Neuro-Optometric Rehabilitation in the Management of Visual Snow Syndrome: A Case Study

Priya Pandey M.Optom, FCSO-USA, MCOptom-UK, (PHD), Rabindra K Pandey M.Optom. FOVDR-USA, FAAO, MCOptom- UK,(PHD)
Ayush Arora- B.Optom, FBVVT, Sourin Pal-M.Optom, FBVVT, Archana Visweshwer- B.Optom, FPO ,Vinodhini Ravi- B.Optom

Introduction

Visual Snow Syndrome (VSS) is an uncommon, complex neurological condition characterized by the persistent perception of "flickering" or "static" dots across the visual field, resembling television static or pixelation[1]. First identified in 1995, VSS has been classified as a distinct clinical entity, although its pathophysiology remains poorly understood[2,3]. Patients experience visual disturbances such as palinopsia (afterimages), photophobia, nyctalopia(night blindness), and enhanced entoptic phenomena including floaters and the blue field entoptic effect[4,5,6]. While it is typically considered benign, in rare cases VSS may herald the onset of more serious neurological diseases[7].

The diagnosis of VSS is typically one of exclusion. A detailed ophthalmic evaluation is required to rule out other possible causes such as retinal diseases, persistent migraine aura, or effects from hallucinogenic drugs[8]. MRI studies have demonstrated widespread alterations in brain networks in individuals with VSS, with both hyper and hypoconnectivity observed[9]. This may contribute to the unclear pathophysiology of the disorder. Common comorbidities such as tinnitus, migraine (with or without aura), anxiety, and depression further complicate both diagnosis and treatment[10,11,12].

Despite the complexity of diagnosis, recent studies have focused on the ocular and neurological aspects of VSS. However, parameters such as the pupillary light reflex and contrast sensitivity—often abnormal in individuals with migraine aura—have not been thoroughly assessed in patients with VSS, despite a potential overlap in pathophysiology[13,14,15]. Treatment strategies remain limited, but recent attention has been given to neuro-optometric rehabilitation therapy (NORT), which involves customized neurosensory and neuromuscular exercises to address symptoms related to oculomotor dysfunction and visual processing issues[16,17,18]. Though there is no definitive treatment for VSS, NORT has shown promise in alleviating symptoms and improving the quality of life for patients[19].

This case study explores the successful implementation of NORT in the management of VSS, emphasizing its efficacy in addressing the unique visual disturbances experienced by the patient.

Case summary & Methodology

Patient Demographics and History:

The patient is a 21-year-old male who presented with complaints of asthenopia, light sensitivity, and persistent perception of flickering dots of varying intensities across his entire visual field over the past two years. He also reported chromatic halos, motion sickness, after images (lasting for 3–5 seconds), intermittent double vision, and the phenomenon he described as a "river effect" while reading, which he attributed to the visual distortions caused by the static-like disturbance in his vision. The patient also experienced glare and had difficulty reading due to his symptoms.

His ocular and medical history revealed a diagnosis of visual snow syndrome, accompanied by anxiety and migraine headaches. His initial glass prescription was: OD: +0.00/-0.50 X 165 (6/6P, N6), OS: +0.00/-0.50 X 30 (6/6P, N6), with best-corrected visual acuity (BCVA) of OD: -0.25/-0.50 X 35 (6/6, N6), OS: -0.25/-0.50 X 20 (6/6, N6).

Treatment Plan:

Our Neuro-Optometric Rehabilitation Therapy(NORT) protocol incorporated optometric photo-biomodulation and precision tinted lenses with 50 In-office sessions of neuro-optometric rehabilitation. The treatment focused on improving binocular vision, accommodative facility, oculomotor control, and gaze stabilization along with visual-vestibular therapies.

The core elements of therapy included:

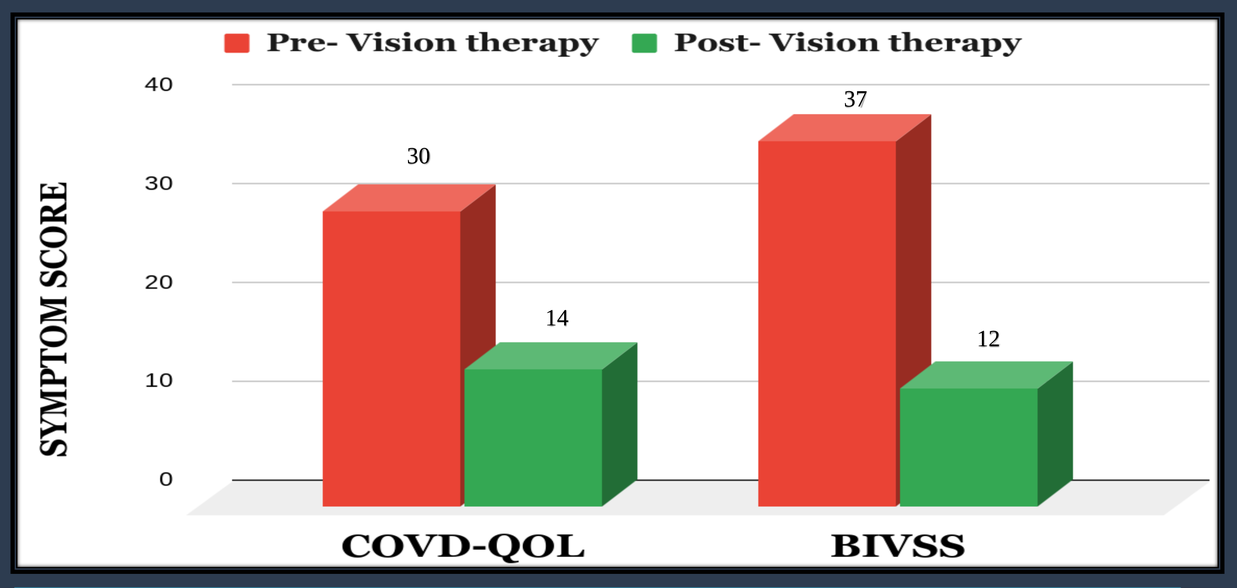
(Table no.1 Description of NORT activities used in this case of VSS)

ACTIVITIES	DESCRIPTION	PHASE I	PHASE II	PHASE III
SACCADES & PURSUITS **SANET VISION INTEGRATOR**	Computer-based therapeutic instrument that can be used to enhance visual abilities: Pursuits, Saccades, Fixation stability, Eye-hand Coordination	Saccades module (large target)promoted eye hand coordination	Saccades module (medium target)	Fast saccades module (small target) with balance board
MARSDEN BALL	Improves spatial awareness i.e. Egocentric and oculocentric localization	Tapping ,catching with smaller saccades and pursuits movement	Tapping ,catching with larger saccades and smaller pursuits movement	Tapping ,catching with lager saccades and smaller pursuits movement with balance board
HART CHART	To improve and develop more precise and sophisticated saccadic eye movement ability	10 X 10	10 X 10 with balance board	10 X 10 with balance board and added metronome
4 CORNER SACCADIC CHART	To enhance and refine advance saccadic eye movement skill	5 X 5	10 X 10 with balance board	10 X 10 with balance board and added metronome
VERGENCE **VTS-4**	Computer based orthoptics training software, helps in training fusional ranges at different distance	Manual vergence	RDS	RDS and manual vergence at 3m with balance board
TRANAGLYPHS	Increases fusional vergence amplitude, velocity and latency	Series 500 BI & BO	Series 600 BI & BO	Series 605,607,610 BI & BO
ACCOMMODATION **Monocular accommodative Rock**	Improves rapid and accurate change of visual focus at a near.	Loose lens rock MAF +/-1.50D with large targets	Loose lens rock MAF +/2.00D with medium targets	Loose lens rock MAF +/-2.00D with fine targets
Binocular accommodative Rock	Binocularly improves rapid and accurate focus at near	BAF +/-1.50D with large targets	BAF +/-2.00D with small targets	BAF +/-2.50D with fine targets
VESTIBULAR **BTS (balance tracking systems)**	Uses the visual system to guide shifts in the centre of balance.	Left and right target	Front and back target	Diagonal and random target
GAZE STABILIZATION EXERCISE (VOR)	Exercises to enhance eyes, inner ears, and ,brain processing.	Primary gazes	Secondary gazes	Tertiary gazes
SPACE FIXATOR	Improves visual-spatial skills	Sstandard	Metronome added	Balance board and metronome
PERIPHERAL AWARENESS	Develops peripheral awareness	Peripheral chart (large) with 4 direction	Peripheral chart (medium) with 6 direction	Peripheral chart (small) with 8 direction
PHOTO-BIOMODULATION	To balance sympathetic and parasympathetic nervous system			

Results

(Table no.2 Pre and Post vision therapy parameters)

PARAMETERS	PRE VISION-THERAPY	POST VISION THERAPY
BINOCULAR VISION PARAMETERTS		
Cover test	D: High Exophoria N: Intermittent Exotropia	D: Orthophoria N: Orthophoria
Near point of convergence	20 cm	1-5 cms
NFV	D: 4/18/10 N: 6/X/X	D: X/22/16 N: 12/20/16
PFV	D: 6/12/10 N: 9/X/X	D: 21/30/26 N: 28/34/31
Amplitude of accommodation	OD: 8.3D OS: 8.3D OU: 9D	OD: 11D OS: 11D OU: 10.5D
Accommodative Facility	OD: 5cpm OS: 2cpm OU: 2cpm	OD: 12cpm OS: 12cpm OU: 5cpm
SYMPTOM SCORE		
Quality of life questionnaire	30	14
BIVSSS	37	12



Discussion & Conclusion

Discussion

Visual Snow Syndrome (VSS) is a rare, visually debilitating disorder that presents with persistent positive visual phenomena, such as flickering static, visual distortions, and other sensory disturbances. This case illustrates the successful application of NORT in managing the visual disturbances associated with VSS, particularly when traditional treatments like medications and standard optical corrections fail to provide relief.

The neuro-optometric rehabilitation strategy, which included precision-tinted lenses and a tailored vision therapy regimen, addressed the patient's oculomotor deficits, vergence dysfunction, and reduced accommodative facility. Precision-tinted lenses, typically prescribed for patients with light sensitivity, have been shown to help reduce the photophobia and glare experienced by migraineurs and patients with VSS[17,18]. The vision therapy protocol integrated binocular vision exercises, accommodative training, and dynamic visual processing tasks, which together resulted in marked improvements in the patient's visual comfort, quality of life, and functional vision.

The positive outcome observed in this case aligns with existing literature suggesting that neuro-optometric rehabilitation can play a significant role in managing complex visual and oculomotor disturbances in VSS patients[19]. Although the exact mechanisms of VSS remain elusive, the improvements in vergence ranges, accommodative flexibility, and oculomotor control suggest that the visual system can be rehabilitated, at least partially, through targeted interventions aimed at addressing underlying dysfunctions in visual processing.

Conclusion

This case study underscores the transformative potential of Neuro-Optometric Rehabilitation in managing Visual Snow Syndrome(VSS). The remarkable improvements in the patient's visual disturbances and overall quality of life following treatment demonstrate how a customized, multidisciplinary approach targeting both sensory processing and neuromuscular control can offer significant relief for those affected by this intricate condition. Vision therapy interventions, specifically designed to recalibrate the visual and neurological systems, play a crucial role in addressing the underlying dysfunctions associated with VSS. By enhancing the brain's ability to process visual input more accurately, patients can experience a notable reduction in symptoms such as visual static, light sensitivity, and difficulties with contrast perception.

Additionally, the patient's enhanced ability to perform daily tasks and engage in regular activities further emphasizes the holistic impact of vision therapy on both functional vision and psychological well-being. The integration of therapeutic techniques like eye-tracking exercises, visual-motor coordination activities, and peripheral awareness training within a neuro-rehabilitative framework illustrates how targeted vision therapy can address the neural inefficiencies that contribute to VSS.

Looking forward, continued research into Neuro-Optometric Rehabilitation is crucial to further refine treatment protocols for Visual Snow Syndrome. By deepening our understanding of the neuroplastic mechanisms involved, we can develop more advanced, individualized therapies that not only alleviate symptoms but also provide long-term, sustainable improvement in visual function and overall quality of life for those affected by this complex condition. This approach holds the potential to redefine care for patients with VSS, transforming their visual and neurological health outcomes.

References

https://docs.google.com/document/d/1jLGwyagpuu5RizfpNJxQHAbT-8SxPxGf-1Til1BsZ1M/edit?usp=sharing