

Acute acquired esotropia during the COVID-19 pandemic: four case reports

YH Lau^{1,2}, MB, ChB, Emily WH Tang^{1,2}, FCOphth (HK), FHKAM (Ophthalmology),
Tracy HT Lai^{1,2}, FCOphth (HK), FHKAM (Ophthalmology), Kenneth KW Li^{1,2}*, FRCOphth, FHKAM (Ophthalmology)

¹ Department of Ophthalmology, United Christian Hospital and Tseung Kwan O Hospital, Hong Kong SAR, China

² Department of Ophthalmology, School of Clinical Medicine, Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong SAR, China

* Corresponding author: lkw856@ha.org.hk

This article was published on 3 Apr 2023 at www.hkmj.org.

Hong Kong Med J 2023;29:165–7
<https://doi.org/10.12809/hkmj219856>

Case reports

The coronavirus disease 2019 (COVID-19) pandemic started in 2020. To reduce transmission of the virus, many schools suspended face-to-face teaching and moved to online classes. Nonetheless online teaching impacted the health of children, for example weight gain, disruption of sleep cycle, and psychosocial stress.¹ As ophthalmologists, we are particularly concerned about insufficient outdoor exposure and increased screen time since they are known to be associated with the development of myopia.² In addition to myopia, there have been reports worldwide of acute acquired esotropia cases as a result of excessive use of electronic devices.³

A recent study reported a 3.11% prevalence of strabismus among children in Hong Kong,⁴ higher than that in other Asian countries including Singapore and Korea. Acute acquired esotropia is a rarer type of convergent squint. It is thought to be related to an inability to maintain balance between converging and diverging forces of the eyes, and patients with underlying uncorrected refractive error or psychosocial stress are more prone to developing acquired esotropia. This article describes four patients in Hong Kong who developed acute acquired esotropia as a result of excessive screen time during the COVID-19 pandemic.

Case 1

A 10-year-old girl presented to our clinic with a history of new-onset comitant convergent squint since September 2020. Old photos taken before the COVID-19 pandemic showed straight eyes. The patient reported excessive smartphone use (continuously for around 8 hours per day) since the commencement of online classes in 2020. She had non-accommodative left eye esotropia of 35 prism dioptres (PD) at 1/3 m and 45 PD at 6 m on prism cover test. Worth's 4-dot test revealed left eye suppression. Cycloplegic refraction revealed hyperopia of +1.00 and +1.75 dioptres in the right and left eye, respectively. Extraocular movements were full for both eyes. Magnetic resonance imaging

of the brain was unremarkable. The provisional diagnosis was acute acquired esotropia. The patient refused to stop using her phone and the condition did not resolve with conservative management. In mid-August 2021, 11 months after onset of esotropia, 5.5 to 6 mm bilateral medial rectus recession via a forniceal approach was performed under general anaesthesia. There was straight alignment 9 months postoperatively (Fig 1). The patient was advised to limit time spent on electronic devices to prevent recurrence of esotropia.

Case 2

A 12-year-old boy with previously straight eyes presented with a history of new-onset comitant convergent squint with horizontal diplopia since early 2021. He reported unrestrained and excessive tablet use (8 hours per day) since commencement of the pandemic. The duration of e-learning had doubled (to 4-5 hours) since 2020. The esotropic deviation angle was 50 PD at both 1/3 m and 6 m on prism cover test with glasses. Cycloplegic refraction in July 2021 revealed myopia of -4.25 dioptres in both eyes. Extraocular movements were full for both eyes. Magnetic resonance imaging of the brain was unremarkable. Acute acquired esotropia was diagnosed. Following discussion of treatment options, the parents opted for conservative management and agreed to reduce their son's screen time.

Case 3

An 8-year-old boy presented with new-onset comitant convergent squint with horizontal diplopia since early 2021. The patient reported unrestrained and excessive tablet use (around 7 hours per day) since the start of the pandemic, with 3 hours spent on e-learning classes. Cycloplegic refraction revealed hyperopia of +1.00 and +1.75 dioptres in the right and left eye, respectively. There was fully accommodative left esotropia of 50 PD at 1/3 m and slight left esotropia 6 m without glasses and straight alignment with glasses. Magnetic resonance imaging of the brain showed an incidental finding of a 0.4-cm



FIG 1. (a) Self-taken photo by the patient in case 1 before operation showed right esotropia around 30 to 35 prism dioptres with glasses. (b) Straight alignment on day 2 after operation

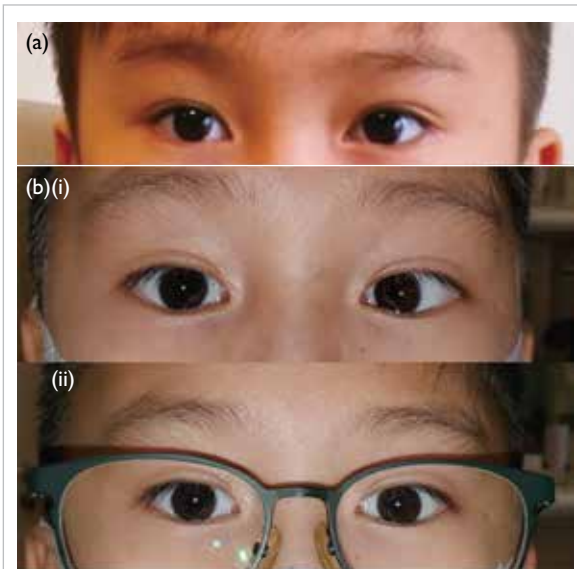


FIG 2. (a) Photo provided by parents of the patient in case 3 showing straight alignment before coronavirus disease 2019. (b) Photos taken at clinic showing (i) new-onset acute acquired accommodative left esotropia at 50 prism dioptres without spectacles and (ii) straight alignment with spectacle correction

enhancing focus over the right side of the anterior pituitary gland, unlikely to be related to the acute esotropia. Acute acquired accommodative esotropia was diagnosed (Fig 2).

Case 4

A 17-year-old girl with previously straight alignment presented with new-onset comitant convergent squint causing intermittent diplopia around the beginning of the COVID-19 outbreak. She reported excessive smartphone use over the last 2 years for

around 9 to 10 hours per day with no breaks. On commencement of online teaching, she claimed to spend 9 hours every day on online classes. She had non-accommodative left eye esotropia at 30 PD at both 1/3 m and 6 m upon prism cover test. Subjective cycloplegic refraction revealed mild myopia of -1.75 and -1.5 dioptres in the right and left eye, respectively. Magnetic resonance imaging of the brain was unremarkable. The provisional diagnosis was acute acquired esotropia. Bilateral medial rectus recession (right eye: 5.5 mm, left eye: 6 mm) via a forniceal approach was performed under general anaesthesia. At 6 months postoperatively, the angle of deviation with glasses was 12 PD esophoria at 1/3 m and 8 PD esophoria at 6 m.

Discussion

We report four cases of acute acquired concomitant esotropia with onset or which demonstrated worsening development during the COVID-19 pandemic. All cases were associated with excessive use of an electronic device corresponding to an increased amount of time spent on e-learning. Similar to previous case reports, the surgical outcome of this condition was good. We believe the prognosis should be good due to the previously established binocularity and stereopsis in the premorbid state and if the patient can comply with the need to restrict screen time.

Lee et al⁵ proposed that acute acquired esotropia may be precipitated by excessive near work activity. Our cases all spent prolonged time looking at a screen since the implementation of online classes due to COVID-19 lockdown. The diagnosis of acute acquired concomitant esotropia is one of exclusion. Cycloplegic refraction is required to exclude any accommodative element due to refractive error. Comprehensive neurological examination and imaging is necessary to rule out any organic cause. Magnetic resonance imaging is preferred due to its higher resolution for soft tissue and lack of radiation. Surgical treatment is bilateral medial rectus recession, titrated according to a table of surgical numbers derived from Parks' book⁶ that lists how many mm of recession should be done for different angles of deviation. It has been proposed that the demand for longer durations of sustained near viewing, ie, screen time, has increased the risk of developing acute acquired esotropia. Several studies worldwide have reported similar cases.^{1,3} Nonetheless it appears that complete abstinence with no screen time is not feasible among children in Hong Kong as most parents in Hong Kong are working, which makes monitoring the use of electronic devices at home difficult. Most schools in Hong Kong now adopt blended online with face-to-face teaching, even after the relaxation of lockdown measures, to lower the infection risk for

both teachers and students. As per the limitations of all case reports, we are unable to obtain data for a control group since e-learning for children in Hong Kong is unavoidable.

To conclude, it is inevitable that Hong Kong children will be exposed to excessive electronic device usage during the worldwide pandemic, predisposing them to esotropia. Setting a limit on screen time, taking intermittent eye breaks, and using a larger screen with high resolution and consequent longer reading distance should be considered as preventive measures.

Author contributions

Concept or design: EWH Tang.

Acquisition of data: YH Lau, EWH Tang, THT Lai.

Analysis or interpretation of data: YH Lau, EWH Tang, THT Lai.

Drafting of the manuscript: YH Lau, EWH Tang, THT Lai.

Critical revision of the manuscript for important intellectual content: All authors.

All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of interest

As an editor of the journal, KKW Li was not involved in the peer review process. Other authors have disclosed no conflicts of interest.

Funding/support

This study received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Ethics approval

All patients were treated in accordance with the Declaration of Helsinki. All patients and/or their parent/guardian provided informed consent for all procedures and for publication.

References

1. Vagge A, Giannaccare G, Scarinci F, et al. Acute acquired concomitant esotropia from excessive application of near vision during the COVID-19 lockdown. *J Pediatr Ophthalmol Strabismus* 2020;57:e88-91.
2. Zhang X, Cheung SS, Chan HN, et al. Myopia incidence and lifestyle changes among school children during the COVID-19 pandemic: a population-based prospective study. *Br J Ophthalmol* 2022;106:1772-8.
3. Mohan A, Sen P, Mujumdar D, Shah C, Jain E. Series of cases of acute acquired comitant esotropia in children associated with excessive online classes on smartphone during COVID-19 pandemic; digital eye strain among kids (DESK) study-3. *Strabismus* 2021;29:163-7.
4. Zhang XJ, Lau YH, Wang YM, et al. Prevalence of strabismus and its risk factors among school aged children: The Hong Kong Children Eye Study. *Sci Rep* 2021;11:13820.
5. Lee HS, Park SW, Heo H. Acute acquired comitant esotropia related to excessive smartphone use. *BMC Ophthalmol* 2016;16:37.
6. Parks MM. Atlas of strabismus surgery. Philadelphia (PA): Harper and Row Publishing; 1983.