

Causes, clinical picture and treatment of consecutive exotropia

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Introduction

Consecutive exotropia (CXT), an unpleasant condition that may occur as a complication of surgery for esotropia, or very rarely following optical treatment for esotropia, has been a matter of concern to the doctor, the patient and to the patient's family. The issue of the causes and treatment of CXT have been addressed more than once [1-5].

The purpose was to discover the causes of the disease in patients who underwent surgery for CXT at the Filatov Institute, and to define the treatment strategy.

Materials and Methods

We retrospectively analyzed the records of 14 patients (age, 6 years to 25 years) who sought medical aid at the Filatov Institute for CXT following surgery for esotropia. Patients underwent visual acuity assessment, refractometry, estimation of the strabismus angle in different gaze directions, binocular vision grading on the synoptophore, a four-dot test (using the TST-1 apparatus), biomicroscopy and ophthalmoscopy.

Results

Clinically, the disease demonstrated the following: Strabismus angle varied between 5 degrees and 60 degrees among patients. Six patients had normal ocular motility and 8 had adduction deficiency (one of them had microneystagmus in adduction). There was little or no convergence in 5 patients and 9 patients, respectively. Three patients had dissociated comitant vertical strabismus. Twelve patients had normal visual acuity (0.85-1.0 and better), whereas 2 had severe amblyopia. The four-dot test (using the TST-1 apparatus) found monocular vision in all patients. Synoptophore examination showed binocular fusion, anomalous retinal correspondence (ARC) and various functional scotoma types in 3, 3, and 8 patients, respectively. All 14 patients underwent surgery (the medial rectus muscles were inspected, advanced anteriorly and secured to the sclera, and, if necessary, muscle resection was performed). As a result, correct eye position was obtained in 11 patients, while a residual angle of 5-7 degrees was observed in 3; binocular vision, simultaneous vision or monocular vision was observed in 4, 6 and 4 patients, respectively.

Based on patient examination and thorough evaluation of history and of previous surgery records, the following causes and predisposing factors of CXT

were discovered: excessive recession of the medial rectus muscles in surgery for esotropia (a thorough initial inspection during surgery for CXT revealed that in 8 patients, medial rectus muscles were secured too far (7-10 mm) from the original site after recession); little or no convergence; presence of dissociated comitant vertical strabismus, functional scotoma or ARC, severe amblyopia, and ignoring the accommodative component in moderate or severe hyperopia.

Recommendations

Our observations allowed us to develop recommendations for the management of CXT.

Let us consider the main approaches to the management of consecutive exotropia depending on the angle of exotropia and on the nature of pre-CXT status.

First, let us consider patients previously diagnosed with non-accommodative esotropia and refraction close to emmetropia. In large-angle deviation (i.e., the angle of CXT > 10 degrees), we usually recommend to perform surgical treatment (the medial rectus muscles should be inspected, advanced anteriorly and secured to the sclera, and, if necessary, resection of one or both muscles should be performed) first. The amount of the required advancement is determined more accurately during the inspection. This surgery should be followed by orthoptic treatment, convergence exercises and ocular motility exercises. In small-angle deviation (i.e., the angle of CXT ≤ 10 degrees), we recommend trying orthoptic treatment aimed at normalization of ARC and development of fusional reserves; convergence exercises and ocular motility exercises for the improvement in adduction; exercises with biviozotener (with compensation of the angle of exotropia using base-in prisms); electrical stimulation of medial rectus muscles; and software programs for improvement in binocular and stereoscopic vision. If amblyopia is present, pleoptic treatment is used, and, when visual acuity is improved to 0.3-0.4, surgical and orthoptic treatment is used.

Second, let us consider patients previously diagnosed with partially accommodative comitant esotropia, moderate or severe hyperopia, and small-angle deviation. When CXT occurs following surgery, the lens power

should be reduced by 2.0 to 3.0 D, and in hyperopia of $\leq +3$ D, lens wear should be discontinued. In addition, the following therapy is recommended: orthoptic treatment with development of positive fusional reserves on the synoptophore (if functional scotomas or ARC are present, synoptophore treatment should be begun with “flashes” or “oscillations”); exercises with biviozotrenner (with compensation of the angle of exotropia using base-in prisms) and/or binatimetr (binocular vision training apparatus); electrical stimulation of medial rectus muscles; software programs for improvement in binocular and stereoscopic vision. If this therapy fails, surgical treatment (inspection of the medial rectus muscles with their advancement anteriorly) is performed; this is followed by orthoptic treatment.

In large-angle deviation (the angle of CXT > 10 degrees), surgical treatment (inspection of the medial rectus muscles with their advancement anteriorly) is performed which is followed by orthoptic treatment.

Third, let us consider patients previously diagnosed with accommodative comitant esotropia and moderate or severe hyperopia. It is noteworthy that CXT might occur in cases when the patient's visits to the ophthalmologist's office for observation are rarely made, and the right time to reduce the power of positive spherical lenses in a step-by-step manner has gone by, although it was necessary to do this because of a natural reduction in hyperopia with age. If CXT occurs, the lens power should be reduced by 2.0 to 3.0 D, and in hyperopia of $\leq +3$ D, lens wear should be discontinued. Orthoptic treatment should involve the techniques aimed at the development of positive fusional reserves

and dissociation of accommodation and convergence; exercises with biviozotrenner (with compensation of the angle of exotropia using base-in prisms) and binatimetr; electrical stimulation of medial rectus muscles; convergence exercises and ocular motility exercises for the improvement in adduction; software programs for improvement in binocular and stereoscopic vision.

Fourth, in CXT exotropia with diplopia, prismatic correction is determined (base-in prisms are used, and, if a vertical strabismus component is present, the direction of the base is corrected accordingly by the optometrist). It must be borne in mind that in exotropia, the deviation should be only partially ($1/2$ or $1/3$), rather than completely, compensated for. To prevent a secondary increase in strabismus angle, patients must be tested for tolerance with the intended correction in place. If prism therapy fails, surgical treatment is performed; this is followed by orthoptic treatment.

Alternate occlusion is sometimes effective in reducing the exotropia provided that ocular motility is normal, that is, the exotropia is not caused by excessive recession of the medial rectus muscles [3]. This approach has been tried with some success by Noorden, Campos [3]. Those authors note that as a rule, consecutive exotropia CXT decreases with time, and should reoperation become necessary they prefer to wait at least 6 months before proceeding with it.

Conclusion

Knowledge of the causes of consecutive exotropia and thorough examination of patients with strabismus are essential for proper management.

References

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