

TREATMENT AND REHABILITATION OF CHILDREN WITH CONGENITAL MYOPIA

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Abstract

Congenital myopia is a visual disorder characterized by the presence of nearsightedness at birth or during the first months of life. The condition may significantly affect visual development, educational performance, social adaptation, and overall quality of life if not diagnosed and managed appropriately. Effective treatment and rehabilitation strategies are essential to optimize visual function, prevent secondary complications, and promote normal development of the visual system. The aim of this study was to evaluate modern approaches to the treatment and rehabilitation of children with congenital myopia and to assess their effectiveness in improving visual outcomes. Comprehensive ophthalmological examinations, individualized optical correction, amblyopia therapy, visual rehabilitation programs, and regular follow-up monitoring were implemented. The results demonstrated significant improvement in visual acuity, binocular vision, and functional visual performance among children receiving early and continuous intervention. The findings emphasize the importance of multidisciplinary rehabilitation programs and personalized treatment strategies for achieving favorable long-term outcomes in pediatric patients with congenital myopia.

Keywords: congenital myopia, pediatric ophthalmology, visual rehabilitation, optical correction, amblyopia, binocular vision, low vision therapy, visual development, refractive disorders, child rehabilitation.

1. Introduction

Congenital myopia is among the most significant refractive abnormalities encountered during childhood. Unlike acquired forms of myopia that typically develop during school years, congenital myopia is present from birth or appears during infancy and is often associated with structural and functional abnormalities of the eye. Early impairment of visual function may negatively influence the development of the visual cortex, sensory integration, learning ability, and psychosocial adaptation. The visual system undergoes rapid maturation during the first years of life. Clear retinal image formation is essential for normal development of visual pathways and binocular function. In congenital myopia, blurred retinal images may interfere with this developmental process, increasing the risk of amblyopia, strabismus, reduced stereoscopic vision, and long-term visual disability. Consequently, timely diagnosis and intervention are critical for preserving visual potential. The causes of congenital myopia are multifactorial and include genetic predisposition, developmental

abnormalities of the eye, connective tissue disorders, prematurity, and hereditary syndromes. Children with high congenital myopia frequently demonstrate excessive axial elongation of the eyeball and may be at increased risk of retinal and choroidal complications later in life. Management of congenital myopia extends beyond simple correction of refractive error. Effective treatment requires comprehensive assessment of visual function, ocular anatomy, binocular vision, and developmental status. Modern pediatric ophthalmology increasingly emphasizes individualized treatment plans that address both optical correction and visual rehabilitation. Optical correction remains the cornerstone of therapy. Properly prescribed spectacles or contact lenses improve image quality on the retina and support normal visual development. However, optical correction alone may not be sufficient in children with amblyopia, binocular vision abnormalities, or severe visual impairment. Additional rehabilitation interventions are often required to maximize visual function and facilitate social and educational integration. Rehabilitation programs may include amblyopia treatment, visual stimulation exercises, accommodative training, low vision support, educational adaptation, and psychological counseling. Such interventions aim not only to improve visual performance but also to enhance independence and quality of life. Recent advances in diagnostic technologies and rehabilitation methods have expanded opportunities for early intervention. Improved understanding of neuroplasticity has demonstrated that appropriate visual stimulation during childhood can significantly enhance functional outcomes even in patients with severe refractive disorders. The aim of this study was to evaluate the effectiveness of contemporary treatment and rehabilitation approaches in children with congenital myopia and to determine their impact on visual acuity, binocular function, visual development, and overall quality of life.

2. Materials and Methods

The study was conducted between 2024 and 2025 in specialized pediatric ophthalmology clinics. A total of 140 children aged 6 months to 17 years diagnosed with congenital myopia participated in the investigation. Each patient underwent comprehensive ophthalmological examination, including assessment of visual acuity, cycloplegic refraction, ocular alignment, binocular vision, accommodation, fundus examination, and ocular biometry. Additional investigations such as optical coherence tomography and ultrasonographic biometry were performed when clinically indicated. Patients were categorized according to the severity of myopia. Individualized treatment plans were developed based on age, refractive status, visual acuity, presence of amblyopia, and associated ocular abnormalities. Therapeutic interventions included:

- Spectacle correction;
- Contact lens correction in selected cases;
- Amblyopia therapy using occlusion techniques;
- Visual stimulation exercises;
- Accommodation and convergence training;
- Low vision rehabilitation programs;
- Educational support and parental counseling;
- Regular ophthalmological monitoring.

Clinical outcomes were evaluated during scheduled follow-up visits over a twelve-month period.

3. Results

At the beginning of the study, reduced visual acuity was identified in the majority of examined children. High degrees of myopia were frequently associated with impaired binocular vision, accommodative dysfunction, and signs of amblyopia. Implementation of individualized optical correction resulted in substantial improvement in visual performance. Most children demonstrated significant enhancement of best-corrected visual acuity within the first months of treatment. Early correction provided the greatest benefits among younger patients during critical stages of visual development. Amblyopia therapy produced favorable outcomes in children with unilateral or asymmetric visual

impairment. Regular occlusion treatment combined with optical correction contributed to progressive improvement in visual acuity and sensory function.

Visual rehabilitation exercises enhanced accommodative capacity, fixation stability, and binocular coordination. Children participating consistently in rehabilitation programs demonstrated better functional outcomes compared with those exhibiting poor compliance.

Patients with severe congenital myopia benefited from low vision rehabilitation strategies.

Magnification devices, contrast-enhancing techniques, and educational accommodations improved academic performance and daily functioning.

Follow-up examinations demonstrated stabilization of visual function in most patients. Early intervention reduced the risk of secondary complications and promoted more favorable developmental outcomes.

Parental participation significantly influenced treatment success. Children whose caregivers actively supported rehabilitation activities showed higher adherence rates and better clinical progress.

4. Discussion

The findings of this study confirm the importance of comprehensive treatment and rehabilitation in managing congenital myopia. While optical correction remains the foundation of therapy, additional rehabilitation measures substantially enhance visual outcomes and functional adaptation.

The improvement in visual acuity observed following early correction highlights the critical role of timely intervention. The developing visual system demonstrates considerable plasticity, allowing substantial functional gains when appropriate visual stimulation is provided during childhood.

Amblyopia management remains an essential component of treatment because blurred retinal images during early development may result in permanent reduction of visual function if left untreated. The positive response observed in this study supports the effectiveness of combined optical and occlusion therapy.

Visual rehabilitation programs contributed significantly to improvement in binocular function and overall visual performance. These findings emphasize the necessity of addressing not only refractive correction but also broader aspects of visual development.

Low vision rehabilitation proved particularly valuable for children with high congenital myopia and associated structural abnormalities. By enhancing functional vision and promoting independence, rehabilitation programs contribute directly to improved quality of life.

The study also demonstrated the importance of family involvement. Effective communication between healthcare providers and caregivers facilitates adherence to treatment recommendations and supports long-term success.

Despite advances in treatment, congenital myopia remains a chronic condition requiring lifelong monitoring. Continued follow-up is essential for detecting refractive progression, retinal complications, and changes in visual function.

Future developments in pediatric ophthalmology, including innovative optical technologies, pharmacological interventions, and digital rehabilitation tools, may further improve outcomes for children with congenital myopia.

5. Conclusion

Comprehensive treatment and rehabilitation programs are highly effective in improving visual outcomes among children with congenital myopia. Early diagnosis, accurate optical correction, amblyopia management, and structured rehabilitation interventions contribute significantly to visual development and functional adaptation.

Individualized treatment strategies allow optimization of visual acuity, binocular function, and quality of life while reducing the risk of long-term complications. Multidisciplinary collaboration among ophthalmologists, rehabilitation specialists, educators, and families plays a crucial role in achieving successful outcomes.

The findings support the implementation of integrated rehabilitation models in pediatric ophthalmology and highlight the importance of continuous monitoring and early intervention in children affected by congenital myopia.

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