTSD). Treatment for TBI and post-concussive syndrome (PCS) may allow patients to more appropriately manage their PTSD.

**CASE REPORT:** JB, a 26-y.o. U.S. Army enlisted soldier, reported for in the TBI Clinic at Landstuhl Regional Medical Center (LRMC) following a recent weight loss in 2011. He complained of persistent headaches with photo- and phonophobia, dizziness and imbalance, fatigue, poor memory and concentration, irritability, insomnia, tinnitus, and blurry vision. His weight loss was suspected to be from inflammatory bowel disease. His medical history was also significant for post-concussive syndrome, chronic post-traumatic stress disorder, vertigo, drug-induced accommodative dysfunction, anxiety, depression, and joint pain. He was taking multiple medications for migraines and mood stabilization as well as for pain. He had been evaluated and treated in 2010 for blast exposure incurred on a deployment during 2005-2006.

JB had poor oculomotor control; moving his eyes caused dizziness and swaying backwards when he was standing. He had to look at the floor to walk in a straight line. When tested for ego-center, he consistently indicated objects were centered when aligned approximately mid-pupil over his right eye.

JB was assigned yoked prism (4° base-left OU) to wear four hours per day. While wearing yoked-prism glasses, he was to execute oculomotor, eye-hand coordination, and balance and ambulation activities. After two weeks of therapy he had improved stability while wearing the yoked-prism glasses and noticed visual distortion through the prism. After three weeks of therapy, his midline testing showed consistent center over the right nasal canthus. He started weaning off yoked prism, decreasing by one hour per week with the intent to incorporate oppositional prism to challenge his balance.

JB was subsequently assigned to an in-patient TBI/PTSD rehabilitation program in Texas and not seen for further evaluation.

**DISCUSSION:** Significant physical impairments can delay a patient’s ability to address psychological trauma. Providing physical rehabilitation to patients to help return automatic function may allow them to more appropriately address psychological trauma.

- » Cymbalta can cause blurred vision, dizziness, somnolence, and fatigue.
- » Xanax can cause decreased accommodation and depth perception as well as abnormal EOM movements; it can also cause blurred vision, diplopia, or photophobia.
- » Abilify can cause blurred vision and photophobia as well as agitation, anxiety, insomnia, dizziness, tremor, or possible abnormal gait.
- » Tramadol can cause dizziness, headaches, and somnolence. It can also cause nervousness, anxiety, tremor, and agitation.
- » Ambien can cause visual disturbances, ataxia, and dizziness.

- Rehabilitation plan
  - Initial prism intervention with yoked base left was to alleviate symptoms.
  - Visually-guided movement incorporated into all therapy activities to re-establish spatial mapping and reset subjective awareness of egocenter.
  - After 3 weeks of prism and movement rehabilitation training, the patient was moving toward normal egocentric awareness.
  - Moving forward, the alleviating prism would have been weaned; perturbation with prism in the opposite direction (yoked base right) could have been introduced to fine-tune spatial awareness and somatosensory integration.

TABLE 1: PATIENT EVALUATION SUMMARY FROM 1 YEAR PRIOR

DATE	EXAM	ADDITIONAL INFORMATION
29 Jun 2010	Initial Neurology Exam  History of Injury: <ul style="list-style-type: none"> <li>• IED blast 6-7 feet (2 meters) from HUMVEE resulting in significant rear end damage</li> <li>• Recalls being awakened by ammonia inhalant but no further treatment at the time of incident</li> </ul> Initial symptoms: <ul style="list-style-type: none"> <li>• Tinnitus</li> <li>• Blurred vision</li> <li>• Headache</li> <li>• Amnesia immediately after the event, cleared in a few days with rest</li> </ul>	Persistent symptoms: <ul style="list-style-type: none"> <li>• Headache:                                     <ul style="list-style-type: none"> <li>– daily pressure type, preceded by an aura,</li> <li>– beginning at the base of the head radiating anteriorly</li> <li>– nausea/vomiting and decreased appetite</li> </ul> </li> <li>• Balance and coordination problems</li> <li>• Poor concentration</li> <li>• Sporadic tinnitus, diminished hearing</li> <li>• Frequent awakenings at night to nightmares, cold sweats, and racing thoughts</li> </ul> At time of initial exam had completed 3-week PTSD program and reported 3 suicide attempts
14 Jul 2010	Initial Optometry Exam	<ul style="list-style-type: none"> <li>• Drug-induced Accommodative Dysfunction</li> <li>• Reading Rx prescribed</li> </ul>
15 Jul 2010	Neurology Follow up	<ul style="list-style-type: none"> <li>• Elevated liver enzymes</li> <li>• Right upper quadrant abdominal pain</li> </ul>
26 Jul 2010	MRI	Within normal limits with and without contrast

TABLE 2: COMPREHENSIVE LIST OF PATIENT MEDICAL DIAGNOSES BY CATEGORY

SYSTEMIC CONDITIONS INCLUDING PAIN	TRAUMATIC BRAIN INJURY	BEHAVIORAL HEALTH
<ul style="list-style-type: none"> <li>• Primary snoring</li> <li>• Abdominal pain, Chronic diarrhea of unknown origin, Gastroenteritis</li> <li>• Abnormal liver function test (amitriptyline use)</li> <li>• Pain localized to one or more joints                             <ul style="list-style-type: none"> <li>– Osteochondritis dissecans (knee joint, pain/degeneration)</li> <li>– Pes planus (flat feet)</li> <li>– Ankle joint pain</li> <li>– Neck stiffness</li> <li>– Pain in the arms</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Postconcussion syndrome</li> <li>• Headache syndromes, Common migraine (without aura) with status migrainosus</li> <li>• Memory lapses or loss</li> <li>• Speech difficulties</li> <li>• Disturbance of smell</li> <li>• Drug-induced disorder of accommodation</li> <li>• Vertigo</li> <li>• Auditory hallucinations</li> <li>• Insomnia</li> </ul>	<ul style="list-style-type: none"> <li>• Chronic post-traumatic stress disorder</li> <li>• Psychiatric diagnosis or condition deferred on axis I</li> <li>• Anxiety disorder NOS</li> <li>• Axis V global assessment of functioning (GAF) scale</li> <li>• Major depression, recurrent</li> <li>• Moderate recurrent major depression</li> <li>• Adjustment disorder with depressed mood</li> </ul>

## History

18 Jul 2011: Complains of blurry vision and photophobia with migraines

- MOI: 2005-2006 18 IED blasts, 1 resulting concussion no LOC, PT had a gunshot to the chest with LOC.
- 13 Jul 2011 neurology exam
  - Table 1 lists findings from initial evaluation period from 29 Jun -26 Jul 2011; patient subsequently lost to follow-up
  - Was deployed and sent back to LRMC for evaluation of abdominal pain with diarrhea and 20+ pound weight loss; suspect IBD
  - Reports previous history of concussion/blast events
  - Persistent symptoms of headache/photophobia/phonophobia, dizziness and balance problems, fatigue, poor memory and concentration, irritability, insomnia, tinnitus, blurry vision
  - Table 2 shows all medical diagnoses
- Medications
  - Topiramate, unknown dose, 2 tablets morning and afternoon for migraine
  - Sumatriptan, 25 mg x 0.5-1 tablet as needed at onset of migraine
  - Cymbalta, 60 mg x2 every morning for depression and anxiety
  - Xanax, 0.5 mg TID taking 2 pills in am for anxiety
  - Abilify, 10 mg every morning for adjustment disorder
  - Tramadol, 50 mg x 1-2 tablets as needed for GI pain
  - Ambien, 10 mg every night for sleep
- Table 3 shows a summary of follow-up visits.

## Key Considerations for This Patient

- Post-Traumatic Stress Disorder<sup>1</sup>
  - mTBI patients 2.8 times more likely to develop psychiatric disorder including PTSD
  - Military survey: 16% of troops with bodily injury versus 44% of those with mTBI screened positive for PTSD
- Persistent Effects of Traumatic Brain Injury<sup>2,3</sup>
  - Post-Trauma Vision Syndrome
  - Post-Concussion Syndrome
- Chronic Pain<sup>4</sup>
  - Painful stimulation causes ipsilateral shift in subjective body midline position
- Medication interactions
  - Most common medication categories for TBI and CVA patients in study of hospital-based population were anti-anxiety, antidepressant, and anti-convulsant<sup>5</sup>
    - » Medication use did not appear to affect frequency of visual symptom reporting
  - The following specific medication side-effects may have complicated the patient’s presentation<sup>6-7</sup>
    - » Topiramate can cause diplopia and nystagmus when taken in high-dosage
    - » Sumatriptan can cause anxiety and dizziness.

## References

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TABLE 3: SUMMARY OF OFFICE VISITS

Type of Visit	18-JUL-11	1-SEP-11	7-SEP-11	10-SEP-11	16-SEP-11	21-SEP-11
Visual Midline Testing	Optometry Exam Not tested Shift not seen 14 July 2010	Co-Evaluation Optometry and Physical Therapy Centered over right pupil Vertical: no shift ant/post Objective and Subjective	Vision Therapy Oculomotor Eval Centered over right pupil Localization: Past pointing to the right of target all presentations in right field. Improved accuracy in left field.	Vision Therapy Not tested	Physical Therapy Not tested	Optometry Exam Centered over right nasal canthus
Saccades	Ability: 4/4 Accuracy: 3/4 Head Movement: 4/4 Body Movement: 4/4, tested seated Quality: (+)dizziness	Ability: 3/4 Accuracy: 3/4, undershoot; pendular rapid nystagmus-type movement noted when change direction horiz/vert/diag Head Movement: 4/4 Body Movement: 3/4, sway mostly backward Quality: (+)dizziness	No change from previous	Not tested	Not tested	Ability: 4/4 Accuracy: 3/4, undershoot, no nystagmus on transitions Head Movement: 4/4 Body Movement: 3/4, sway mostly backward Quality: (+)dizziness
Smooth Pursuit	Ability: 4/4 Accuracy: 3/4, saccadic intrusions Head Movement: 4/4 Body Movement: 4/4, tested seated Quality: (-) dizziness/ diplopia	Ability: 3/4 Accuracy: 2/4, pendular rapid nystagmus-type movement on vertical and rotation at variable points, (-)blur, (-)diplopia Head Movement: 4/4 Body Movement: 3/4, sway mostly backward Quality: (+) dizziness, (-) diplopia	No change from previous	Not tested	Not tested	Ability: 4/4 Accuracy: 3/4, saccadic intrusion only Head Movement: 4/4 Body Movement: 4/4 no sway Quality: (-) dizziness/ diplopia
Gait and Balance	Not tested	Forward: avg speed, min veer, gaze slightly down Backward: slow Forward head up/down: ran into wall right side, (+) dizzy/blur Forward head side/side: incr dizziness, extreme veer right (held to prevent walking into wall) Tandem forward: looking down able to walk straight, slow. Looking forward falls to either side Romberg: eyes open, feet side by side wobble to either side, falls to either side with either leg forward Fukuda: 360 turn to right in 30 seconds 5° yoked prism base right: repeat Romberg eyes open with feet side by side, falls backward 5° yoked prism base left: standing Romberg–stay standing with feet side by side and with either leg in front. Tandem walk able to stay on line but slow.	Wearing yoked prism (5° base left) Forward while moving head up and down and was able to keep balance Forward while moving head left to right and was able to keep balance	Wearing yoked prism (5° base left) Forward without head movement, with visual scanning x 3 round-trips of 30 foot track – no dizziness. Backward, able to maintain forward gaze no dizziness x 2 roundtrips. Tandem walk x 3 roundtrips without loss of balance, maintained forward gaze.	Pt received yoked prism glasses Significant subjective improvement in activity performance (+) Dizziness and nausea with wear	With yoked prism: smooth tandem walk without looking at floor, no falls. Without yoked prism: slight wobble, no looking at floor
Therapy	None assigned	None performed	Fast pointing Mazes Percon maze trace Peg sorting	Marsden ball Fast pointing Peg sorting Balance on BOSU (ball side down) Trashcan basketball		
Plan	Return for vision therapy training Return for co-evaluation with optometry and physical therapy	Yoked prism 4 hours per day with therapy activities Ordered yoked prism glasses (4°)for home training Return for vision therapy and physical therapy 3x/week to use loaner prism glasses (5°) in-office Vision therapy to include oculomotor, visuomotor, and fine motor activities Physical therapist to add left-side resistance to enhance proprioceptive feedback Refer to audiology for VNG	Continue from previous	Continue from previous	Continue from previous	Yoked prism 2 hours per day Perform therapy activities 1 time per day with yoked prism on and 1 time per day without yoked prism Patient enrolled in off-site PTSD/TBI program Planned return for further follow up after completion Lost to follow-up

