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REVIEW ARTICLE

Strategies of visual rehabilitation in childhood cataracts

Estratégias de reabilitação visual em catarata infantil

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KEYWORDS:

Congenital cataract; Visual rehabilitation; Low vision; Visual stimulation; Pediatric ophthalmology.

ABSTRACT

Purposes: To review strategies of visual rehabilitation in children with congenital cataracts and their functional and quality of life outcomes. **Methods:** Narrative review in PubMed was conducted between December 2025 and January 2026, using the descriptors "congenital cataract" AND "visual rehabilitation" and "congenital cataract" AND "low vision." Of the 327 articles found, 16 original studies were included and analyzed qualitatively. **Results:** The success of visual treatment depends on early surgery and intensive rehabilitation. There was no difference in final visual acuity between intraocular lens implantation and correction of aphakia with glasses or contact lenses. However, lens implantation in children under seven months of age led to more complications and reoperations, and therefore, contact lenses are recommended for this age group. Functional magnetic resonance imaging showed partial recovery of basic visual modulation after late surgery; however, visual-multisensory integration and inhibitory circuits remain incomplete, resulting in persistent functional limitations, including deficits in face recognition. Early visual stimulation with high-contrast materials and playful activities has been shown to be essential. The Children's Visual Function Questionnaire showed a significant deficit in quality of life, especially in the subscales family impact and functional competence, with significant improvement after multi-professional rehabilitation. **Conclusions:** The finding that early intervention improves visual function and quality of life reinforced the importance of multi-professional follow-up in the rehabilitation of children with congenital cataracts.

DESCRITORES:

Catarata congênita; Reabilitação visual; Baixa visão; Estimulação visual; Oftalmologia pediátrica.

RESUMO

Objetivos: Revisar estratégias de reabilitação visual em crianças com catarata congênita e seus desfechos funcionais e de qualidade de vida. **Métodos:** Revisão narrativa na base PubMed entre dezembro de 2025 e janeiro de 2026, usando descritores "congenital cataract" AND "visual rehabilitation" e "congenital cataract" AND "low vision". De 327 artigos, 16 estudos originais foram incluídos e analisados qualitativamente. **Resultados:** O sucesso visual depende de cirurgia precoce e reabilitação intensiva. Não houve diferença na acuidade visual final entre implante de lente intraocular e afacia corrigida com óculos ou lentes de contato. Entretanto, implante em menores de sete meses apresentou mais complicações e reoperações, recomendando-se lentes de contato nessa faixa etária. Ressonância magnética funcional demonstrou recuperação parcial da modulação visual básica após cirurgia tardia, porém integração visual-multissensorial e circuitos inibitórios permanecem incompletos, resultando em limitações funcionais persistentes, incluindo déficits em reconhecimento facial. Estimulação visual precoce com materiais de alto contraste e atividades lúdicas mostrou-se essencial. O Questionário de Função Visual Infantil evidenciou déficit significativo na qualidade de vida, especialmente em impacto familiar e competência funcional, com melhora significativa após reabilitação multiprofissional. **Conclusões:** Intervenções precoces melhoram função visual e qualidade de vida, reforçando a importância do acompanhamento multiprofissional na reabilitação de crianças com catarata congênita.

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INTRODUCTION

Childhood cataracts are responsible for 5% to 20% of pediatric blindness worldwide, and their prevalence is 0.63 to 9.74 cases per 10,000 children. Early diagnosis and treatment are essential to avoid irreversible visual damage[1]. In Brazil, the authors of a multicenter study conducted in 2007 with 3,210 children determined that congenital cataracts were the seventh cause (7.1%) of visual impairment in isolated cases and the sixth cause (6.1%) in multiple disabilities[2]. Data from UNICAMP confirmed the relevance of the condition, placing it among the three main preventable causes of childhood blindness[3].

METHODS

A narrative and non-systematic literature review was performed in the PubMed database between December 2025 and January 2026, using the descriptor combinations "congenital cataract" AND "visual rehabilitation" (179 results) and "congenital cataract" AND "low vision" (148 results). Original studies in English, Portuguese, or Spanish that addressed visual rehabilitation, early visual stimulation, or low vision in children with congenital cataracts were included, regardless of the date of publication.

The initial search resulted in 327 articles. After removing duplicates, analyzing the titles and abstracts, and excluding case reports, reviews, editorials, studies with adults, and articles without full text available, 30 articles were read in full. Sixteen of these articles fully met the inclusion criteria and were included in the review and analyzed qualitatively in terms of visual rehabilitation strategies and their clinical and functional outcomes.

DISCUSSION

A systematic review on bilateral congenital cataracts in children under two years of age showed no superiority of intraocular lens implantation over correction of aphakia with glasses or contact lenses, in terms of either visual acuity or surgical complications. The different surgical techniques evaluated—including corneal approach, pars plana, posterior capsulotomy, and optic capture—also showed no significant differences in terms of visual outcomes. The results showed that the success of visual treatment depends mainly on early surgical intervention and intensive visual rehabilitation, with adequate optical correction, treatment of amblyopia, and systematic follow-up[4].

A prospective study comparing intraocular lens implantation and contact lens use in patients with unilateral cataract showed that visual acuity was similar between the groups after 4.5 years of follow-up. However, the group that underwent intraocular lens implantation exhibited a higher rate of complications (81% versus 56%) and reoperations (72% versus 21%), with similar incidence patterns of glaucoma. Based on these findings, the use of contact lenses is recommended for children under seven months of age[5-7].

The use of binocular video–based eye-tracking systems to assess congenital cataract patients with nystagmus showed greater speed of eye movement and less stability, but the predicted systematic visual exploration was maintained. These findings suggest that neural mechanisms can develop even after prolonged visual deprivation and contribute to functional recovery[8].

Functional magnetic resonance imaging evaluations of individuals with congenital cataracts who underwent late surgery show that the level of resting-state neural activity changes as light reaches the retina, which indicates the restoration of basic visual modulation. However, the inhibitory circuits are not fully established, and there is no typical modulation in parietal, auditory, and somatosensory regions. These findings suggest that after the surgery, there is a partial recovery of the resting-state dynamics of the visual system, but visual-multisensory integration and inhibitory refinement remain incomplete, which might contribute to persistent functional limitations[9].

A prospective study of patients with congenital cataracts who underwent late surgery showed that those with worse preoperative visual acuity retained specific deficits in face recognition after three years of follow-up. These limitations are not explained solely by low visual acuity but are also the result of early visual deprivation[10].

It is a fact that early visual stimulation is essential after cataract surgery, including using high-contrast materials, light stimuli, and playful activities to strengthen residual visual potential. Early intervention produces better and long-lasting results, prevents further impairment, and promotes functional independence. In Brazil, this practice is regulated by

the Ministry of Health Ordinance No. 3.128/2008 and is part of the public rehabilitation services[11-14].

In conclusion, visual rehabilitation directly impacts the quality of life of visually impaired children and their families[15,16]. Two studies used the Children's Visual Function Questionnaire to assess this impact. The first study included 69 guardians of children with bilateral congenital cataracts and showed a significant deficit in quality of life, especially in the subscales of family impact and competence in performing activities. In the second study, the questionnaire was administered to 24 parents or caregivers of visually impaired children and revealed a statistically significant difference in overall vision health and quality of life after multi-professional rehabilitation. These findings reinforce that early interventions improve not only visual function but also the quality of life of children and their families[15,16].

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