

# Effectiveness of Using Silicone Tape in Blepharoptosis

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**Annotation:** Congenital anomalies of the organ of vision are currently the main form of ophthalmopathology in childhood. This is confirmed by leading experts in pediatric ophthalmology (Avetisov ES, Khvatova AV, Kovalevsky EI - 1989). Among congenital defects of the organ of vision, blepharoptosis is in the first place. The ptosis of the upper eyelid, even partially, is a significant cosmetic defect. Complex forms of ptosis (according to various authors, in 44.35% of cases) especially worsen the appearance of patients, in which the ptosis of the eyelid is combined with other pathological diseases of the eye and oculomotor apparatus (blepharophimosis, epicanthus, paralytic strabismus, etc.). Eliminating ptosis in children is not just a cosmetic problem, as timely treatment of this pathology helps prevent a number of complications associated with ptosis - amblyopia, incorrect head position, impaired binocular vision, and poor posture.

**Keywords:** Simple, congenital, hereditary ptosis is mainly transmitted in an autosomal dominant manner and is usually myogenic in nature. This type of ptosis is often associated with levator hypoplasia.

**Introduction:** Complex ptosis is also dominantly inherited. Complex ptosis includes ptosis combined with other eyelid anomalies: epicanthus, blepharophimosis, ankyloblepharon, etc. Complex ptosis is often associated not only with hypoplasia or aplasia of the levator, but also with incorrect, atypical attachment or complete absence of the levator. In these forms, synkinesis, fusion of the levator with the superior rectus muscle, lack of peripheral innervation,

and aplasia of the oculomotor nuclei are common.

Myogenic ptosis, which develops in middle and late adulthood, occurs in several family members and is usually symmetrical.

The bulk of publications on ptosis mainly cover one narrow problem - the technique of surgical treatment. At the same time, the main difficulty in the correction of congenital blepharoptosis, noted by all specialists, is the uncertainty of the results obtained. Often, various methods of surgical correction of ptosis are used without taking into account the clinical features of ptosis and are limited to a small number of observations. The large number of available operations for ptosis, the appearance in the ophthalmological literature of descriptions of new operations and their modifications indicate the constant interest of ophthalmologists in this issue, as well as the fact that none of the methods used today can completely solve the problem of blepharoptosis.

In this regard, there is a need to develop more advanced technologies for the treatment of blepharoptosis and the use of pre-formed factors affecting the central structures of the nervous system. The prospects for work in this direction, provided that the use of methods that have a normalizing effect on the functional state of the central nervous system is pathogenetically justified, are supported by a number of studies that show the effectiveness of their use in various age groups, including in congenital pathology, and the features of the functions of the central nervous system. As NN notes: Kulikov et al. (1999), when laser radiation is applied to certain areas of the skull - the projection of brain structures - "functional changes are observed in the corresponding area of the cerebral cortex, where various functions of the body are expressed."

We have developed a comprehensive approach to the rehabilitation of children with congenital blepharoptosis, which involves a multi-level impact on pre-existing factors and the central and peripheral joints of the neuromuscular apparatus.

**Research methods and materials:** The indication for the use of this diagnostic and therapeutic method is the presence of congenital blepharoptosis of any form and degree. Contraindications include seizures and epilepsy, as well as the presence of a predisposition to cancer.

The procedure for electrical stimulation according to the blink reflex system is carried out only by a doctor using a household device "AMPLIPULSE-5" (TU 4-87 EX 2.893.063 TU-LU PO "Radiopribor" (Velikiye Luki) No. 88/576-71), with a gradual increase in the operating mode, increasing the current strength from 10 to 150 Hz, modulation depth 100%, duration 2-3 seconds, according to the patient's sensations, up to a contraction of the orbicularis oculi muscle. The effect is produced by the cathode on the skin projection of the exit points of the facial nerve on both sides, the I and III branches of the trigeminal nerve are stimulated with a point electrode, and the second electrode (anode) is placed in the cervical spine area with an area of 50-75 cm<sup>2</sup> (exposure time 1 minute for each point). The procedures are performed daily, the course of treatment is from 8 to 10 procedures.

The procedures are performed with a gradual reduction in pulse duration to 0.5 ms.

The change in impulse is carried out based on measurements of the lability of the neuromuscular apparatus.

IR laser irradiation of the projection motor zones of the cerebral cortex is carried out using the AMOL-Izel-Victoria local laser exposure device (TU 9444-001-05841879-93 AONPMTLO "Volna", Moscow, registration number 94/271-129, in continuous mode). mW. Irradiation is carried out for 3 minutes on each side. The course of treatment for one area is 8-10 procedures per day.

Radiation dose:

- ✓ for 1 procedure – 1.2 J/cm<sup>2</sup>;
- ✓ from 9.6 J/cm<sup>2</sup> to 12 J/cm<sup>2</sup> per treatment course.

With complex exposure, laser irradiation of the projection zones of the facial region of the cerebral cortex is first performed, followed by electrical stimulation using the blink reflex method without a temporary break. This procedure is considered the most physiological, since a time interval is required for the biological reaction of the tissues to manifest.

In surgical treatment, the following methods should be distinguished: suspension of the upper eyelid with the anterior muscle, fusion of the superior rectus muscle with the upper eyelid, maximum resection of the levator of the upper eyelid, resection of the cartilage of the upper eyelid, a combined method of eyelid lift and resection of the ciliary edge of the upper eyelid.

A proprietary algorithm for clarifying the diagnostic function of the levator, including measuring the width of the palpebral fissure on both sides in three positions of gaze with an accuracy of up to 0.5 mm, allows you to monitor the results and promptly adjust the course of treatment. The width of the palpebral fissure is checked before, immediately after and in the late period of treatment.

**Results:** The trigeminal nerve exit points are affected using the Amplipulse device. An early response to electrical stimulation, such as a blink reflex, is provided by a contraction of the eyelids on the side of the stimulus and a lower current strength; a late response occurs on the side opposite to the stimulus with a higher current strength. An increase in the current strength to evoke a blink reaction above 0.8 mA for an early response and above 1.8 mA for a late response is an indicator of a decrease in the functional complex of the upper eyelid levators.

The identified objective criteria for diagnosing this pathology allow us to make additions to the generally accepted classification of the degree of blepharoptosis: 1) with moderate changes in levator function and conductive pathways, 2) with pronounced changes in these structures.

Based on the differences in the functional status of the upper eyelid elevators, it is proposed to use different surgical techniques. In "severe" blepharoptosis with borderline depression of the muscular apparatus of the upper eyelid elevator and the conduction pathways, it is recommended to perform surgical intervention to the maximum extent, that is, maximum reduction of the upper eyelid, combined with complete closure of the palpebral fissures.

In the presence of "mild" types of pathology with a moderate degree of disruption of the neuromuscular structures responsible for the movement of raising the upper eyelid, it is indicated, if possible, to use "soft" methods of surgical intervention without affecting the lifting of the upper eyelid. This is resection of the cartilage of the upper eyelid and lifting the ciliary edge of the upper eyelid.

**Discussion:** For all types and degrees of blepharoptosis, except for patients with contraindications, the first stage involves diagnostic, and then therapeutic use of electrical stimulation using the blink reflex method with forced IR laser irradiation of the motor cortex responsible for the facial muscles. In the absence of positive dynamics during the course of previously established treatment methods, it is safe to perform any appropriate surgical methods. In the case of a positive effect of conservative treatment (widening of the palpebral fissure by more than 0.5 mm in at least one of the viewing positions, reducing the current strength to more than 0.1 mA with an early response and more than 0.3 mA with a late response), only "soft" operations that do not affect muscle tissue are indicated with conservative treatment.

It should be noted that the generally accepted classification of congenital blepharoptosis does not include ophthalmological complications (strabismus, amblyopia, refractive pathology) as a separate group. At the same time, when using an integrated approach to the treatment of blepharoptosis in children, these diseases cannot be ignored, since their elimination is part of the ultimate goal of blepharoptosis treatment. Under the influence of pre-formed factors (blink reflex method and electrical stimulation using IR laser radiation), not only the levator of the upper eyelid is affected separately; other functions of the upper eyelid are also affected in combination.

Effectiveness of the method. The clinical experience of the MONIKI ophthalmology department in eliminating congenital blepharoptosis is based on more than 12 years, during which 200 children were treated (220 operations were performed on them). The distribution of the number of operations by type of surgical intervention and degree of blepharoptosis is presented in Table 1.

Based on previous studies of the functional capabilities of the lifting apparatus using preformed factors, dosed surgical intervention is performed using different techniques at different degrees of blepharoptosis.

When performing electrical stimulation of the trigeminal nerve exit points using the blink reflex method, there are proven standards for early and late responses (ER and LR, respectively), on the basis of which all further tactics of treating a patient with congenital blepharoptosis are built.

After the first examination using the blink reflex method, a course of treatment using this method with the addition of laser stimulation was carried out. If the functional state of the levator superioris improved, the numerical values of RO and PO decreased, respectively, the width of the palpebral fissure increased, and the magnitude of blepharoptosis decreased.

In the presence of unfavorable initial data, in the absence of positive dynamics during the treatment process, surgical intervention with separate or cartilage resection of the levator of the upper eyelid can be performed.

If a child in the first age group (3-5 years) has third-degree congenital blepharoptosis, temporary frontal suspension should be performed (if possible) using one of the methods accepted in pediatric practice to prevent amblyopia and strabismus. In the future, after a detailed examination of the patient, it will be possible to use one of the methods described below to treat the child.

Thus, the method of hanging the upper eyelid from the frontalis muscle: is performed in children under 2 years of age for palliative purposes or in older children who have not been helped by other surgical interventions. This surgical method is also acceptable for bilateral blepharoptosis, as it provides the ability to control both eyelids (symmetrically by the CNS), which is performed in a simpler and physiological way.

The method of fusing the superior rectus muscle of the eye with the upper eyelid can only be recommended for children with superior rectus paralysis. The great advantage of this operation is the ability of the upper eyelid and eyeball to move synchronously when looking up and down.

The levator resection method can only be used in blepharoptosis with severe dysfunction of the levator superioris or in cases where previous surgical interventions have been ineffective.

The method of cartilage resection of the upper eyelid is the most suitable method for eliminating congenital blepharoptosis of the 1st and 2nd degree, accompanied by moderate dysfunction of the levator palpebrae superioris in children over 5 years of age.

We consider the combined method of levator maxilla resection with cartilage resection of the upper eyelid to be a worthy alternative to the method of hanging the upper eyelid on the frontal muscle.

One of the gentler methods that is recognized as suitable for repeated surgical treatment is the ciliary edge lift of the upper eyelid. This method is used only in cases where minor cosmetic defects require minor correction, during repeated surgical interventions after more complex operations.

The influence of pre-established factors on the change in visual acuity and character in blepharoptosis complicated by amblyopia was studied. The following trends were identified and are reflected in Table 2.

**Conclusion:** After complex treatment, the degree of amblyopia also changed. Thus, if before treatment 6.9% of patients had a high degree and 11.7% of patients in this group had a moderate

degree, then after treatment the number of patients with moderate amblyopia decreased by 2.3%, and 32.5% of patients (14 children) were completely cured of amblyopia. In general, the results of changes in the degree of amblyopia during treatment are presented in Table 3.

Thus, based on a study of the incidence of congenital blepharoptosis and an analysis of the available literature, a need was identified for a definitive method for differential diagnosis of the functional status of the levator to determine the use of rational treatment and diagnostic tactics.

Comparing the obtained data with the original data, we concluded that it is possible to improve the functionality of the levator palpebrae superioris group during electrical stimulation. At the same time, it was concluded that, based on the results of these studies, it was possible to predict the clinical outcomes of using a particular surgical intervention technique.

In case of positive results of conservative treatment (reducing the current strength required to induce the eye blink reaction, increasing the width of the palpebral fissure), a "soft" operation was performed, excluding intervention in the muscle structures.

The use of minimally invasive methods in children is very important, since we are talking about a growing organism, in which any intervention is a priori associated with risk. Therefore, the treatment of congenital diseases of the eyelids and associated damage to the nervous system should be carried out as accurately as possible. Following this postulate, we consider it necessary to develop standards for the treatment of congenital blepharoptosis, depending on the initial anatomical and functional changes.

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