

Generalization of Experience in Surgical Treatment of Dissociated Vertical Strabismus and Development of Recommendations on the Tactics of Surgical Treatment of this Pathology in Children

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Abstract: Vertical strabismus may manifest itself as a concomitant or paretic (paralytic) form, be a consequence of neurological diseases, traumas, congenital syndromes. There is a purely vertical strabismus, which is associated with the lesion of the muscles of vertical action, and a combination of vertical strabismus with other lesions of the oculomotor apparatus (convergent, divergent strabismus, nystagmus). Vertical strabismus may be secondary - it may appear after correction of convergent or divergent strabismus when the plane of muscle attachment is displaced upward or downward from the initial place. Paretic or paralytic lesions of the oblique muscles of vertical action are most often noted in vertical strabismus.

Key words: treatment of dissociated vertical strabismus in children.

Relevance. Convergent concordant strabismus in children is often accompanied by a vertical component. The cause of development of such strabismus, as a rule, is congenital paresis of muscles of vertical action. Most often the upper oblique muscle of one eye is affected, less often - the upper rectus muscle, even less often - the lower rectus muscle of one of the eyes. The vertical component in this case can manifest itself as a concomitant vertical strabismus, when the eyes are alternately deviated to one side (more often upward); and as dissociated vertical strabismus, when one eye is deviated upward and the other downward. In this case, the superior eye usually has paresis of the superior oblique muscle, which is accompanied by compensatory hyperfunction of the inferior oblique muscle of the same eye. At the same time, the other eye develops hyperfunction of the contralateral synergist - the inferior rectus muscle and weakening of the function of the contralateral antagonist - the superior rectus muscle. Another variant is also possible, when there is a paresis of the superior rectus muscle in the inferior eye, and compensatory hyperfunction of the ipsi-lateral antagonist - the inferior rectus muscle and the contralateral synergist - the inferior oblique muscle of the other eye - also develops. In this case, the affected eye sometimes has false ptosis of the upper eyelid, which may mask vertical deviation. These children often have a forced head position.

It is known that vertical deviation, even at small angles of deviation, is not compensated by conservative hardware treatment and is a serious obstacle to achieving the correct position of the eyes and to the development of binocular functions. In this case it is possible to eliminate strabismus completely and create conditions for correct formation of visual functions only by surgery. The tactics of surgical treatment of dissociated vertical deviation, both isolated and in combination with horizontal deviation, can be different. Some authors recommend eliminating vertical deviation with operations on the rectus muscles of vertical action: recessions and resections of the upper and lower rectus muscles. The amount of displacement or shortening of both upper and lower rectus muscles is not recommended to be more than 5 mm. There are also recommendations to perform recession and anteriorization of the inferior oblique muscle and even vertical displacement of the attachment sites of the inner and outer rectus muscles.

Purpose of the study: Generalization of the experience of surgical treatment of dissociated vertical strabismus and development of recommendations on the tactics of surgical treatment of this pathology in children.

Research materials and methods: The results of surgical treatment of 76 children aged 8 to 14 years who were in the department of eye diseases of the multidisciplinary clinic of the Samarkand State Medical University in 2021-2024 were analyzed. All of these children had convergent friendly alternating strabismus combined with dissociated vertical deviation. All children were examined according to a generally accepted methodology, which included the following items:

1. Determination of visual acuity.
2. Determination of refraction.
3. Determination of the nature of vision in the direct and forced position of the head.
4. Determination of the mobility of the eyeballs in 8 directions of gaze.
5. Examination of the width of the eye slits during fixation with each eye.
6. Measurement of the angle of strabismus in the primary position, in the state of reduction and withdrawal of each eye, as well as when tilting the head to the sides.

The magnitude of the horizontal deviation angles was determined by Hirschberg and was different: 10-15° in 28 children, 20-25° in 42, 30° in 6. The objective angle of horizontal deviation determined on the synoptophore exceeded the angle determined by Hirschberg by 4-8 degrees.

In the primary gaze position, vertical deviation was determined in all children: in 52 - hypertropia, in 24 - hypotropia. When the leading eye was turned off, it deviated in the opposite direction: in 52 patients - downwards, in 24 - upwards. The magnitude of the angles of vertical deviation in the primary gaze position in 63 children was 10-12°, in 13 children the eyes deviated vertically by 15°. In the position of bringing the superior eye, the vertical deviation increased to 20-25° in 49 children.

All these children were divided into two groups. Group 1 consisted of 49 patients who were diagnosed with hyperfunction of the inferior oblique muscle in the superior eye. In all these children, hypertropia increased in the adduction position and when the head was tilted in the opposite direction. 12 children from this group had a forced head position.

Group 2 consisted of 27 patients in whom dissociated vertical strabismus was not accompanied by hyperfunction of the inferior oblique muscle. The reason for their vertical deviation was paresis of the superior rectus muscle of the inferior eye. Hyperfunction of the inferior rectus muscle developed compensatorily in the other eye. In 4 patients of this group, false ptosis of the upper eyelid of the inferior eye was noted.

Surgical treatment of strabismus consisted in correcting both the horizontal and vertical components of deviation. The following surgical procedures were performed:

1. Recession of the internal rectus muscle and resection of the external rectus muscle - to correct horizontal deviation. The amount of displacement and shortening of the muscles depended on the angle of deviation and was determined according to the scheme proposed by us (2).
2. Myectomy of the inferior oblique muscle. The operation was performed on the superior eye in the presence of signs of hyperfunction of this muscle (7).
3. Bivertical recession is a simultaneous recession of the muscles of vertical action - the upper rectus muscle in the superior eye and the lower rectus muscle in the inferior eye. The magnitude of recessions depended on the angle of deviation and was 4-5 mm.
4. Recession of the inferior rectus muscle and resection of the superior rectus muscle in the inferior eye. The values of recession and resection depended on the angle of deviation in the primary position of the gaze and amounted to 4-5 mm.

Results and discussion

In the surgical treatment of such a complex type of strabismus, it is not always possible to limit oneself to one operation. Nevertheless, we tried to minimize the number of operations for each child.

Strabismus correction has always started with a horizontal component. Despite the alternating nature of strabismus, recession of the internal rectus muscle and resection of the external rectus muscle were performed on the more often squinting or worse-seeing eye. We prefer this tactic of bilateral recession of the internal rectus muscles, as it allows us to more accurately dose the effect of the operation.

In the presence of hyperfunction of the inferior oblique muscle, its myectomy was performed. This operation was always performed simultaneously with the intervention on the muscles of horizontal action, which made it possible to reduce the total number of operations in this child. We prefer this technique over recession and anterior transposition of the inferior oblique muscle, since it is easy to perform, takes much less time with a similar, and sometimes better effect (3).

As a result of surgical treatment in the early postoperative period, the correct horizontal and vertical position of the eyes was achieved in 37 out of 49 children (75.5%), operated simultaneously on the horizontal action muscles and the inferior oblique muscle. 4 children retained a residual horizontal deviation of 10-15 degrees (before the operation, all had a strabismus angle of 25° or more). In 6 children of this group, the horizontal component of deviation was corrected, but the vertical deviation from 7 to 10° remained. This was due to the prevalence of paresis of the superior rectus muscle in the inferior eye as the root cause of dissociation. After 2-3 months, they underwent surgery on straight vertical motors.

Children of the 2nd group (27 people) underwent surgical treatment in two stages. The first step was to correct the horizontal deviation in a generally accepted way. The second operation, aimed at correcting vertical deviation, was performed after 2-3 months.

To correct vertical deviation, 12 children from this group underwent recession of the inferior rectus muscle and resection of the superior rectus muscle in the inferior eye. When analyzing the immediate results of the operation, it was found that the correct eye position was obtained in 7 out of 12 children. In the remaining 5 children, the operated inferior eye became the leading one, and when fixing objects with it, the supraverging deviation of the other eye was preserved. Another 2 children developed a similar condition in the late postoperative period 3-6 months after the intervention. Thus, more than half of these children had a hypo effect.

15 children from this group, as well as 6 children from group 1, whose vertical component did not completely correct after the first operation, underwent a bivertical recession. A total of 21 children were operated on in this way. In the early postoperative period, the correct eye position was achieved in all operated children. False ptosis was completely corrected in 3 children and decreased in 1 child.

The long-term follow-up period ranged from 1 to 5 years. All children in the postoperative period received courses of pleoptic and dipoptic treatment. None of the children developed secondary divergent strabismus in the long term. 6 children with a horizontal deviation angle of 20-25 ° showed a residual positive angle of 10-15°. All children with a residual angle of horizontal deviation

An operation was performed to recess the internal rectus muscle with resection of the external rectus muscle in the second, non-operated eye in the period from 6 months to 1.5 years after the first operation. In 3 children with severe paresis of the superior rectus muscle in the inferior eye, 1-3 months after two stages of surgical treatment, vertical deviation reappeared. It was a residual hypotropia of 7-10° in the inferior eye. These children underwent the third stage of surgical treatment: resection of the superior rectus muscle in the inferior eye. The size of the resection was 5 mm. As a result, hypotropia was completely eliminated in one child, in 2 it remained within 5 ° and manifested itself intermittently. During the entire observation period, not a single child developed a hypereffect of vertical deviation.

The hardware treatment carried out in the postoperative period made it possible to obtain simultaneous near vision in 18 children, simultaneous far vision in 23, binocular near vision in 11 children and binocular far vision in 7 patients. In total, it was possible to develop binocular functions of varying severity in 59 patients out of 76 (77.6%).

Conclusions: thus, dissociated vertical strabismus is a pathology of the oculomotor apparatus that is difficult to diagnose and treat. It is often combined with horizontal deviation and is accompanied by a forced head position and false ptosis of the upper eyelid. Surgical treatment of this pathology should always begin with the elimination of horizontal deviation. At the same time, it is advisable to simultaneously perform surgery on the rectus muscles of horizontal action to weaken the inferior oblique muscle with its hyperfunction. This often makes it possible to correct both horizontal and dissociated vertical deviation in one step. As an operation that weakens the lower oblique muscle, we recommend its myectomy. This operation is easy to perform, short in time and effective.

In the absence of hyperfunction of the inferior oblique muscle or insufficient effect of surgery to weaken it, vertical deviation can be effectively eliminated with the help of one-momentary bivertical recession of the rectus muscles of vertical action: the upper rectus muscle in the superior eye and the lower rectus muscle in the inferior eye. The bivalve recession proved to be more effective than the unilateral operation of the recession of the inferior rectus muscle with resection of the superior rectus muscle. As the third stage of eliminating dissociated vertical deviation, if the first two are insufficient, it is advisable to resect the weakened superior rectus muscle in the inferior eye. The size of the resection is 5 mm. Timely surgical treatment of the vertical component of strabismus makes it possible to achieve the correct eye position in most patients and create conditions for the formation of binocular visual functions.

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