

CLINICAL CRITERIA FOR SELECTING A REHABILITATION
METHOD IN CHILDREN AND ADOLESCENTS WITH UNILATERAL
POST-TRAUMATIC OCULAR SUBATROPHY

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Abstract. Post-traumatic ocular subatrophy in children and adolescents requires an individualized approach to rehabilitation. The choice of rehabilitation method depends primarily on the condition of the injured eye, including the presence of pain and inflammation, the degree of globe deformity, the condition of the cornea and conjunctiva, eyelid position, and tolerance of prosthetic rehabilitation. In a stable, painless eye without active inflammation, globe-preserving options such as a cosmetic contact lens or scleral shell prosthesis may be preferred. Persistent pain, recurrent inflammation, and marked deformity require reconsideration of the initial management strategy. In children, long-term follow-up is particularly important, with timely adjustment or replacement of the prosthesis as the orbit grows.

Keywords: children, adolescents, ocular trauma, post-traumatic ocular subatrophy, rehabilitation, globe-preserving management, scleral shell prosthesis, ocular prosthesis, cosmetic contact lens.

Introduction

Severe ocular trauma in childhood may result not only in permanent visual loss but also in profound anatomical changes in the injured eye. Chronic hypotony, inflammation, detachment of the intraocular coats, and marked disorganization of intraocular structures may lead to progressive shrinkage and deformation of the globe. The terminal stage of this process is generally referred to in contemporary English-language literature as *phthisis bulbi* and is characterized by globe shrinkage, chronic hypotony, degenerative and inflammatory changes, formation of cyclitic membranes, and, in advanced cases, calcification and ossification [1].

However, post-traumatic ocular subatrophy should not in every case be equated with the final terminal stage of the disease. In some patients, the injured eye remains

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clinically quiet and painless for a prolonged period, while the residual globe volume and condition of the external tissues allow the use of globe-preserving cosmetic rehabilitation.

This problem is of particular importance in children. Pronounced asymmetry of the palpebral fissures, globe shrinkage, scarring, altered eyelid position, and a visible cosmetic defect may affect self-esteem, interaction with peers, and social adaptation. A contemporary systematic review confirms that ocular disease and visual impairment in children may affect various aspects of quality of life, although the extent of this impact depends on the nature of the disorder and the age of the child [2].

Therefore, when vision is irreversibly lost, the ultimate goal of treatment is no longer restoration of visual function but achievement of a stable, painless condition and an acceptable cosmetic result. Contemporary ocular prosthetic care includes cosmetic contact lenses, scleral shells, custom ocular prostheses, and, when necessary, surgical preparation of the tissues for prosthetic rehabilitation [3].

The choice between these options should not be based solely on the absence of vision. It should primarily depend on the clinical condition of the injured eye and the feasibility of safe long-term rehabilitation.

Aim of the study - To determine the main clinical criteria for selecting a rehabilitation method in children and adolescents with unilateral post-traumatic ocular subatrophy.

Materials and Methods

The review was based on published data concerning terminal ocular atrophy, management of the painful blind eye, the use of scleral shells and ocular prostheses, and specific aspects of ocular prosthetic rehabilitation in children.

Results and Discussion

The principal consideration when selecting a rehabilitation strategy is not the extent of visual loss itself, but the condition of the preserved globe. The absence of vision alone is not a sufficient indication for eye removal. Pain, signs of active inflammation, progression of deformity, and the possibility of comfortable cosmetic prosthetic rehabilitation are of greater importance. In end-stage ocular atrophy, the main goals of treatment are relief of pain and cosmetic rehabilitation [1].

A contemporary review of the management of the painful blind eye shows that treatment may include topical therapy, minimally invasive procedures, and surgical



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intervention. The choice depends on the cause of pain, the structural condition of the eye, and the response to previous treatment [4].

Thus, pain should not be regarded merely as discomfort associated with wearing a prosthesis. Persistent or increasing pain requires identification of its cause and may limit the feasibility of globe-preserving prosthetic rehabilitation.

Contemporary literature includes clinical examples of successful use of custom scleral prostheses in patients with *phthisis bulbi*. In particular, Vijayan et al. demonstrated that an acceptable cosmetic result can be achieved with a custom-made scleral shell fitted over a preserved but deformed globe [5].

Of particular interest is the study by Yeoman et al. examining current clinical practice in the use of scleral shells. According to surveyed clinicians, the most important factors associated with successful wear included residual globe volume, corneal integrity, and corneal sensitivity. The principal concerns included discomfort and the risk of keratitis [6].

Current evidence indicates that corneal sensitivity does influence tolerance of a scleral shell; however, it should be assessed together with corneal integrity, residual globe volume, and the patient's actual response to the prosthesis [6].

Therefore, in clinical practice, it is more appropriate to assess overall ocular surface tolerance rather than rely on corneal sensitivity as an isolated parameter.

When the size and shape of the globe are relatively preserved and the main cosmetic defect is related predominantly to changes in the cornea, iris, or pupillary area, a cosmetic contact lens may be considered.

This option minimally alters globe volume and preserves natural ocular motility. Contemporary reviews of ocular prosthetic care consider cosmetic contact lenses as one of the available methods for improving the appearance of a non-functioning eye, alongside scleral shells and ocular prostheses [3].

However, studies specifically evaluating cosmetic contact lenses in children with post-traumatic ocular subatrophy remain limited. Therefore, this option should be selected individually in patients with a satisfactory ocular surface, no active inflammation, and good tolerance of the lens.

When globe shrinkage is more pronounced, a cosmetic contact lens may be insufficient to restore symmetry.



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In such cases, a custom scleral shell can simultaneously mask anterior segment abnormalities and partially compensate for the loss of ocular volume [5].

Contemporary reviews of ocular prosthetic rehabilitation emphasize the need to adapt the prosthesis individually to the condition of the surrounding tissues. In the presence of marked cicatricial changes, preliminary surgical correction of the prosthetic bed may be required [3, 8].

Reduction in globe volume is relevant when selecting the method of correction, but it should not be considered as an isolated criterion.

In mild subatrophy with relatively preserved globe shape, a cosmetic contact lens or thin scleral shell may be sufficient. With a more pronounced volume deficit, a thicker custom scleral shell may be required.

However, excessive prosthetic thickness does not necessarily improve the cosmetic result. It may adversely affect eyelid position and make prosthesis wear less comfortable.

Thus, the clinically relevant consideration is the combination of residual globe volume, globe shape, ocular surface condition, and the ability to position the prosthesis without excessive pressure.

Preservation of the globe is justified only when it remains clinically safe and does not interfere with rehabilitation.

Persistent pain, chronic or recurrent inflammation, progressive deformity, marked ocular surface abnormalities, and inability to achieve satisfactory prosthetic rehabilitation require reassessment of the treatment strategy [1, 4].

In such cases, the need for surgical intervention should be determined individually after comprehensive examination.

Importantly, the indication for surgery is not the absence of vision itself, but rather a clinical condition in which preservation of the eye is associated with pain or inflammation or does not allow a safe and stable rehabilitation outcome.

Rehabilitation of a child does not end with fabrication of the first prosthesis.

As the child grows, the dimensions of the orbit, palpebral fissure, and surrounding tissues change. Therefore, a prosthesis that fits satisfactorily at one age may later require adjustment or complete replacement.

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Jain et al. emphasize that children with custom ocular prostheses require regular follow-up and that the prosthesis may need periodic relining or replacement as the orbit grows [7].

Schittkowski and Weiss also highlight the complexity of pediatric ocular prosthetic rehabilitation and the need for close cooperation between the ophthalmologist and ocularist. In the presence of cicatricial changes or complex anatomy, modified prosthetic designs, more frequent follow-up examinations, and surgical correction of the tissues may be necessary [8].

Therefore, successful initial rehabilitation should be regarded only as the beginning of long-term follow-up.

Conclusion

The choice of rehabilitation method in children and adolescents with unilateral post-traumatic ocular subatrophy should be determined by the condition of the injured eye rather than by the absence of vision alone. In a stable, painless eye without active inflammation, globe-preserving rehabilitation options should be preferred. A cosmetic contact lens or custom scleral shell should be selected according to residual globe volume and the condition of the cornea, conjunctival fornices, and eyelids. Persistent pain, inflammation, progressive deformity, and inability to achieve safe prosthetic rehabilitation require reconsideration of the initial management strategy. In children, long-term follow-up and timely adjustment or replacement of the prosthesis are essential as the orbit grows.

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