CASE REPORTS

Diplopia after Excessive Smart Phone Usage

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ABSTRACT

Acute comitant esotropia in a child has a mixed set of differentials and we present a report of three cases in children who presented with acute onset diplopia. On careful history taking, all the kids reported an excessive use of the smart phone in the preceding month. We hypothesise that excessive use of the smart phone at near leads to excessive stimulation of ciliary muscle, hence accommodative spasm in these children. This is the first case series to report an association of smart phones and accommodative spasm.

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Diplopia is one of the most common complaints in a patient presenting to a neuro-ophthalmologist. Diplopia may often harbour a serious vision or life-threatening neurologic disease, and its correct localization and diagnosis are therefore essential. Hence, we often subject the patients to extensive imaging and investigations in the setting of an acute diplopia. Acute comitant esotropia in children has a mixed set of differentials and we present a report of three cases in children who presented with acute onset diplopia.

Three patients presented with diplopia and blurred vision for near in the pediatric ophthalmology department of a tertiary health centre (Table 1). Two children complained of transient inward deviation of eye (Figure 1). Visual acuity ranged from 20/100 to 20/40. Cover test revealed a small degree of esotropia in these patients. Extraocular movements were full in all cases. Fundus examination was normal in all cases.

There was no history of head trauma, fever, neurological illness, previous such episodes, migraines/headaches, history of glasses, or patching in any of the cases. A dry refraction by an autorefractor revealed a large myopic error in all cases (Range -4.5 D to -8.5 D) in both eyes. A cycloplegic refraction, however, revealed a small hyperopia in all cases. A clinical diagnosis of accommodative spasm was made. Scheimpflug imaging of the anterior segment of the eye was done which documented movement of the anterior as well as posterior

surface of the lens confirming our diagnosis. All the patients underwent a detailed Gadolinium-enhanced MRI of the brain and optic nerves which came out to be normal. Routine investigations (Hemogram, renal function, liver function tests, ESR, CRP, Chest X Ray) were carried out in all patients to rule out any evidence of infection or inflammatory disorder. However, since we were sure of spasm in these patients we did not investigate them further. Family history suggestive of migraine was not present in any of the patients included in this series. Moreover, the extraocular movements were full and hence ophthalmoplegic migraine was ruled out.

On eliciting history further, we determined two children (case 1 and 2) had a summer break at school and reported an excessive use of smart phone in the preceding month (>4 h per day). The smart phone usage was discouraged, and patients were started on cyclopentolate drops 1% twice daily for 2 weeks. At the first follow-up, both the patients were recovering and hence were kept under follow-up on the same medication. When symptoms subsided, the drops were tapered and then finally stopped. In addition, we gave them photochromatic glasses for outdoor use and prohibited the use of smart phone. For the third patient who had symptoms only for 1 week; based on our experience of the above cases, we just discouraged the use of smart phone and gave

Table 1. Details of the cases and clinical findings along with the course of disease.

	Age (years)/ Gender	Chief complaint	Duration of symptoms (days)	Duration of excessive smart phone use	Presenting visual acuity	Pupil	Auto refractor	Cycloplegic refraction	Biometry OD/OS	Time to recovery
Case 1	12/M	Diplopia	15	One month	OD 20/40 OS 20/40	Miosed; small anisocoria (Figure 2)	OD -7 OS -8	OD + 0.25 D/ 0.5 DC*95 20/20P OS + 0.25 D/ 0.5 DC*95 20/20P	AI - 23.49 K -43.25 ACD - 3.4 LT - 3.77 AI - 23.39 K -43.28 ACD - 3.41 LT - 3.81	8 weeks
Case 2	8/M	Diplopia, inward deviation 10 PD	20	One month	OD 20/100 OS 20/80	Miosed	OD -4.5 OS -8.5	OD + 1.5 D 20/40 OS + 1.5 D 20/60	AI - 23.49 K - 41.8 ACD - 3.2 LT - 3.6 AI - 23.49 K - 42.2 ACD - 3.2 LT - 3.58	6 weeks
Case 3	10/M	Diplopia, inward deviation 15 PD	21	One week	OD 20/100 OS 20/100	Miosed	OD -3.5 D OS -5 D	OD + 0.5 D 20/100 OS + 0.5 D 20/100	AI - 23.49 K ACD LT AI - 23.49 K ACD LT	3 weeks

Notes. M = Male; ACD = Anterior Chamber Depth; AL = Axial Length; K = Keratometry; LT = Lens Thickness

Figure 1. Gross image of case 2 presented with a 1-month history of diplopia. On examination has a small esotropia (as noted in the figure in right eye).

placebo drops. At the first-week follow-up, symptoms were already decreasing and hence no cycloplegics were prescribed. All three patients recovered in a period ranging from 3 to 8 weeks.

Patients are symptom free at a final follow-up of 6 months.

Accommodative spasm is a relatively rare entity resulting from over stimulation of the parasympathetic nervous system. When combined with miosis, it is termed as spasm of the near reflex.^{1,2} In most cases the etiology is thought to be functional.^{1,2} The major symptoms include sudden onset of blurred vision because of apparent myopic refractive error (pseudomyopia), diplopia, limited ocular motility, ocular pain, and photophobia. Management includes inhibiting the excessive accommodation and excessive convergence using strong cycloplegic agents and/or plus lenses.² Due to reports of recurrence after treatment, gradual tapering of cycloplegics is warranted.³ In our series also, we prescribed cycloplegics in all the patients and the symptoms decreased over a period of 3–6 weeks. The improvement in all patients with cycloplegics strengthened the possibility of accommodation spasm. However, in our series, we blame the use of smart phones as the culprit behind the

Figure 2. Nine gaze picture of case 1 with full extraocular movements. Note the small anisocoria.

accommodative spasm. This is because of a positive and reliable history of cell phone usage and the third patient getting relieved of symptoms without medication.

Smart phone usage in these days is a representative of near work. It is unquestionable that our cell phone dependence is increasing day by day. In addition, parental use of smart phones influences the use of smart phones in children.⁴ Nearly one-fourth of the young population is a cell phone addict.⁵ Previous reports of acute concomitant esotropia after smart phone usage have been reported.⁶ In a technology-filled world of ours, “screenagers” should often be warned about the development of this symptom. For children, it is often necessary to ameliorate diplopia as it effects their near work and if persistent for a long time; it may develop sensory adaptations in the form of amblyopia. Accommodative spasm has been attributed to excessive action of the ciliary muscle. Excessive use of the smart phone at near invariably leads to excessive stimulation of ciliary muscle, hence spasm. Smart phones have been a questionable reason of increasing myopia in the South Asian population.⁷ We hypothesize that in a similar mechanism, overaccommodation while doing excessive near work in the form of cell phone usage leads to spasm in these patients. Perhaps genetic, ethnic, environmental, and behavioural risk factors also play an important role in these patients predisposing them to spasm when nearly every child in this era is a cell phone addict.

To paediatric ophthalmologists, parents always question the usefulness vs the demerits of smart

phones and we often lack literature to answer this. Through our series, we emphasise the use of smart phones as a plausible cause of ciliary muscle stimulation and hence accommodative spasm. There is a need to establish a direct causal relationship between smart phone usage and development of spasm, as well as the temporal associations must be reproduced and studied in larger number of patients. Nevertheless, in the present era, our history taking in such patients should be modified to question and include smart phone usage. Till we negate the effects of the smart phones on the eye; caution against their excessive use should be advocated especially in the paediatric age group.

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Declaration of interest

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