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Acute Acquired Concomitant Esotropia From Excessive Application of Near Vision During the COVID-19 Lockdown

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ABSTRACT

The public health measures imposed in many countries to slow the spread of the novel coronavirus (COVID-19) outbreak could have negative effects on children's physical and mental health. The authors describe four cases of acquired concomitant acute esotropia likely caused from excessive application of near vision during the COVID-19 lockdown. **[*J Pediatr Ophthalmol Strabismus*. 2020;57:e88-e91.]**

INTRODUCTION

Although the novel coronavirus (COVID-19) continues to spread across the globe, many countries have instituted a range of public health measures to slow transmission and ease the burden on health care systems. Among these measures, school closures are affecting approximately 70% of the world's student population.[1] Although these measures are necessary to deal with the outbreak, there are concerns that they might have negative effects on children's health, including weight gain, sleep disruption, and psychosocial stress.[2] Moreover, insufficient time spent outdoors and excessive near work might be associated with an increased risk of myopia.[3,4]

Acute acquired concomitant esotropia is a relatively rare form of strabismus characterized by a sudden onset of concomitant esotropia with diplopia. The cause of acute acquired concomitant esotropia seems to be related with an inability to maintain balance between the converging and diverging forces of the eye, particularly in patients with uncorrected myopia or after physical or psychological stress.[5] Recently, acute acquired concomitant esotropia has been associated with excessive application of near vision due to the widespread use of computers, tablets, and smartphones.[6,7]

We describe four young patients who developed acute acquired concomitant esotropia associated with excessive near work during the COVID-19 lockdown.

CASE REPORTS

Case 1

A 4-year-old girl presented to the Eye Clinic of the Policlinico San Martino (Genoa, Italy) with acute onset of diplopia. Two days before presentation, her parents noted crossed eyes when she woke up. She had no history of recent infections or physical or psychological stress. In the past 2 months, she used a tablet approximately 8 hours a day. Her best

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Figure 1. Composite nine-gaze photograph of type 2 acute acquired concomitant esotropia in a 16-year-old boy (case 2). The patient showed manifest esotropia of 30 prism diopters in all positions of gaze and normal ocular version and duction.

corrected visual acuity (BCVA) was 20/25 in both eyes. Stereopsis was not detectable by the Lang test. Manifest esotropia was 35 prism diopters (PD) at both far and near distances in all positions of gaze. The cycloplegic refraction was +2.00 diopter sphere in both eyes. Ductions and versions were full, with no apparent inferior oblique overreaction or alphabet pattern. Neurologic evaluation and brain magnetic resonance imaging (MRI) under sedation were unremarkable and a diagnosis of acute acquired concomitant esotropia was reached. Wearing glasses with a refraction of +1.50 diopter sphere full time was prescribed, although other treatment options such as prisms, strabismus surgery, or botulin toxin injection were discussed.

Case 2

A 16-year-old boy presented to the Eye Clinic of the Policlinico San Martino (Genoa, Italy) with acute onset of diplopia. He had no history of recent infections or physical or psychological stress. The patient reported an intense use of the computer for more than 8 hours a day. He had worn glasses for myopia since he was a child. His BCVA was 20/20 in both eyes. Stereopsis was normal on the Lang test. On alternate cover test, the manifest esotropia was 30 PD at both far and near distances in all positions of gaze (**Figure 1**). Ductions and versions were full, with no pattern strabismus. Bagolini striated glasses excluded the presence of monofixation syndrome. The cycloplegic refraction was -2.50 diopter sphere in the right

eye and -2.25 diopter sphere in the left eye. Neurologic evaluation and MRI, performed in the emergency department, were normal. He was diagnosed as having acute acquired concomitant esotropia, Fresnel prisms were prescribed as a temporizing measure, and the possibility of symmetrical medial recti recession or botulinum toxin was discussed.

Case 3

A 16-year-old boy presented to the IRCCS Fondazione Bietti (Rome, Italy) with acute diplopia for the past 2 days. His current glasses prescription was -0.50 diopter sphere in both eyes. The patient reported intense computer use for more than 10 hours per day. On examination, his BCVA was 20/20 in both eyes. Stereopsis was normal on the TNO test. The deviation angle of esotropia was 20 PD at both far and near distances. Ductions and versions were full with no pattern strabismus. Bagolini striated glasses evaluation was normal. The cycloplegic refraction was -0.50 diopter sphere in both eyes. Neurologic examination and neuroimaging showed no alterations. He was diagnosed as having acute acquired concomitant esotropia and Fresnel prisms were prescribed as a temporizing measure.

Case 4

An 8-year-old girl presented to the Ophthalmology Department of the Policlinico Mater Domini (Catanzaro, Italy), reporting the acute onset of diplopia 10 days before. The patient's parents reported the use of a tablet for a minimum of 8 hours a day since the introduction of homeschooling. After the onset of diplopia, the patient discontinued the use of devices and experienced an improvement in symptoms during the next days. The examination of a photograph taken at the onset of diplopia revealed a deviation of at least 40 PD. On examination, she had a BCVA of 20/20 in both eyes. Stereopsis was normal on the TNO test. Ductions and versions were full with no signs of incomitance. Manifest esotropia was 25 PD at both far and near distances. The cycloplegic refraction was +1.00 diopter sphere bilaterally. Neurologic evaluation was unremarkable and brainstem MRI yielded a negative response. She was diagnosed as having acute acquired concomitant esotropia and was advised to severely limit computer and tablet use.

DISCUSSION

We described four cases of acute acquired concomitant esotropia that occurred during the COVID-19 national lockdown in Italy. Acute acquired concomitant esotropia is reported to occur typically in patients with unilateral vision loss (Swan type), mild hyperopia (in association with physical or psychological stress [Franceschetti type]), or uncorrected myopia (Bielschowsky type). However, in our patients, the traditional classification of acute acquired concomitant esotropia shows some limitations. In fact, both myopic patients (cases 2 and 3) wore glasses willingly, and the other two patients (cases 1 and 4) presented mild hyperopia but had no history of physical or psychological stress. Interestingly, all patients spent 8 to 10 hours a day using computers, tablets, and smartphones to play, access school lessons, and navigate social networks.

Some authors have emphasized that acute acquired concomitant esotropia can be associated with intracranial disease.[8] Nevertheless, in all cases herein presented, neurologic examination and neuroimaging were unremarkable, and no ophthalmological signs related with neurologic involvement were observed.[9]

Although the etiology of acute acquired concomitant esotropia is still debated, it has been associated with sustained nearpoint demands due to the excessive use of computers, tablets, and smartphones.[7] In particular, Lee et al[7] documented a series of 12 teenagers with acute acquired concomitant esotropia who used smartphones more than 4 hours a day. The authors speculated that excessive smartphone use could lead to accommodation and vergence abnormalities, resulting in dynamic activation of the medial rectus muscles and thus in the development of manifest esotropia. Interestingly, the esodeviation improved in all patients after refraining from smartphone use for 1 month. Nevertheless, strabismus surgery was required in 5 patients with good postoperative outcomes in terms of ocular alignment and stereoacuity.[7]

Because our cases are recent, no follow-up visits to assess the course of ocular deviation over time are available. This issue represents the main limitation of the present case series.

Prolonged school closure and home confinement during the current COVID-19 lockdown are associated with important lifestyle behavior changes, including a significant increase in screen time.[10] Recent reports highlighted the risk for an increase of myopia burden owing to these new habits.[3,4] However, the excessive application of near vision might have other detrimental consequences, including the

development of acute acquired concomitant esotropia. Reducing the number of total hours of screen time and the number of consecutive minutes/hours without visual breaks, should be recommended to prevent acute acquired concomitant esotropia. Furthermore, in the lockdown era, the use of widescreen images displayed within high definition television might extend the distance of vision and prevent the onset of acute acquired concomitant esotropia.

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