

Case Report
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Improvement in Visual Acuity in a Patient with Nonsyndromic Retinitis Pigmentosa Following Combined Vision Therapy: A Case Report

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ABSTRACT

Background: Retinitis Pigmentosa (RP) is a progressive hereditary retinal degenerative disorder characterized by photoreceptor loss, progressive visual field constriction, and eventual central vision impairment. We report a case of a 40-year-old female patient with retinitis pigmentosa presenting with headache, bilateral blurred vision (distance and near), poor hand-eye coordination, oculomotor dysfunction, dizziness, impaired object perception, night blindness, mobility limitations, and reading fatigue.

Case Presentation: The initial examination indicated that the patient's unaided distance visual acuity was 6/60 in the right eye (OD) and 6/48P in the left eye (OS). The near vision was recorded as N36P in the right eye and N36 in the left eye. Optical coherence tomography (OCT) revealed bilateral foveal thinning accompanied by fine epiretinal membranes. The Humphrey visual field analysis (HVF 10-2) showed severe generalized depression, along with significant localized defects.

The patient subsequently participated in a structured three-phased vision rehabilitation program, which included a total of 173 office-based sessions. The first phase lasted for 60 days, followed by 30 days of sessions each subsequent year.

Results: Following combined vision therapy, the patient demonstrated remarkable improvement. Best-corrected visual acuity (BCVA) improved to 6/18+4 bilaterally, with near vision improving to N8P with reading glasses. Stereoacuity improved from flat fusion to 140 seconds of arc. Complete resolution of asthenopic symptoms, including diplopia, headache, eyestrain, and reading fatigue, was achieved. The patient reported enhanced functional independence, improved dark adaptation, better mobility, and increased reading efficiency.

Conclusion: This longitudinal case study demonstrates significant visual acuity and binocularly and functional recovery in a patient with retinitis pigmentosa following structured, multimodal vision therapy. The success of combined therapy highlights the potential of tailored vision rehabilitation to restore binocularly and enhance quality of life in retinal degenerative conditions. These findings advocate for expanded research into comprehensive rehabilitation protocols for patients with progressive retinal disorders.

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Introduction

Retinitis Pigmentosa (RP) represents a heterogeneous group of inherited retinal dystrophies characterized by progressive degeneration of photoreceptor cells in the retina, leading to progressive vision loss. The disease typically manifests initially with night blindness (nyctalopia) and progressive constriction of the visual field, frequently progressing to tunnel vision and, in advanced stages, to severe central vision impairment [1,2]. The condition was first clinically described in 1853 and the terminology was established in 1857, although the name persists as somewhat

of a misnomer given that inflammation plays only a minimal role in disease progression [2].

Epidemiology and Global Impact

Retinitis pigmentosa represents one of the most common inherited causes of visual disability worldwide. The nonsyndromic form of RP has a global prevalence of approximately 1 in 5,000 individuals, with significant geographical variation [2,3]. Prevalence estimates range from 1 in 3,026 in Denmark to 1 in 4,869 in Birmingham, UK, and as high as 1 in 372 in rural India, likely reflecting differences in methodology, case definitions, and the prevalence of consanguineous marriages in certain populations [2,3]. Retinitis pigmentosa constitutes approximately 50% of all inherited retinal diseases, affecting more than 1.5 million individuals globally [2,3].

Men are affected slightly more frequently than women, primarily due to higher expression of X-linked forms in males [2].

The age of symptom onset is dependent on the genetic inheritance pattern. Autosomal recessive RP typically presents with symptoms during early adolescence, while autosomal dominant RP may not manifest until the second or third decade of life [2]. Approximately 75% of individuals with RP present for clinical evaluation and diagnosis by age 30 years [2]. The average age of diagnosis has been reported at 35.1 years (median 36.5 years) in population-based studies [2].

Clinical Features

The classic fundoscopic triad of RP includes bone spicule pigmentation, vascular narrowing, and optic nerve head pallor, though these findings may not be evident early in disease progression [2-4]. Associated findings frequently include epiretinal membranes (evident in up to 94% of RP patients), posterior subcapsular cataracts (affecting approximately 72% of patients), and macular edema [2]. OCT imaging typically demonstrates photoreceptor layer disruption, particularly at the inner segment/outer segment junction and external limiting membrane, while the fovea is often relatively preserved until advanced disease stages [2].

Current Management and Limitations

Currently, no definitive cure exists for retinitis pigmentosa. Conventional management primarily emphasizes supportive care including provision of low-vision aids, orientation and mobility training, and genetic counselling [2,3]. While vitamin A supplementation has been advocated for many years based on the hypothesis that it may slow retinal deterioration, evidence remains mixed and inconclusive; current evidence does not uniformly support supplementation for most RP patients, though specific subgroups may benefit [2].

Emerging therapeutic approaches under investigation include gene therapy, particularly showing promise with FDA-approved voretigene neparvovec-rzyl for *RPE65*-related Leber congenital amaurosis; stem cell therapy exploiting retinal progenitor cells and pluripotent stem cells; neuroprotective approaches utilizing growth factors and antioxidants; and retinal prosthetic implants [2,3]. However, these approaches remain investigational or available only for specific genetic subtypes, leaving the majority of RP patients without curative options.

Vision Rehabilitation and Therapy: Emerging Evidence

Given the absence of curative treatments and the progressive nature of RP, vision rehabilitation has emerged as an important therapeutic approach focused on optimizing residual visual function and enhancing quality of life. Vision therapy encompasses multiple modalities aimed at improving oculomotor control, enhancing binocular coordination, strengthening visual processing capabilities, and promoting neural adaptation to vision loss.

Structured vision rehabilitation programs combining multiple therapeutic techniques have demonstrated potential benefits in improving functional vision. Low vision device provision significantly enhances functional independence, with research demonstrating substantial improvements in visual acuity and daily task performance.[3] Binocular vision therapy targeting fixation instability, oculomotor dysfunction, and suppression can restore functional stereopsis and improve visual comfort [2].

Emerging evidence suggests that phototherapy modalities, particularly syntonic phototherapy employing specific light wavelengths to modulate autonomic nervous system activity, may complement traditional rehabilitative approaches. Syntonic phototherapy stimulates sympathetic activation to enhance arousal and reduce visual fatigue and promote parasympathetic relaxation and peripheral visual awareness [5].

Rationale for the Present Case Report

The present case represents a comprehensive implementation of integrated vision therapy combining traditional orthoptic techniques, computerized visual-motor integration training, autovergence exercises, and advanced phototherapeutic interventions. This multimodal approach systematically addresses the multiple dimensions of visual dysfunction characteristic of RP. The patient achieved substantial improvements in visual acuity, binocular function, and symptom resolution following intensive therapy, demonstrating the potential of structured vision rehabilitation to produce meaningful functional gains even in progressive retinal disease.

This case contributes to the emerging evidence base supporting comprehensive vision rehabilitation for RP patients and highlights the potential for structured, individualized therapeutic approaches to enhance outcomes beyond conventional supportive care and low-vision aids alone.

Case Presentation

Patient Demographics and Chief Complaints

We report the case of a 40-year-old female patient diagnosed with nonsyndromic retinitis pigmentosa who presented to our vision rehabilitation clinic with multiple visual and functional complaints. Primary symptoms included persistent headaches, bilateral blurred vision affecting both distance and near tasks, markedly reduced hand-eye coordination, difficulty tracking moving targets, dizziness, impaired ability to judge sizes and shapes of objects, night blindness, mobility limitations, particularly in dim lighting, and significant reading fatigue. These symptoms substantially impacted her daily functioning, independence, and ability to participate in family activities including her children's education.

Initial Examination Findings

Visual acuity assessment showed a significant reduction in both distance and near vision. The unaided distance visual acuity was 6/60 in the right eye (OD) and 6/48P in the left eye (OS), while near visual acuity was N36P in OD and N36 in OS. Color vision was impaired bilaterally. Evaluation of stereopsis using the Titmus fly stereo test revealed a complete absence of stereopsis, indicating flat fusion.

Ocular motility and binocular function assessments at first presentation highlighted considerable oculomotor dysfunction, with saccadic inaccuracy, reduced smooth pursuit gain, accommodative insufficiency, and a complete absence of functional binocular coordination. The patient demonstrated compensatory head movements during visual tracking and reported frequent diplopia, particularly during near tasks.

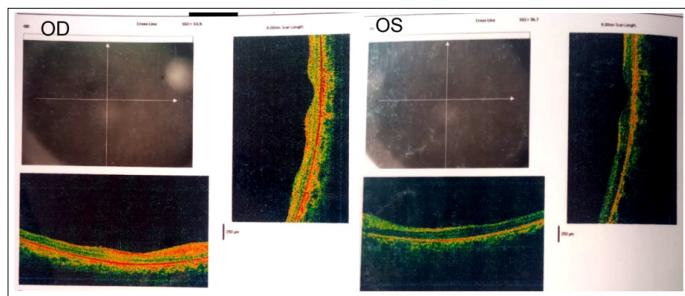


Figure 1: Initial OCT Report of Both Eye

Optical coherence tomography (OCT) of the macula revealed bilateral foveal thinning consistent with photoreceptor and outer retinal layer degeneration, presence of a fine epiretinal membrane (ERM) in both eyes, preserved foveal architecture despite generalized thinning, and evidence of inner retinal layer thinning.

Fundus photography showed classic features of retinitis pigmentosa, with bone-spicule pigmentation distributed throughout the peripheral and mid-peripheral retina, waxy pallor of the optic nerve head bilaterally, and attenuation of the retinal arterioles. The central macula was preserved, and there was no evidence of cystoid macular edema.

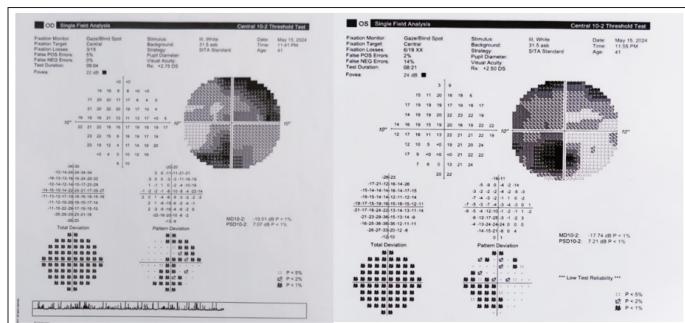


Figure 2: Initial HVF Report of Both Eye

At baseline, the patient's Humphrey visual field analysis revealed profound central visual field loss in both eyes, consistent with advanced retinitis pigmentosa. For the right eye (OD), the central 10-2 threshold test showed a mean deviation (MD) of -19.51 dB ($P < 1\%$) and a pattern standard deviation (PSD) of 7.07 dB ($P < 1\%$), indicating severe generalized depression with pronounced patchy defects across the field, especially in the superior and inferior quadrants. Foveal sensitivity was 22 dB, with low fixation losses and minimal false positive and negative errors, and the deviation maps confirmed both widespread and localized areas of significant loss. In the left eye (OS), the MD was -17.74 dB ($P < 1\%$) and the PSD was 7.21 dB ($P < 1\%$), with a foveal sensitivity of 24 dB; the overall field was marked by extensive sensitivity loss and dense scotomatous regions, particularly in the inferior central field, though test reliability was somewhat reduced due to increased fixation losses and error rates. Together, these findings confirm the presence of extensive, bilateral, and predominantly inferior central visual field constriction with scattered absolute and relative scotomas, establishing a clinical profile of severe and advanced visual field compromise at presentation.

Based on this comprehensive clinical examination, imaging, and visual field analysis, the patient was diagnosed with bilateral nonsyndromic retinitis pigmentosa (confirmed genetic retinal dystrophy), bilateral foveal thinning with epiretinal membrane formation, severe generalized visual field constriction involving

the central region, binocular vision dysfunction with absent stereopsis, accommodative insufficiency, oculomotor dysfunction including saccadic and pursuit deficits, and an asthenopic symptom complex.

Treatment Rationale and Patient Counseling

Given the progressive degenerative nature of retinitis pigmentosa and the absence of definitive medical or surgical treatment options, a comprehensive vision rehabilitation approach was proposed. The patient and family received extensive counseling regarding:

- The progressive nature of RP and expected disease trajectory.
- Realistic therapeutic goals focusing on optimizing residual visual function.
- Potential benefits including improved functional vision, reduced symptoms, and enhanced quality of life.
- Limitations including inability to reverse underlying photoreceptor degeneration.
- Time commitment required for intensive vision therapy.
- Importance of regular monitoring to track progression.

After thorough discussion and informed consent, the patient elected to pursue a structured, multimodal vision therapy program.

Treatment Protocol Overview

A comprehensive three-phase vision therapy program was implemented, consisting of 173 office-based therapy sessions conducted over approximately 11 months. Sessions were scheduled at a frequency of 5–6 days per week, with each session lasting 40–45 minutes. The phased approach progressed systematically from monocular visual function enhancement through binocular integration to functional vision neurotherapy, allowing gradual development of foundational skills before advancing to more complex visual tasks.

Phase 1: Monocular Visual Function Enhancement Therapeutic Objectives

The primary objectives of Phase 1 were to establish robust monocular visual functions in each eye independently, serving as the foundation for subsequent binocular integration. Specific targets included improving saccadic accuracy and speed, enhancing smooth pursuit tracking, increasing accommodative facility and amplitude, developing perceptual discrimination abilities, and expanding functional peripheral awareness.

Saccadic Eye Movement Training

Structured saccadic exercises were implemented to improve rapid, accurate gaze shifts between targets. The protocol involved horizontal and vertical saccades with targets positioned at varying eccentricities (10–30 degrees) requiring rapid fixation shifts, diagonal saccades to train oblique eye movements often neglected in standard exercises, sequential targeting using multiple arrays for systematic scanning, variable distance saccades combining saccadic movements with accommodative demands, and progressive difficulty with smaller targets and increased separation. Sessions emphasized accuracy before speed, and the patient was instructed to execute eye movements without compensatory head movements to isolate extraocular muscle control.

Smooth Pursuit Training

Pursuit exercises targeted the ability to maintain stable fixation on moving targets through linear tracking (horizontal, vertical, and diagonal) at controlled velocities of 5–20 degrees/second), circular tracking (clockwise and counterclockwise at varying diameters), predictable and unpredictable motion (for anticipatory and reactive pursuits), and training initially in monocular, then binocular

conditions. Target velocities were progressively increased as pursuit gain improved.

The Modified Hart Chart method was employed to enhance accommodative flexibility, using systematic near–far alternation (between near and far), progressing from large to smaller print, timed cycles per minute for quantifying improvement, and both monocular and binocular training, with integration into reading tasks.

Convergence and Accommodation Integration

The Brock String provided immediate biofeedback for convergence accuracy by guiding sequential bead fixation on beads at varying distances, cultivating physiological diplopia awareness, suppression detection and elimination, convergence stamina with sustained near fixation, and jump convergence for rapid shifts between near and far beads. This exercise trained convergence facility, accommodative–vergence synergy, and awareness of binocular function.

Using red–green anaglyphic glasses, peripheral visual field utilization was systematically trained by identifying quadrants with 5×5 letter charts placed in superior-right, superior-left, inferior-right, and inferior-left quadrants; following structured scanning sequences; monocular color isolation so that red targets were visible only to the right eye and green only to the left; progressively increasing eccentricity; and applying these skills to navigation and mobility. This encouraged active utilization of residual peripheral visual function and eccentric viewing strategies.

Phase 2: Selective Monocular Stimulation Under Binocular Conditions

Therapeutic Objectives

Phase 2 focused on integrating monocular visual skills into coordinated binocular function, including establishing simultaneous perception, achieving sensory and motor fusion, developing stereopsis, improving fixation stability under binocular conditions, enhancing visual–motor coordination, and eliminating suppression tendencies.

Advanced Visual-Motor Integration

The computerized platform provided sophisticated visual–motor integration training in saccadic precision (random target presentation, reduced target size and exposure, tracking of reaction time and accuracy, adjustment for difficulty), pursuit tracking (complex trajectories, variable velocity, and combined cognitive tasks), hand–eye coordination (mouse/touchscreen tasks, fine motor and spatial-temporal integration), depth perception (stereoscopic presentations, depth ordering, three-dimensional tasks, stereo acuity threshold training), and spatial awareness (visual search, figure-ground discrimination, peripheral target detection, divided attention). The software automatically adjusted task difficulty, and tracked performance longitudinally.

Systematic binocular vision development through computerized autovergence exercises included Level 1 (simultaneous perception: separate images and suppression awareness); Level 2 (sensory and motor fusion: slight image disparity, vergence facility, prism demands, amplitude expansion, fusional reserve, asthenopia reduction); and Level 3 (stereopsis development: random-dot stereograms, disparity training, global/local integration, real-world tasks). Progression required mastery at each level and systematic increase in challenge.

Polarized vectographic materials were used in controlled vergence and stereopsis training for rapid vergence facility drills,

stamina with prolonged fusion, stereoacuity, variable viewing distances, and suppression detection and elimination. Red–green transaglyph overlays allowed unique binocular training for simultaneous perception, fusion during reading and tracking, natural accommodative integration, and progressive complexity from geometric to text materials.

Additional platforms (e.g. VTS4) were employed for anti-suppression activities, range expansion, accommodation–vergence training, and engaging, game-based learning. The Bernell Aperture Rule supported foundational orthoptic training with flat fusion exercises, stereoscopic depth perception, positive and negative fusional vergence, jump vergence, and measurement of vergence facility.

Phase 3: Functional Vision Neurotherapy

Therapeutic Objectives

The final phase integrated neuro-optometric and phototherapeutic interventions intended to optimize foveal function, enhance retinal cell activity, balance autonomic influences, improve fixation stability, reduce visual stress, and promote neural adaptation to residual function.

Foveal Fixation Training

The MIT device provided high-contrast targets, real-time fixation feedback, and quantitative stability measurement in monocular and binocular modes, with difficulty progression as accuracy improved—translating directly to improved task performance in reading and face recognition.

Haidinger Brushes: Entoptic Macular Awareness

Training with Haidinger brushes focused on generating entoptic phenomena under polarized light to build foveal awareness, fixation centering, eccentric viewing correction, and appreciation of macular pigment, delivering immediate perceptual feedback for central fixation.

Foveal Tagging Method: Afterimage Training

Afterimage training reinforced foveal awareness and fixation stability through brief, intense flashes generating retinal afterimages, projection and tracking exercises, awareness of eye movements, and repeated activation of foveal–cortical pathways.

Syntonic Phototherapy: Autonomic Balance and Retinal Stimulation

Phototherapy used specific wavelength filters—alpha-delta (red–orange) for sympathetic activation (arousal, fatigue reduction, central function) and mu-epsilon (blue–green) for parasympathetic activity (relaxation, peripheral awareness, fixation stability, emotional regulation)—applied in 20-minute sessions, scheduled for individual therapeutic goals.

Vision Restoration Training (VRT)

VRT protocols incorporated computer-based training with threshold-level edge stimulation, forced-choice discrimination, progressive border expansion, long-term adherence (6–12 months), and neuroplastic adaptation at defect margins.

Low Vision Adaptive Strategies

Eccentric Viewing Training (EVT) addressed central vision loss by mapping and consistently training use of a preferred retinal locus (PRL), with compensatory head movements, reading and navigation strategy development, and mobility application. Contrast Sensitivity Enhancement targeted RP-associated deficits through contrast discrimination, glare recovery, low luminance

adaptation, and spatial frequency recognition—reinforcing real-world functional improvements.

Follow-Up Assessments

Final Assessment (After 173 Total Sessions)

Visual Acuity Outcomes

Dramatic improvements in visual acuity were documented:

- Distance Visual Acuity (BCVA): Bilateral improvement to 6/18+4 (from 6/60 OD and 6/48P OS)
- Near Visual Acuity: Bilateral improvement to N8P with reading glasses (from N36P OD and N36 OS)

These improvements represent clinically significant functional gains, translating to substantially enhanced ability to perform daily visual tasks including reading, facial recognition, and distance object identification.

Stereopsis Recovery

Remarkable improvement in binocular function was achieved:

- **Baseline:** Complete absence of stereopsis (flat fusion)
- **Final Assessment:** 140 seconds of arc stereoacuity

This represents a progression from no functional depth perception to clinically significant stereoscopic vision, dramatically enhancing spatial awareness, hand-eye coordination, and navigation abilities.

Asthenopic Symptom Resolution

- Complete resolution of all presenting asthenopic symptoms was documented:
- Diplopia: Resolved
- Headaches: Resolved
- Eyestrain: Resolved
- Reading Fatigue: Resolved
- Dizziness: Resolved
- Compensatory Head Tilting: Significantly reduced

Functional Improvements

The patient and family reported substantial qualitative improvements:

- **Independence:** Markedly enhanced functional independence in daily activities.
- **Educational Participation:** Active involvement in children's education.
- **Community Integration:** Able to perform grocery shopping independently in daylight conditions.
- **Dark Adaptation:** Subjectively faster dark adaptation time.
- **Mobility:** Improved confidence and safety during daytime mobility.
- **Near Vision Tasks:** Greater consistency and reduced fatigue during reading and detailed work.
- **Visual Comfort:** Enhanced overall visual comfort and confidence.
- **Reading Efficiency:** Improved reading speed and line tracking accuracy.
- **Postural Compensation:** Reduced need for compensatory head movements.

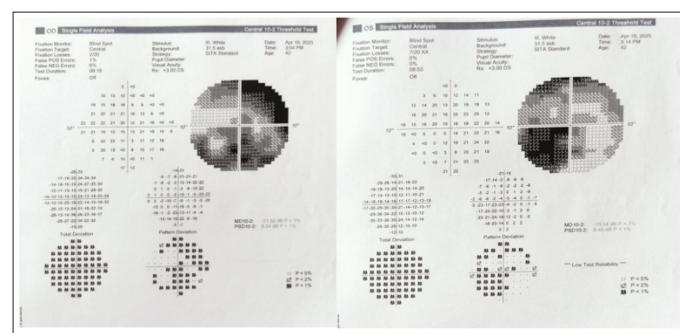


Figure 3: Post Rehabilitation HVF Report of Both Eye

The central 10-2 threshold visual field test for the right eye (OD) revealed a mean deviation (MD) of -21.02 dB and a pattern standard deviation (PSD) of 8.04 dB, both statistically significant at $P < 1\%$. The total deviation and pattern deviation plots indicated extensive generalized sensitivity loss throughout the central 10-degree field, with especially dense scotomatous areas present in the inferior and nasal quadrants. Fixation losses were minimal, with only 2 out of 20, and error rates remained low. The grayscale and deviation maps highlighted pronounced patchy depressions and absolute scotomas, demonstrating features consistent with advanced field loss. For the left eye (OS), the 10-2 threshold test showed an MD of -19.54 dB and a PSD of 8.45 dB, again at $P < 1\%$. Although this field exhibited low test reliability with 7 out of 20 fixation losses, there was diffuse, widespread field loss similar to that seen in the right eye, most pronounced in the inferonasal quadrant, along with dense areas of absolute loss and deep central scotoma. These findings are indicative of severe, bilateral, centrally predominant sensitivity depression with patchy to extensive absolute scotomas, confirming profound and advanced visual field compromise in both eyes.

The patient was advised to maintain regular follow-up visits to ensure sustained progress and to facilitate timely adjustments to the treatment plan as needed.

Discussion

Significance of Findings

This case report demonstrates the effectiveness of a comprehensive, multimodal vision therapy approach in improving visual acuity and binocular function in a patient with retinitis pigmentosa. The documented improvements are particularly noteworthy given the progressive degenerative nature of RP and the general lack of effective treatment options for this condition.

Mechanisms of Improvement

The Observed Functional Improvements Likely Result from Multiple Complementary Mechanisms

While vision therapy cannot reverse photoreceptor degeneration, systematic visual stimulation may optimize the function of remaining photoreceptors through enhanced metabolic activity, improved neural connectivity, and more efficient signal processing. The structured progression from monocular to binocular training ensured maximum utilization of residual function. Targeted saccadic and pursuit training improved the accuracy and efficiency of eye movements, enabling better visual exploration of the environment despite restricted fields. Enhanced oculomotor control compensated partially for field defects by facilitating more effective scanning strategies.

Repetitive, targeted visual stimulation likely promoted cortical adaptation and neuroplastic changes in visual processing pathways. The brain's ability to reorganize and optimize processing of limited visual input was systematically trained through progressive therapeutic challenges. The restoration of stereopsis from complete absence to 140 seconds of arc represents remarkable binocular integration. This improvement enhances depth perception, spatial awareness, and overall visual function beyond simple acuity measures. Coordinated binocular function reduces visual confusion and improves processing efficiency.

Foveal fixation training using MIT, Haidinger brushes, and foveal tagging improved fixation stability, critical for reading and detailed visual tasks. More stable fixation allows maximum utilization of the residual central retinal function. Syntonic phototherapy's modulation of autonomic nervous system activity likely contributed to reduced visual stress, improved comfort, and potentially enhanced retinal cellular function. The balanced application of sympathetic-stimulating and parasympathetic-promoting wavelengths optimized overall visual system performance. Resolution of asthenopic symptoms including diplopia, eyestrain, headaches, and reading fatigue dramatically improved the patient's quality of life and willingness to engage in visual activities. Symptom relief itself may have facilitated greater visual system use, creating a positive feedback loop. Limited published literature documents visual acuity improvement in retinitis pigmentosa through rehabilitative interventions. Most RP management focuses on supportive care, low vision aids, and experimental treatments including gene therapy, retinal prosthetics, and pharmacological interventions. This case joins a small but growing body of evidence suggesting that intensive, structured vision therapy may provide functional benefits even in degenerative retinal conditions [2,3].

The documented improvements in this case are consistent with emerging understanding that:

- Residual visual function can be optimized through systematic training
- Neuroplastic adaptation can partially compensate for sensory deficits
- Binocular vision dysfunction, often overlooked in RP management, can be successfully rehabilitated
- Quality of life improvements extend beyond simple acuity measures

Clinical Implications

This case has several important clinical implications:

Comprehensive Assessment

RP patients should receive comprehensive assessment not only of retinal structure and function but also of oculomotor abilities, binocular status, and functional vision. Many rehabilitatable deficits may be overlooked with standard ophthalmologic examination alone.

Rehabilitation Potential

Even in progressive degenerative conditions, significant functional rehabilitation is possible. Vision therapy should be considered as a complementary approach to conventional RP management.

Individualized Treatment

The structured, phased approach allowed systematic progression tailored to the patient's specific deficits and capabilities. Individualized treatment planning is essential for optimal outcomes.

Intensive Commitment

The substantial improvement required intensive commitment with 173 sessions over 11 months. Patients and families must understand the time and effort required for meaningful results.

Realistic Expectations

While remarkable improvements were achieved, the underlying degenerative process continues. Patients must maintain realistic expectations regarding disease progression while appreciating functional gains.

Quality of Life Focus

Improvements in functional vision, symptom resolution, and independence represent meaningful outcomes beyond simple acuity measures. Quality of life should be a primary therapeutic goal.

Conclusion

This longitudinal case study demonstrates significant visual acuity improvement, binocular function recovery, and asthenopic symptom resolution in a patient with nonsyndromic retinitis pigmentosa following comprehensive, structured vision therapy. Over 173 therapy sessions, the patient progressed from severely compromised vision (6/60 OD, 6/48P OS) to functionally improved acuity (6/18+4 OU), from absent stereopsis to clinically meaningful depth perception (140 seconds of arc), and from symptomatic visual dysfunction to comfortable, efficient binocular vision.

The success of this combined therapeutic approach, encompassing monocular visual function enhancement, binocular integration training, and functional vision neurotherapy including syntonic phototherapy, highlights the potential of tailored vision rehabilitation to meaningfully improve quality of life in retinal degenerative conditions. Despite the progressive nature of retinitis pigmentosa, optimization of residual visual function through systematic training yielded functional independence, reduced symptoms, and enhanced participation in daily activities.

These findings advocate strongly for:

- Comprehensive visual assessment of RP patients beyond standard ophthalmologic examination
- Integration of structured vision therapy into multidisciplinary RP management
- Recognition of rehabilitation potential even in progressive degenerative conditions
- Patient-centered approaches prioritizing functional outcomes and quality of life
- Expanded research into rehabilitation protocols for progressive retinal disorders

While acknowledging the limitations of a single case report and the need for controlled trials, this case provides compelling evidence that intensive, individualized vision therapy can produce meaningful functional improvements in retinitis pigmentosa. The documented outcomes challenge traditional assumptions about the inevitability of functional decline in RP and support a more proactive, rehabilitative approach to management.

Future research should focus on establishing optimal therapeutic protocols, identifying predictive biomarkers for treatment response, exploring synergistic combinations with emerging RP treatments, and conducting long-term outcome studies to define the sustainability of gains and maintenance requirements. The potential for structured vision rehabilitation to transform the

lives of patients with progressive retinal degeneration warrants continued investigation and clinical implementation.

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